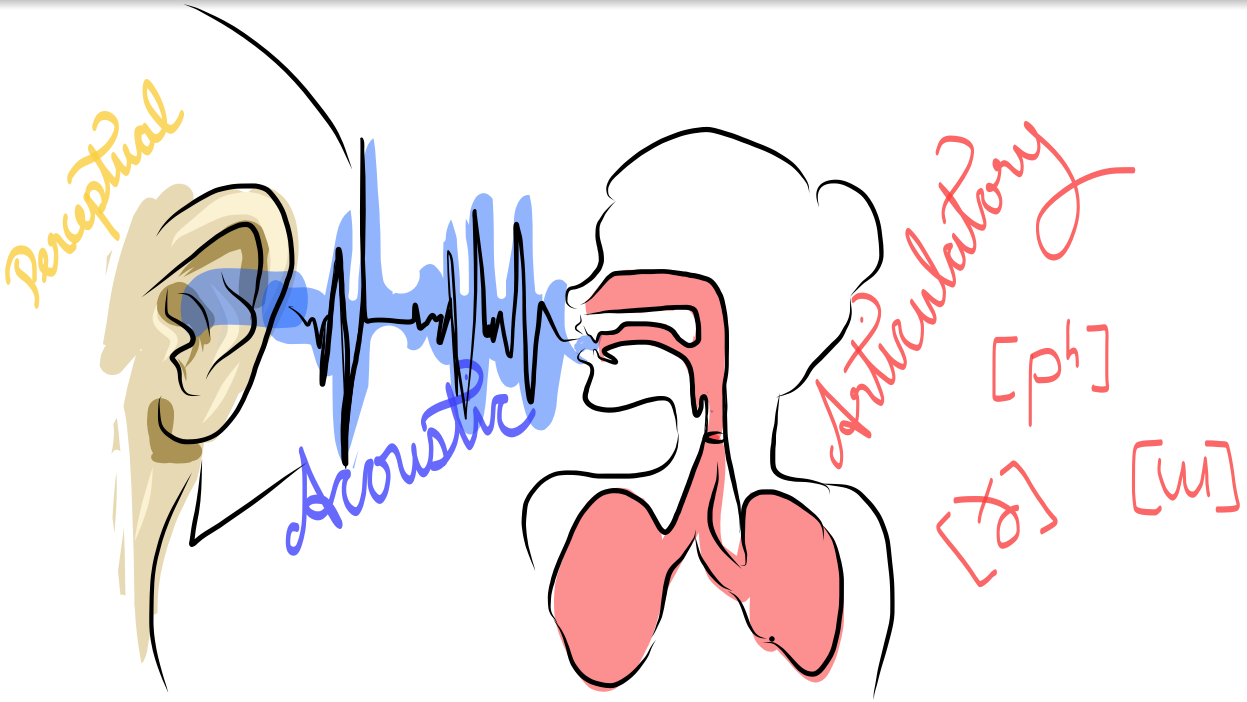

ELC 231: Introduction to Language and Linguistics

Introduction to Phonetics

Dr. Meagan Louie

Last Time: A language consists of

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(i) A structured collection of sounds — Phonetic Inventory

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- sound and meanings into $\langle sound, meaning \rangle$ pairs
- morphemes into words
- words into phrases and sentences
- simple morpheme meanings into complex meanings
- complex meanings with context

Core Subdomains

Linguistics: The study of Language

- Phonetics
- Phonology
- Morphology
- Syntax
- Semantics
- Pragmatics

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Core Subdomains: Phonetics

Phonetics: The study of speech sounds

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Phonology:

The study of the organization and patterning speech sounds

Core Subdomains: Phonetics

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1. Blackfoot (10 second clip) — Play CS-002.mp3
2. Thompson River Salish (15 second clip) — Play TS-001.mp3

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Phonetics: The study of speech sounds

- **Challenge:** Listen and try and transcribe the speech sounds (any way you can - your goal is to describe the speech sounds)

  1. Blackfoot (10 second clip) — Play CS-002.mp3
  2. Thompson River Salish (15 second clip) — Play TS-001.mp3

- Compare with the person sitting next to you
  - are your transcriptions the same?
- Did you have problems trying to transcribe the sounds? Why?

Puzzle: How can we represent speech sounds?

Option 1: With the Roman alphabet? eg., { a, b, c, d, e, f, ... }

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- **BUT:** Orthography (often) doesn't reflect speech sounds very well!
- One letter (eg. 'a') can correspond to a lot of different sounds

(1) a. m**a**n [mæn]

b. f**a**ther ['fɑðɜr]

c. h**a**y [h**ej**]

d. f**a**re [f**ɜ**r]

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(2) a. mar**i**time [ə]

b. c**o**nnect [ə]

c. circ**u**s [ə]

d. ph**y**sician [ə]

Puzzle: How can we represent speech sounds?

Option 1: With an alphabet for a language with more sounds?

- **BUT:** Orthography (often) doesn't reflect speech sounds very well!
- One sound (eg. [k^h]) can correspond to a lot of different letters

ข ฃ

ค ฅ

ฆ

Puzzle: How can we represent speech sounds?

Option 1: With an alphabet for a language with more sounds?

- **BUT:** Not all languages have the same sounds!

CONSONANTS	English	Thai	TR Salish	!Xhosa
Sonorant	7	7	16	16
Pulmonic Obstruent	17	14	18	22
Ejective Obstruent	0	0	8	7
Implosive Obstruent	0	0	0	1
Click Obstruent	0	0	0	18
TOTAL	**24**	**21**	**42**	**64**

Puzzle: How can we represent speech sounds? Ladefoged (2001)

Option 1: With some language's alphabet? ✗

Option 2: With the **International Phonetic Alphabet (IPA)**

- a transcription system that uses a 1:1 'sound-symbol' correspondence

The IPA categorizes consonants according to their articulatory properties:

1. Place of Articulation (bilabial, alveolar, pharyngeal, etc.)
2. Manner of Articulation (stop/plosive, fricative, glide, etc.)
3. Laryngeal Mechanism (voiced, voiceless, ejective, etc.)

Laryngeal Mechanism

Ladefoged (2001)

Speech sounds can be categorized according to their

LARYNGEAL MECHANISM

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Laryngeal Mechanism

Ladefoged (2001)

Speech sounds can be categorized according to their

LARYNGEAL MECHANISM

- Speech sounds are made by pushing air through your vocal tract
- For this course we'll only consider *egressive pulmonic* speech sounds

(i) **Air Source:** Lungs
(ii) **Air Direction:** Out

Making SPEECH SOUNDS

- Speech sounds are made by pushing air through your VOCAL TRACT
- With EGRESSIVE PULMONIC sounds,
  - The air comes up from your lungs

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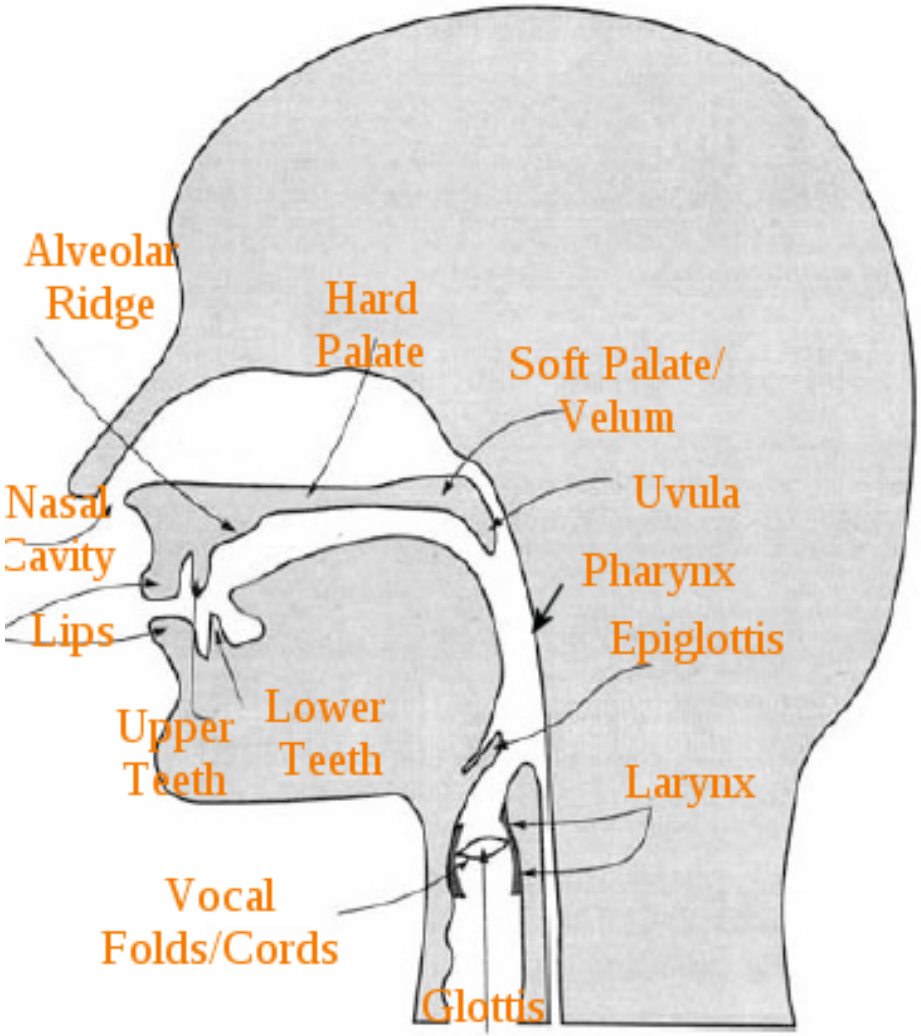
    (the space between your vocal folds/chords)

The Vocal Organs: Place of Articulation

Ladefoged (2001)



Laryngeal Mechanism: Pulmonic Egressive

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Speech sounds can be categorized according to

VOICING - i.e., whether the vocal folds are vibrating

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- **VOICED** (closed, vibrating vocal folds)

{ b, d, g, z, v, m, n, a, i , u, e, o, dʒ, ð, , ... }

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- **VOICELESS** (open vocal folds)

  { p, t, k, s, ʃ, f, tʃ, θ, ... }

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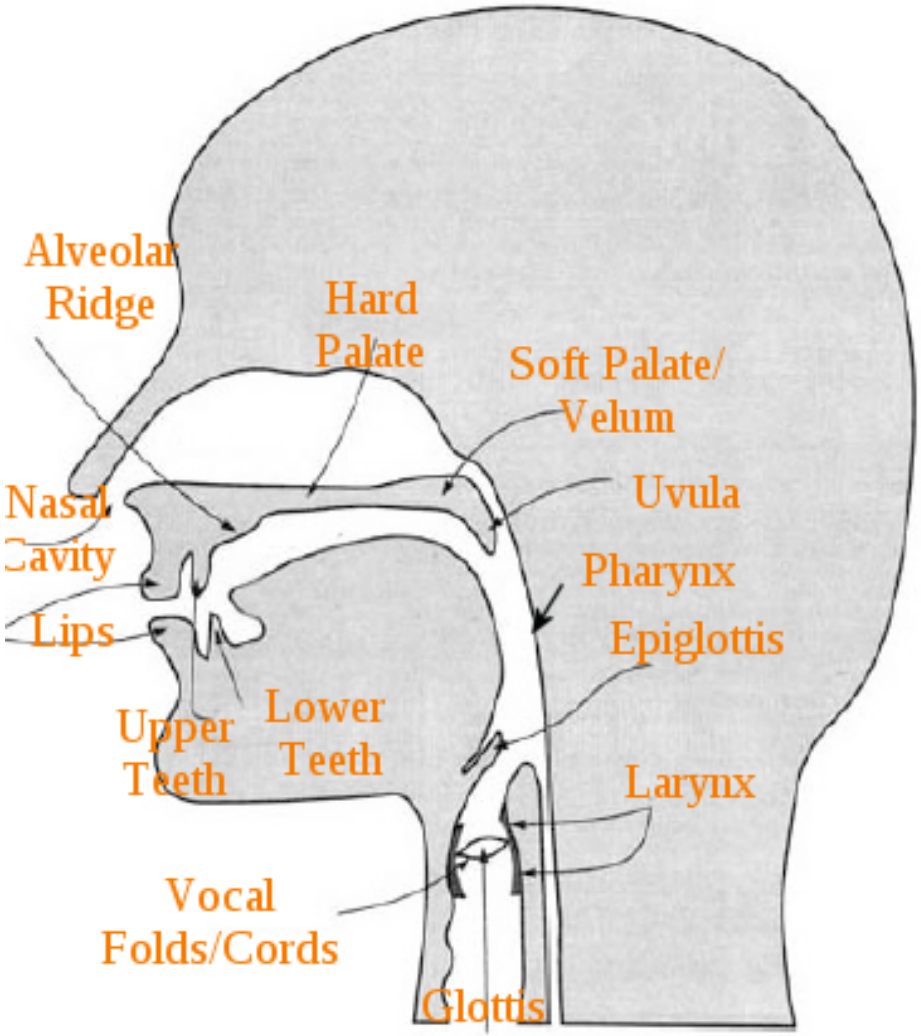

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- **ASPIRATED** (puff of air)

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- **ASPIRATED** (puff of air)

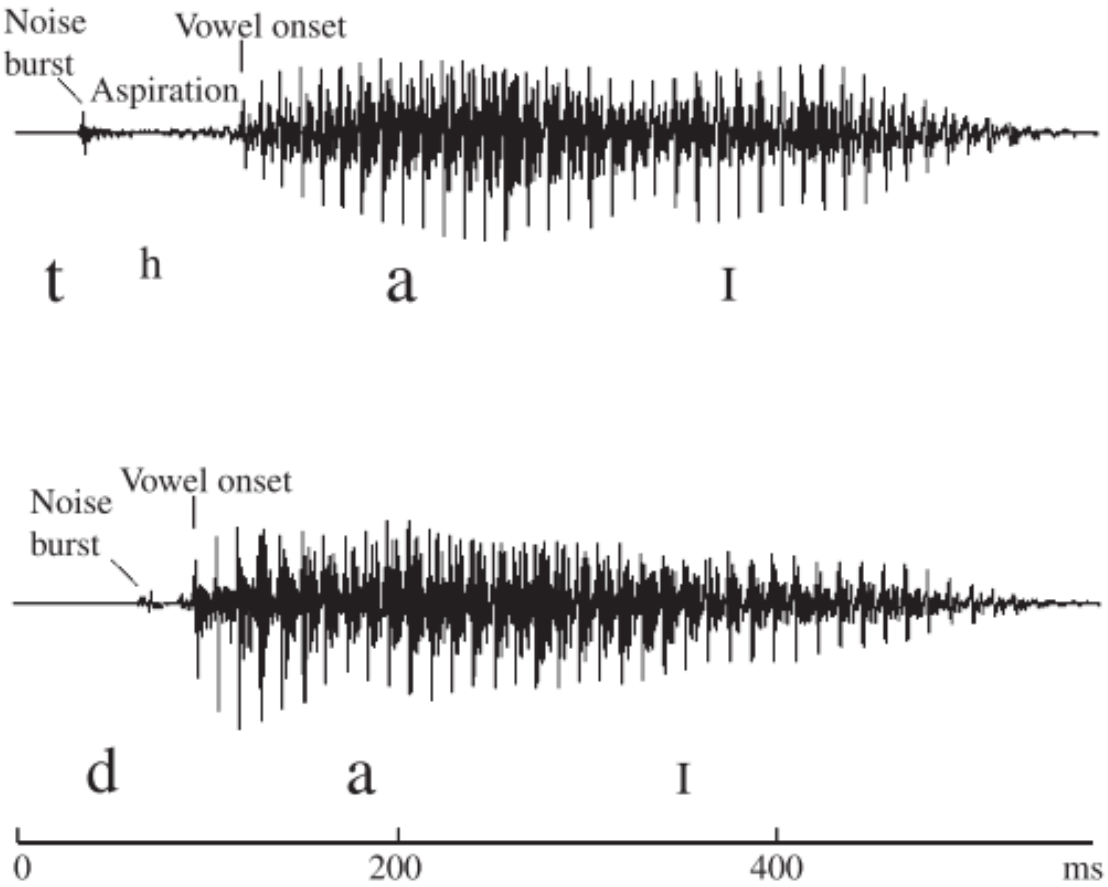
  { p^h, t^h, k^h }

- **UNASPIRATED** (no puff of air)

  { p, t, k }

Laryngeal Mechanism: Aspiration

Ladefoged & Johnson (2011)



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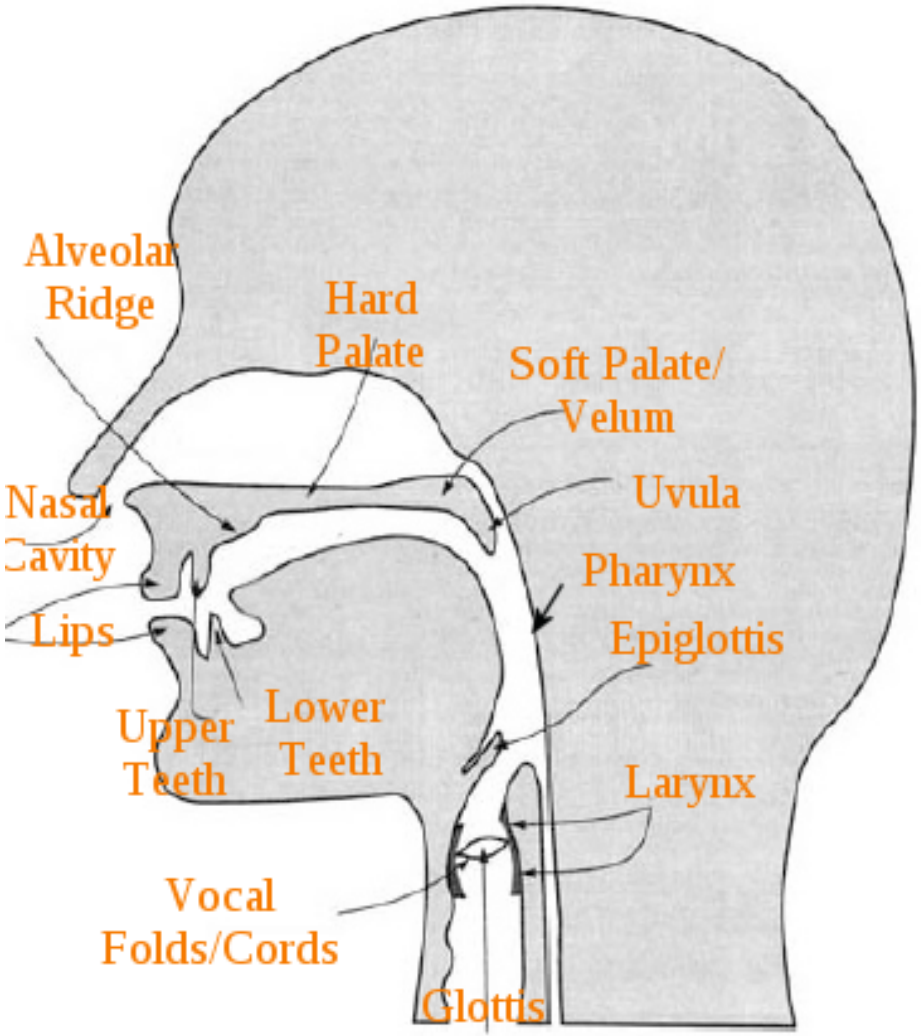
- Speech sounds are made by pushing air through your VOCAL TRACT,
  - The air comes up from your lungs
  - The air then goes through your GLOTTIS
    (the space between your vocal folds/chords)
  - The air then passes through the rest of your VOCAL TRACT
    (i.e., through your oral(-nasal) cavity)

The Vocal Organs: Place of Articulation

Ladefoged (2001)



Making SPEECH SOUNDS

- The air passes through through your oral(-nasal) cavity,
  - You can make CONSTRICTIONS at various points within your oral(-nasal) cavity
  - Different types of constrictions
    result in different types of speech sounds

Place of Articulation

Ladefoged (2001)

Speech sounds can be categorized according to their

PLACE OF ARTICULATION

- eg., according to the 'active articulator'

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(3) **DORSAL:** using the back of the tongue (k, g, q, ʕ)

Place of Articulation

Ladefoged & Johnson (2011)

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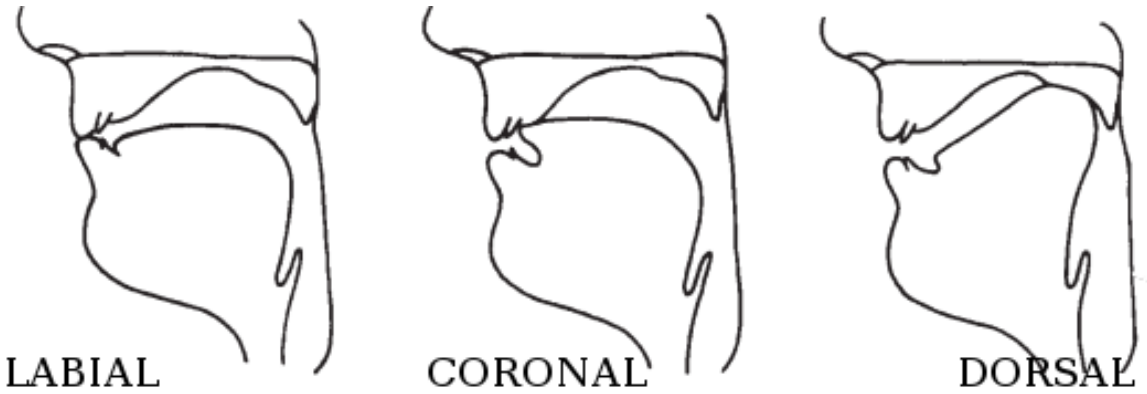

Place of Articulation

Ladefoged (2001)

PLACE OF ARTICULATION can further be categorized according to the 'passive articulator' (where the active articulator moves to)

LABIAL:	**CORONAL:**	**DORSAL:**
Bilabial (p, b, m)	Dental (θ, ð)	Palatal (j)
Labiodental (f, v)	Alveolar (t, d, n, s)	Velar (k, g, ŋ)
	Retroflex (ʈ, ɖ)	Uvular (q, ʀ, ʁ)
	Palato-Alveolar (ʃ, ʒ)	(Pharyngeal (ʕ))

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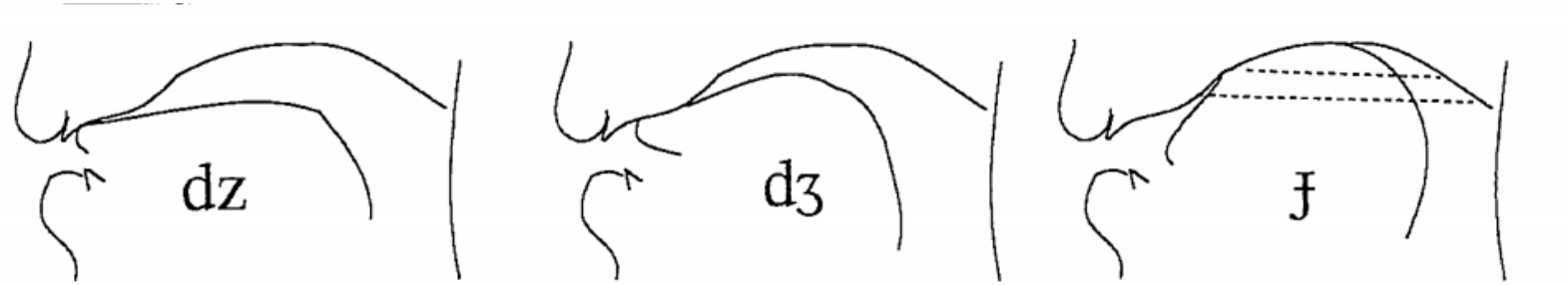
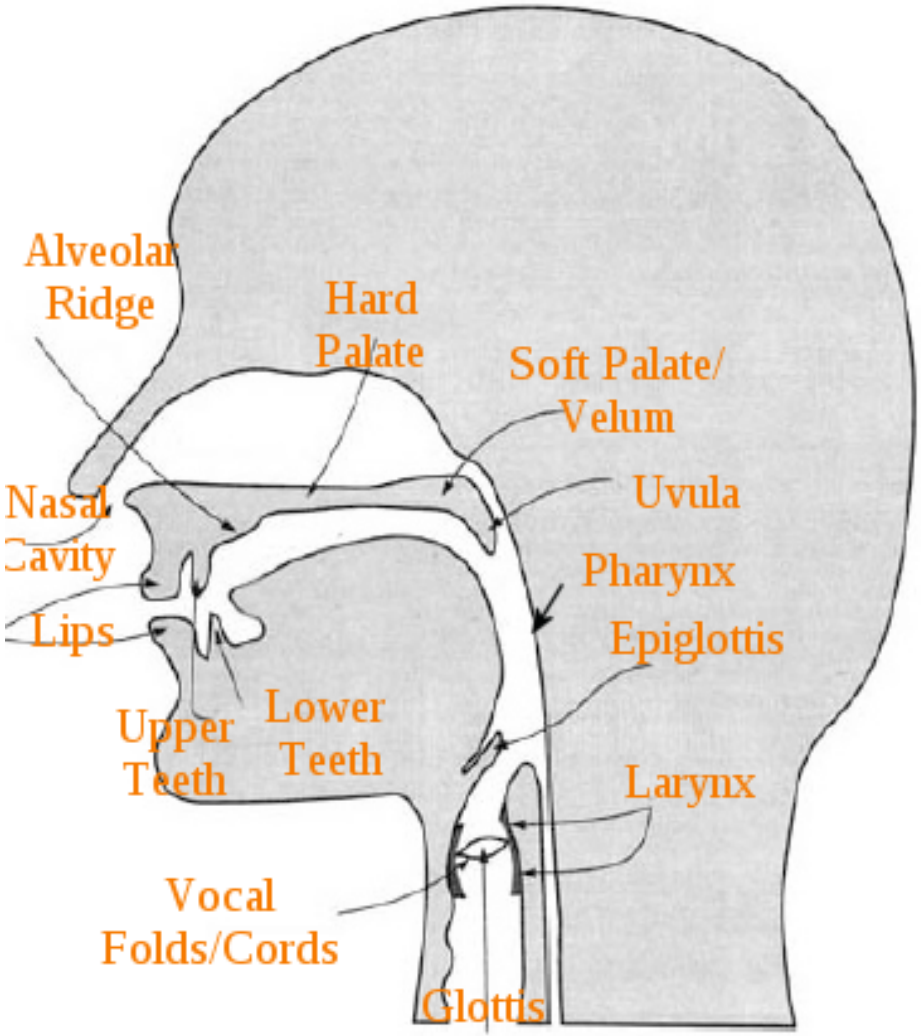


Articulatory positions of laminal denti-alveolar, laminal palatal-alveolar and palatal stops in Ngwo (From Ladefoged & Maddieson (1996))

The Vocal Organs: Place of Articulation

Ladefoged (2001)



Manner of Articulation

Ladefoged (2001)

Speech sounds can also be categorized according to

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(1) **STOP:** complete closure of articulators

- oral (nasal cavity blocked) { p, t, k }
- nasal (nasal cavity open) { m, n, ŋ }

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(4) **AFFRICATE:** stop with fricative release { t͡ʃ, d͡ʒ }

Manner of Articulation

Ladefoged (2001)

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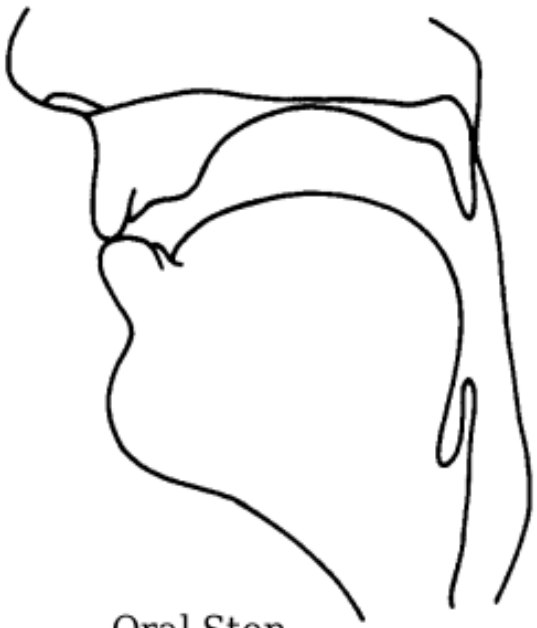
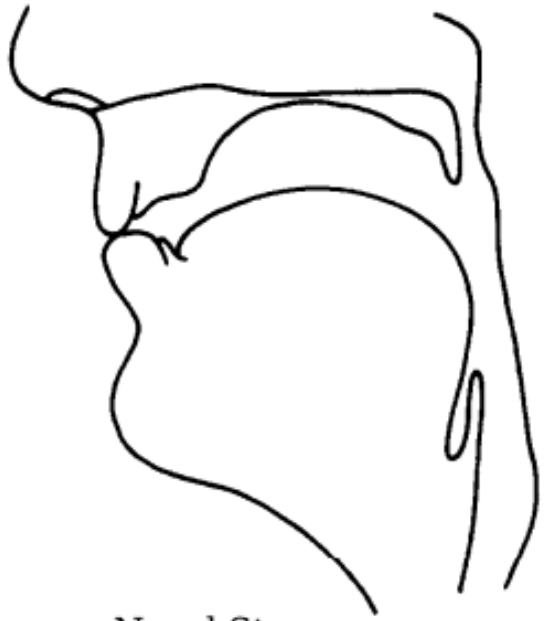


Oral Stop



Nasal Stop

Manner of Articulation

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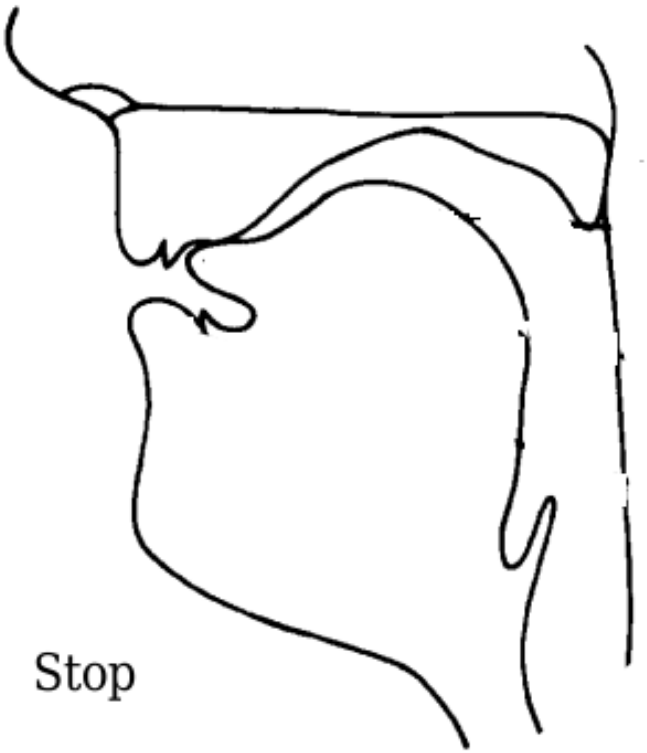
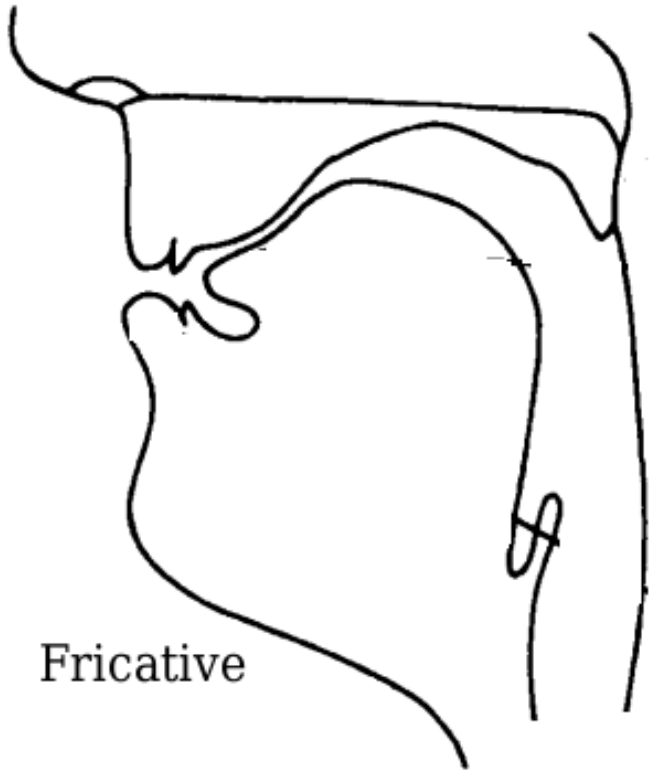
FRICATIVE: close approximation of articulators

(turbulent airstream) { s, z, θ, ð, f, v, ʃ }





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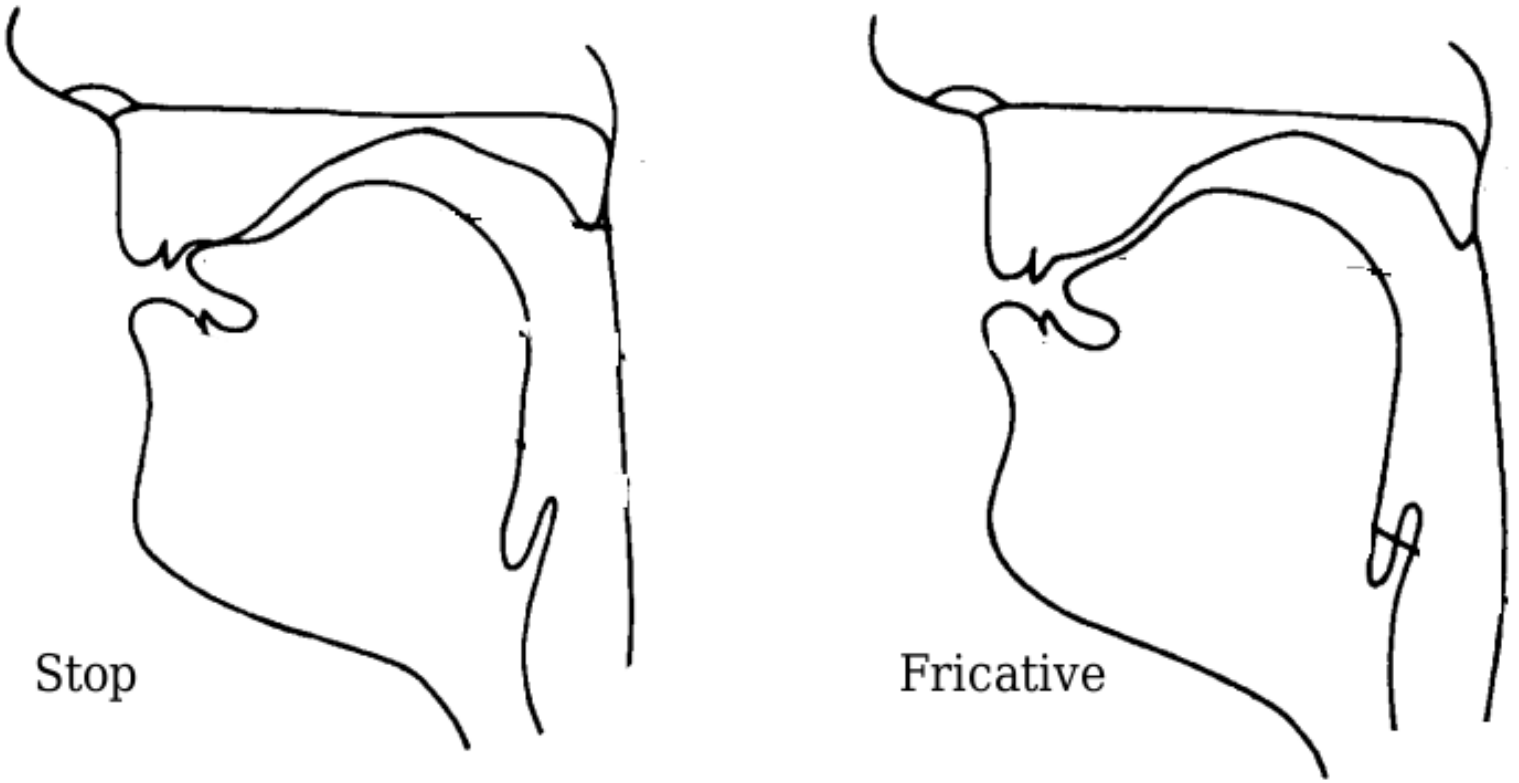

Manner of Articulation

Ladefoged (2001)

APPROXIMANT: close approximation of articulators

(non-turbulent airstream) { w, j, l, r }

What about Vowels?

Ladefoged (2001)

Laryngeal Mechanism, Place of Articulation and Manner of Articulation are usually used to describe CONSONANTS

VOWELS are characterized in terms of the following articulatory features:

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relates to the vertical position of the tongue

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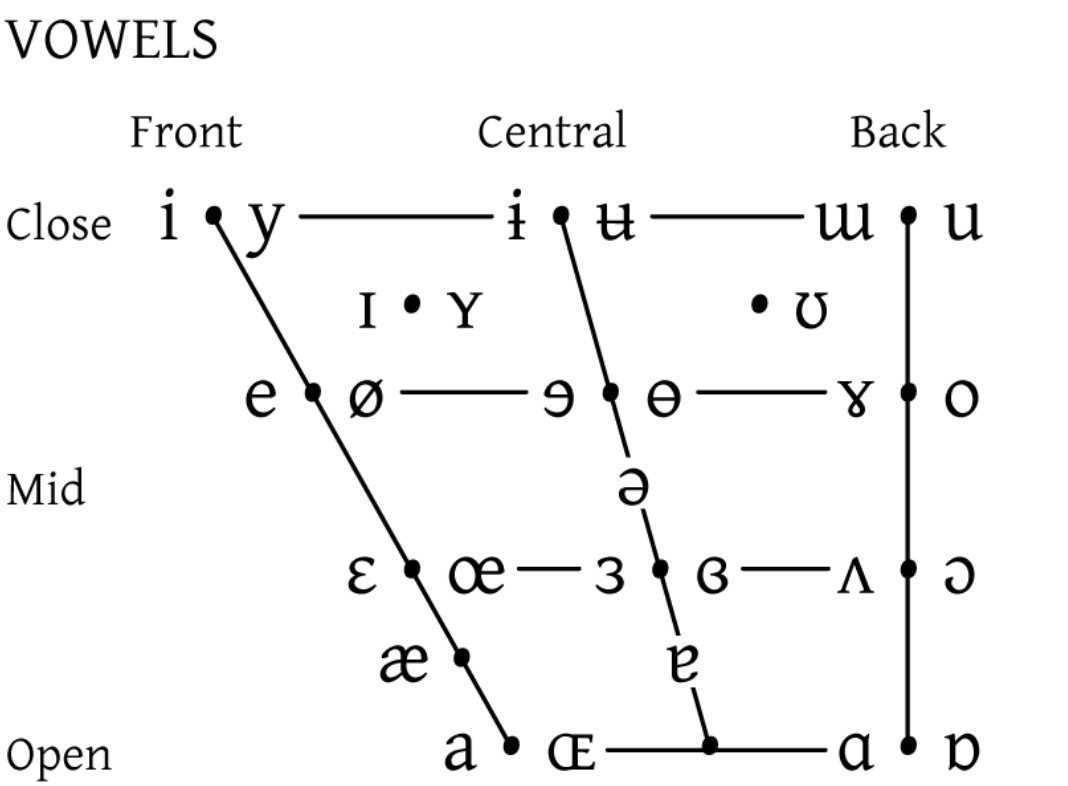
(ii) **FRONT/BACKNESS** (i.e., front [y] vs back [u])
relates to the front/back position of the tongue

(iii) **ROUNDNESS** (i.e., round [y] vs unround [i])
relates to roundness of lips

What about Vowels?

Ladefoged & Johnson (2011)

What about Vowels?



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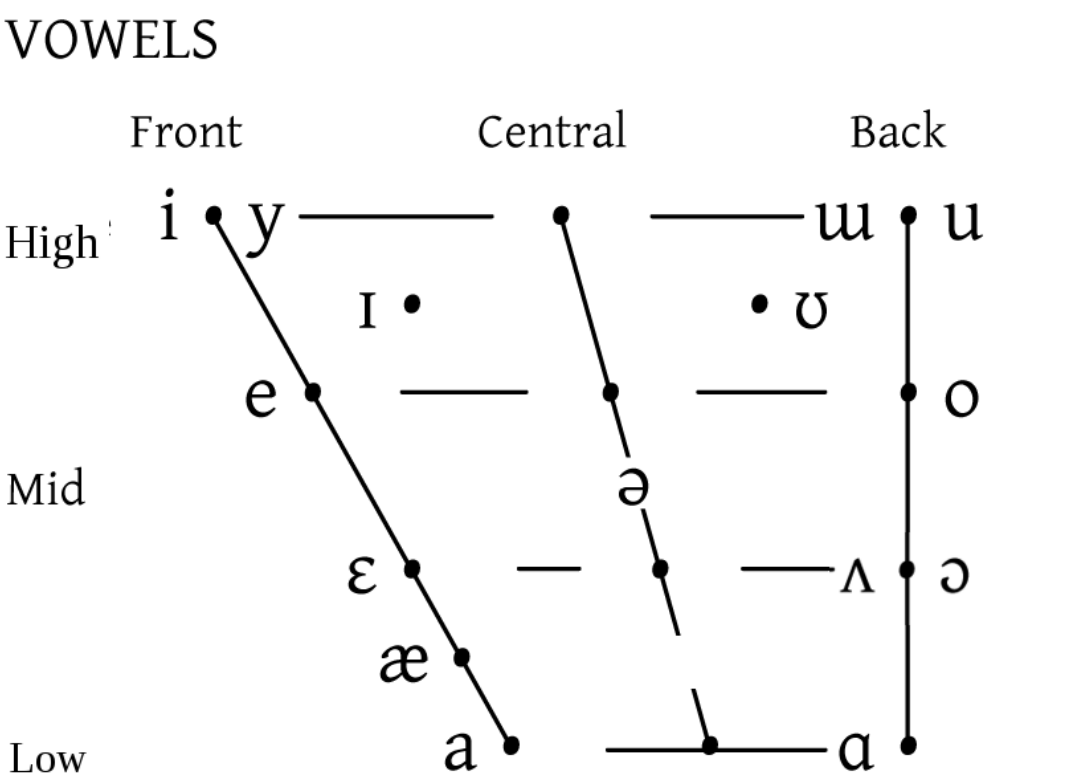
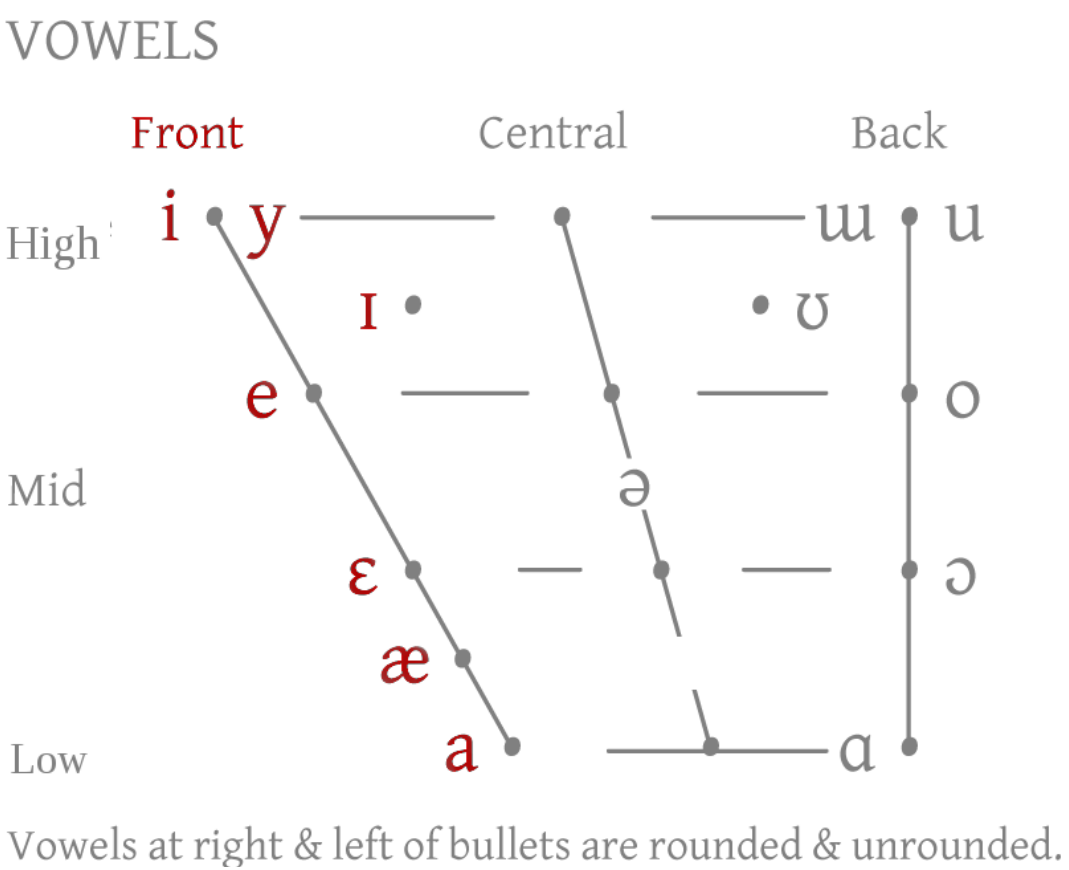


Vowels at right & left of bullets are rounded & unrounded.

What about Vowels?



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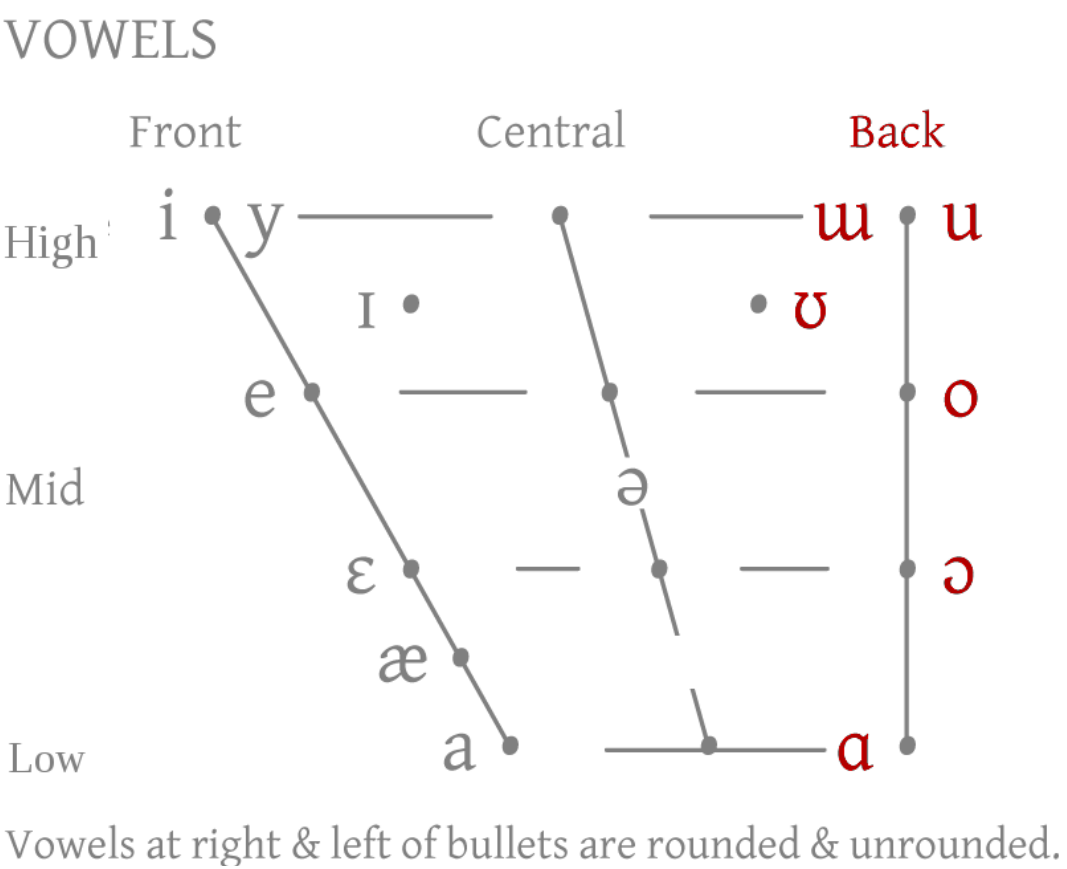

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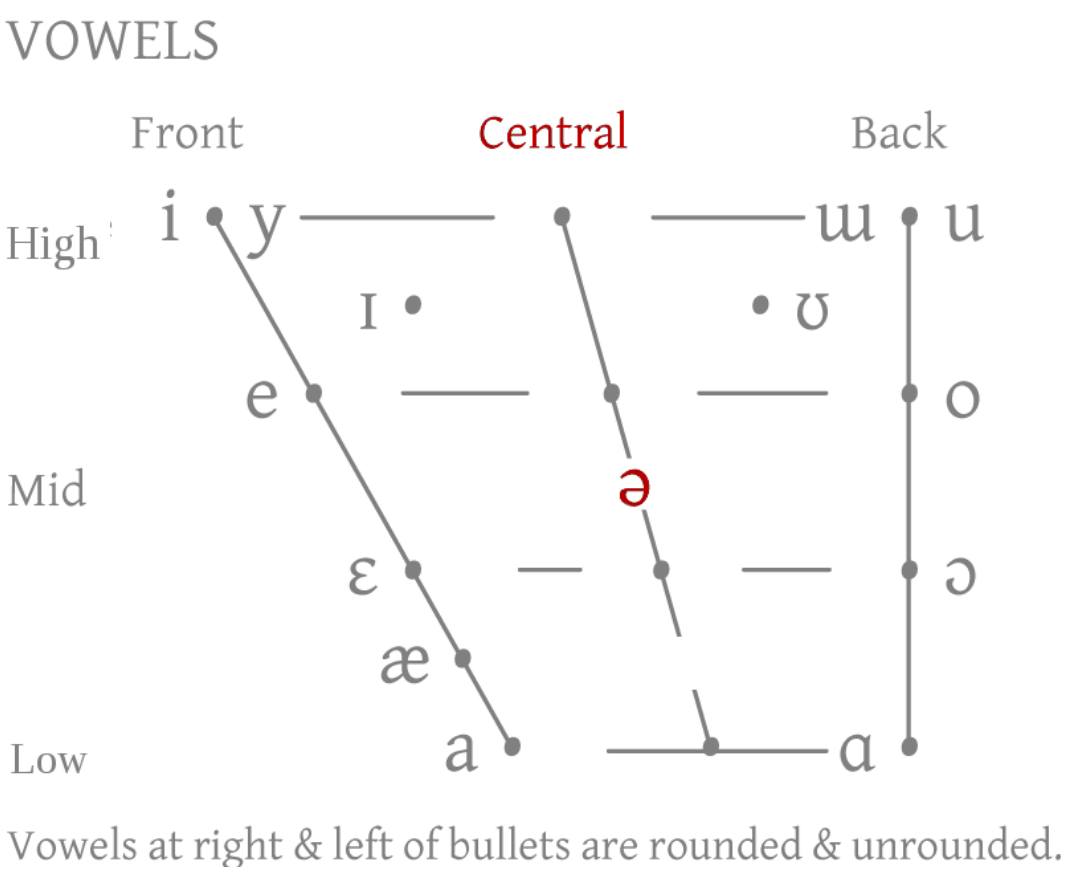

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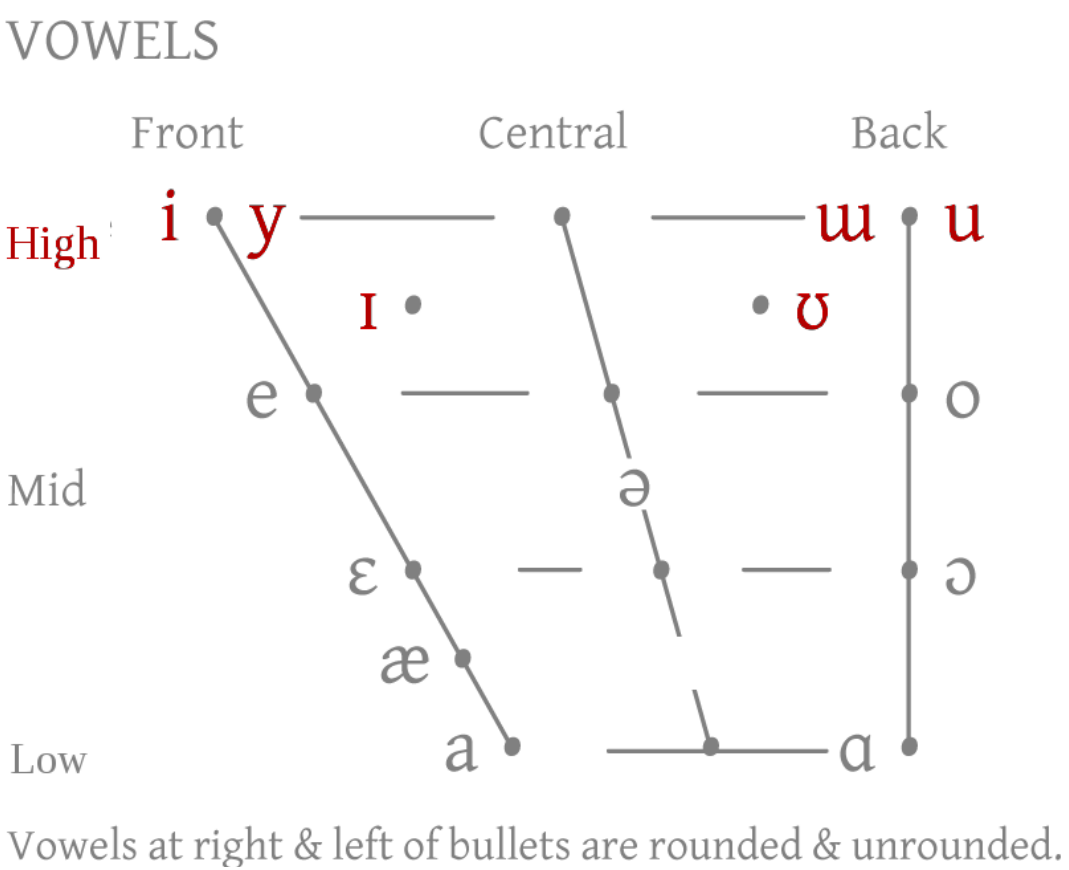

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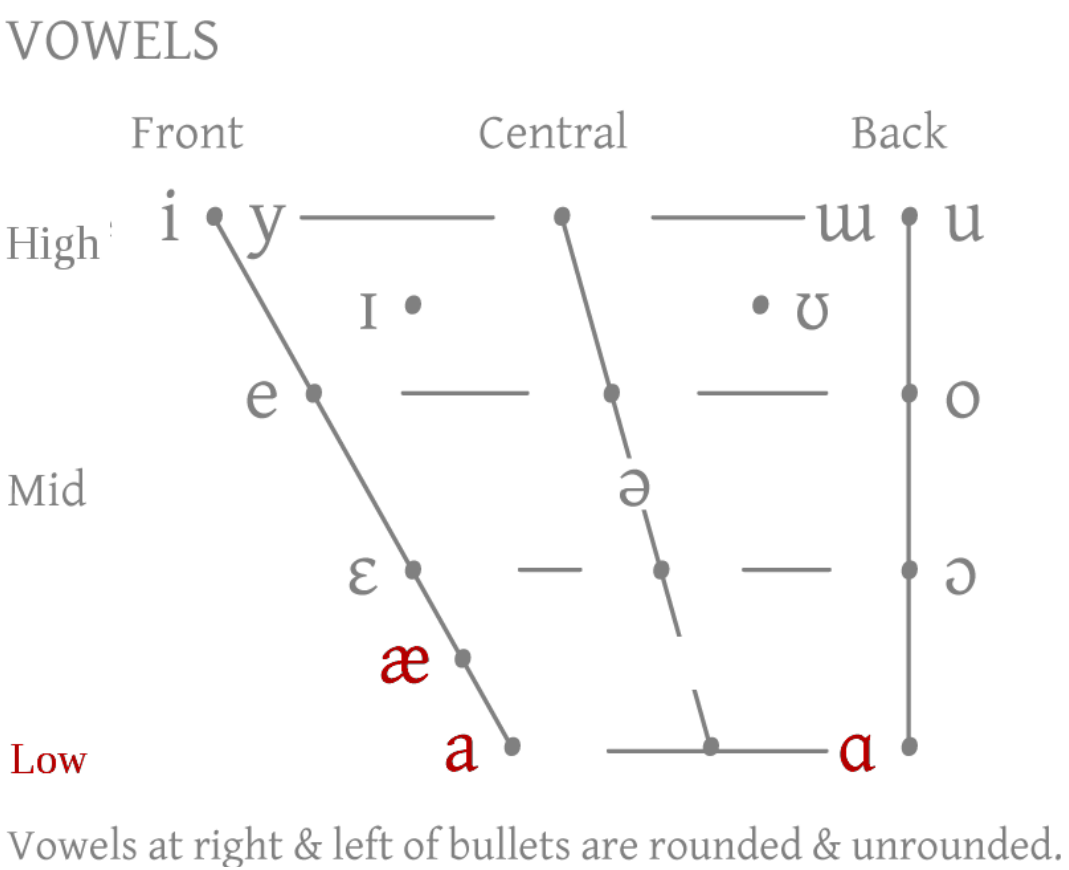

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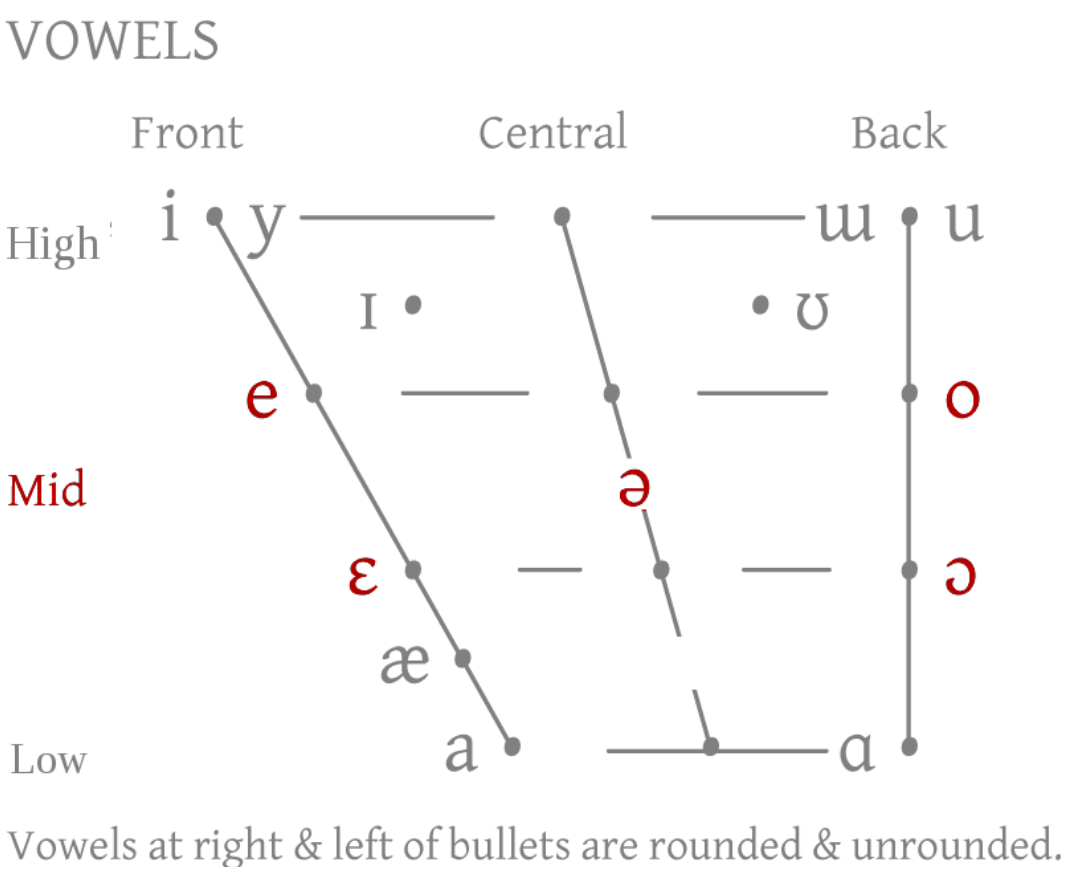

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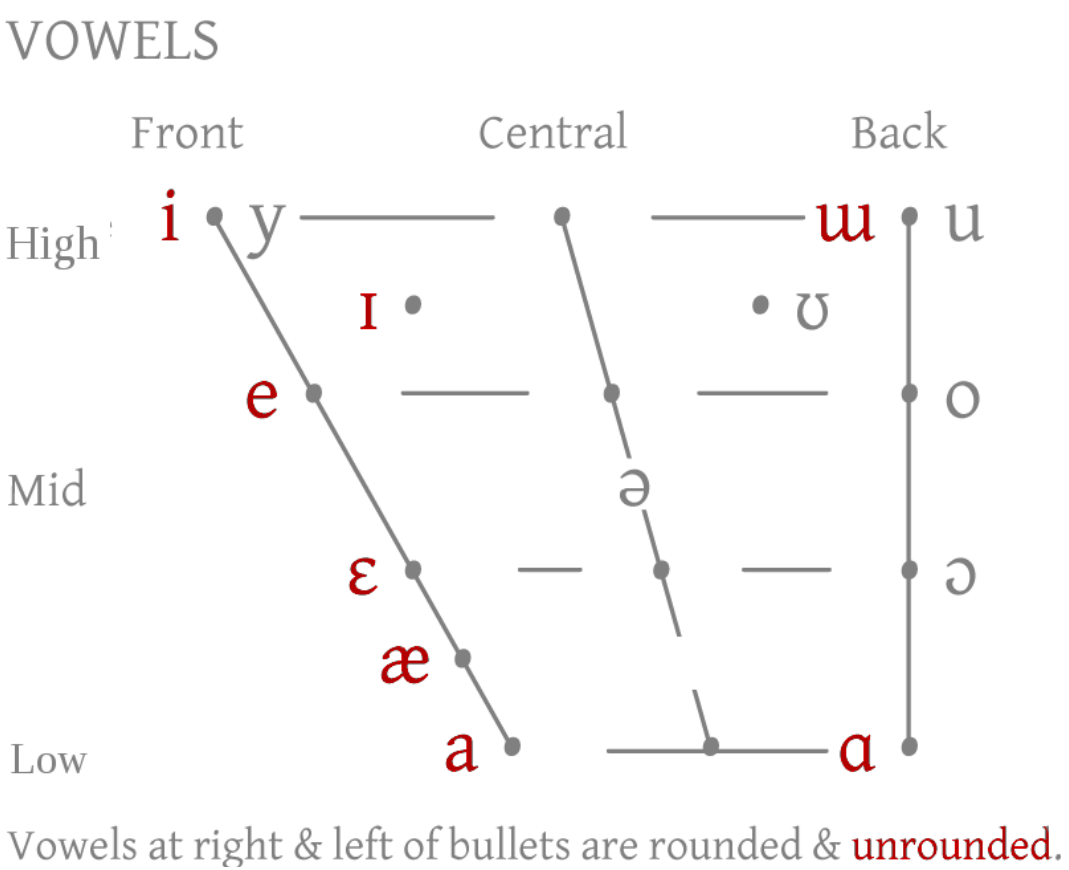

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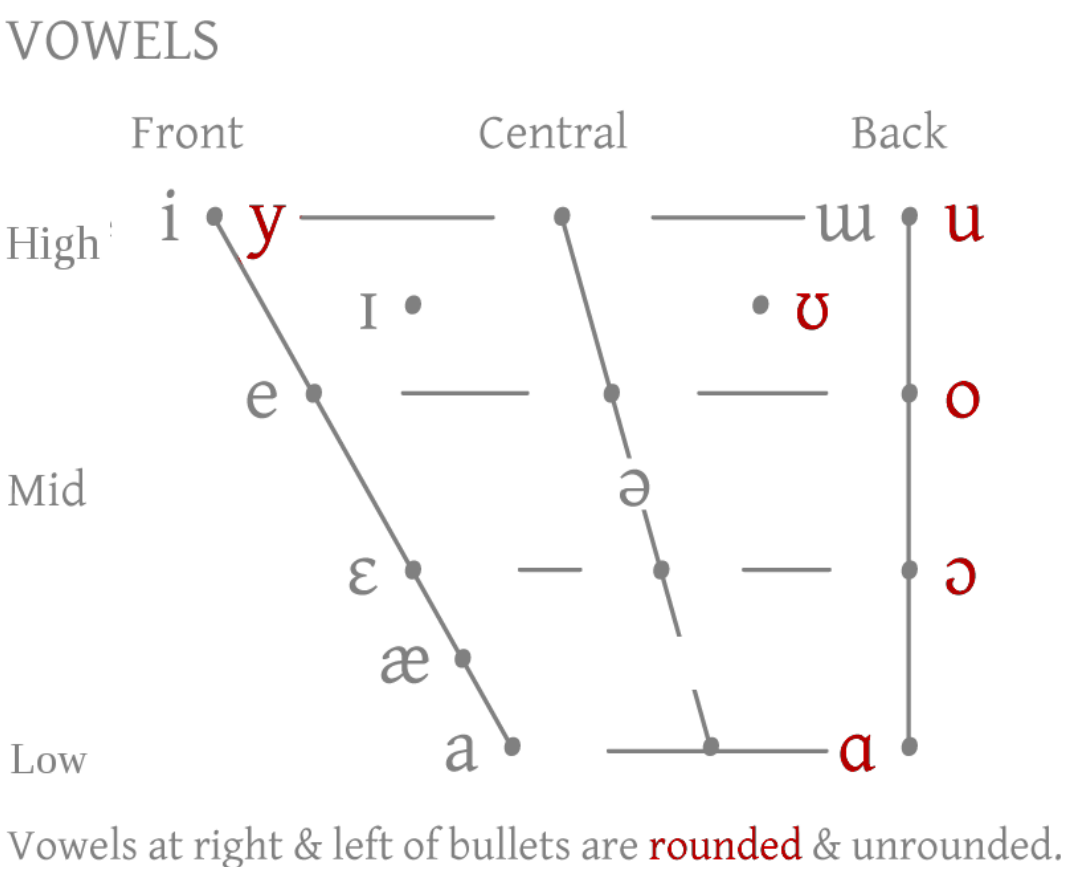

Practice with the IPA: Identification

1. For each of the following examples, write a phonetic transcription using the IPA. Identify the voicing of the first consonant in each word.

(a) deli

(b) cat

(c) cheap — VOICELESS

(d) zebra — VOICED

(e) knee

(f) thing

Practice with the IPA: Identification

2. For each of the following examples, write a phonetic transcription using the IPA. Identify the place of articulation of the first consonant in each word.

(a) belly

(b) foot

(c) chin

(d) calf

(e) knee

(f) thigh

Labial	Coronal	Dorsal
Bilabial	Dental	Palatal
Labiodental	Alveolar	Velar
	Palato-Alveolar	

Practice with the IPA: Identification

3. For each of the following examples, write a phonetic transcription using the IPA. Identify the manner of articulation of the first consonant in each word.

(a) cheery

(b) funny

(c) crazy

(d) merry

(e) silly

(f) jolly

STOP (oral, nasal)

FRICATIVE

APPROXIMANT

AFFRICATE

Practice with the IPA: Writing

4. Give the IPA symbol corresponding to the articulatory description

(i) voiced bilabial stop
(ii) low back unrounded vowel
(iii) voiced lateral approximant
(iv) high back rounded vowel
(v) voiceless alveolar fricative
(vi) voiced velar nasal

(i) voiced postalveolar affricate
(ii) voiced palatal glide
(iii) mid front unrounded vowel (2)
(iv) voiced dental fricative
(v) voiceless labiodental fricative

Core Subdomains: Phonetics

Phonetics: The study of speech sounds

- **Articulatory** - i.e., how speech sound are made
- Acoustic - i.e., their physical properties (waveform analysis, frequency, wavelength, etc.)
- Perceptual - i.e., how speech sounds are perceived (eg., pitch vs frequency)

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Acoustic Phonetics

Speech sounds are sounds, thus they have all the characteristic measurable properties of sounds, eg.

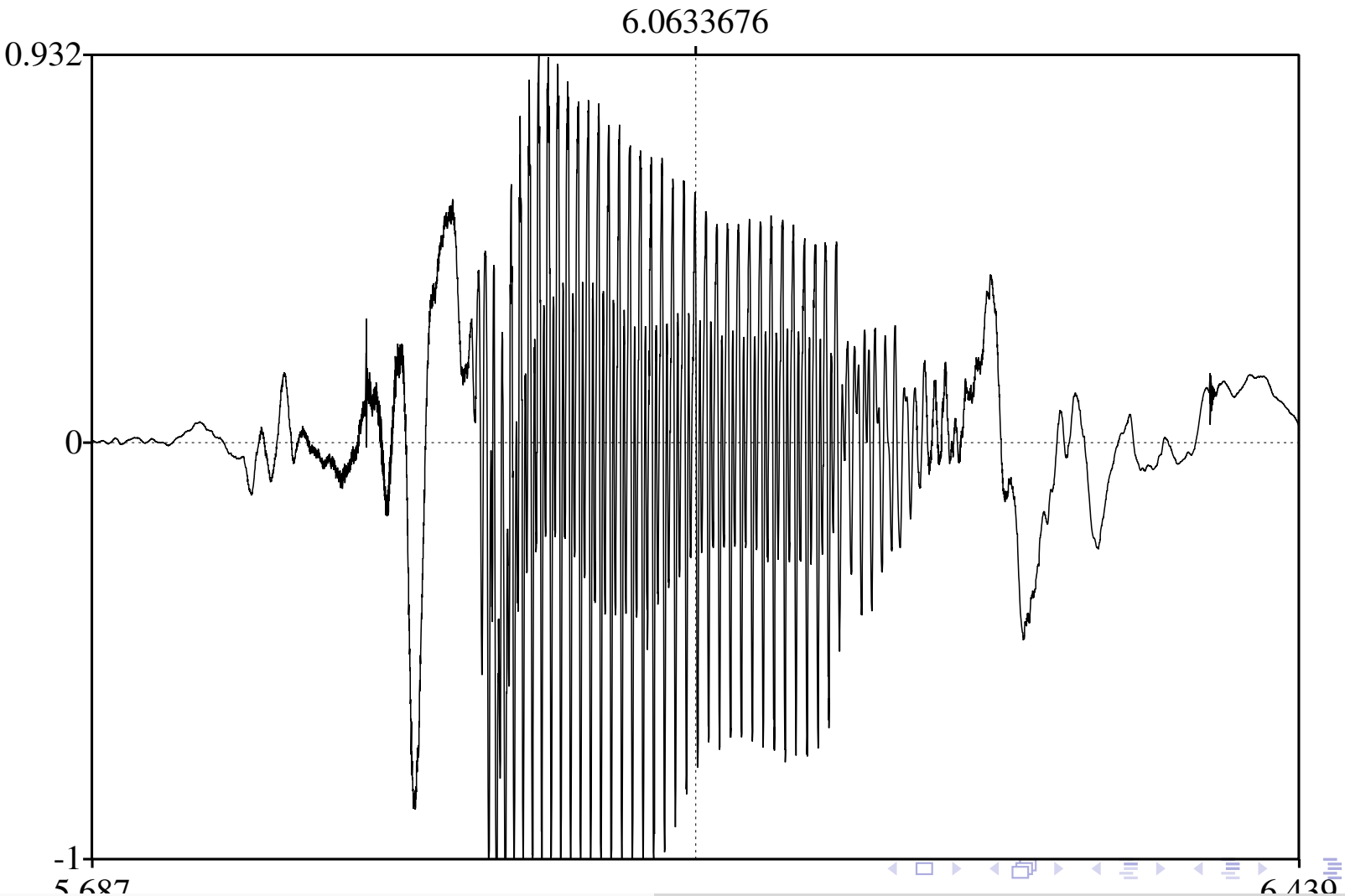
(1) Wavelength

(2) Frequency/Period

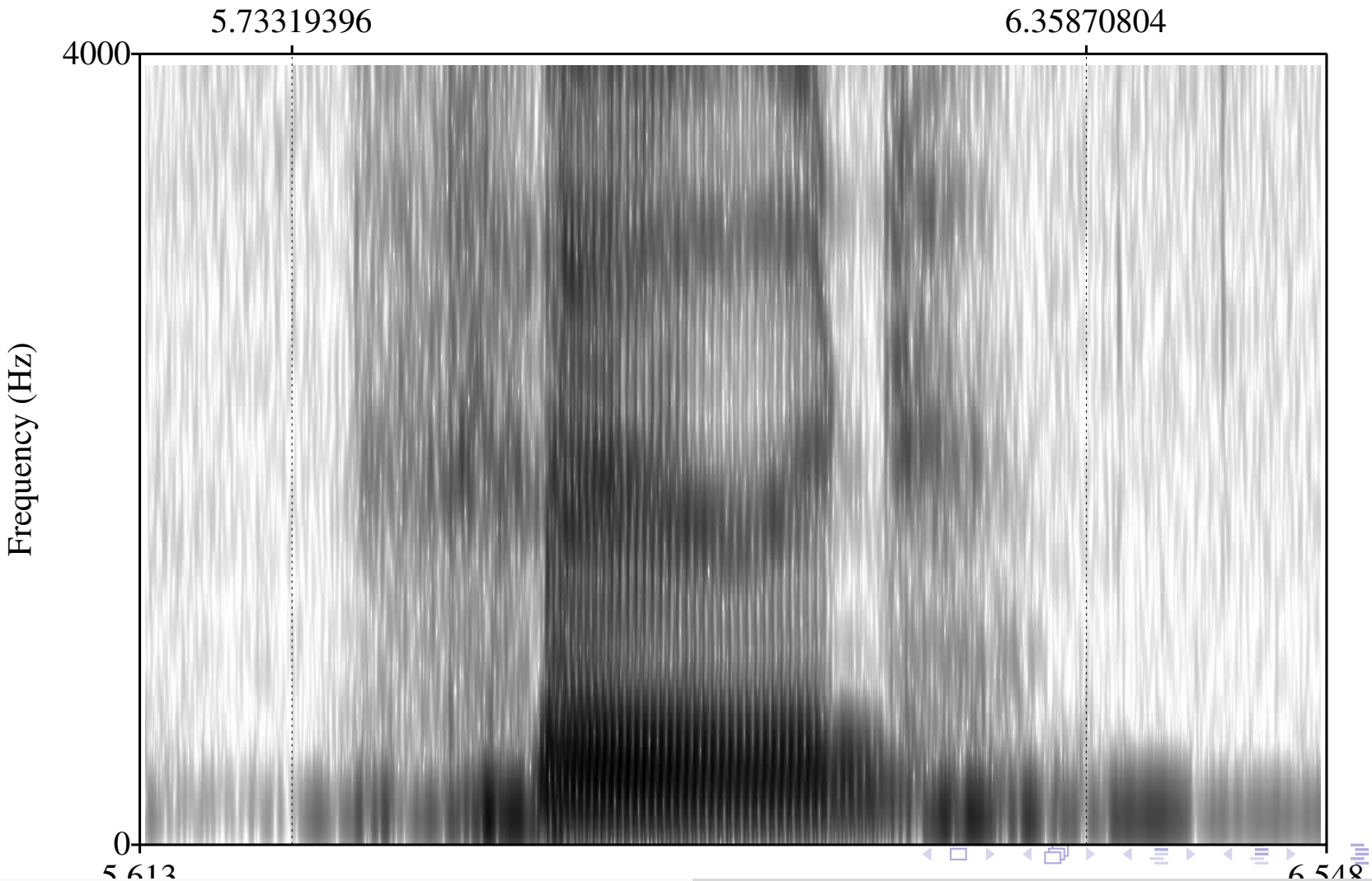
(3) Amplitude

→ Acoustic phonetics is the study of these properties.

A Waveform



A Spectrogram of the word [fud] "food"



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- Our ears, eyes and brain filter/categorize the sound waves into what we ultimately perceive
- Eg. Fundamental frequency (f_0) and pitch (the way we perceive f_0) are logarithmically, not linearly, related.
  - Perceptual phonetics is the study of how we perceive speech.

Perceptual Phonetics

- **The McGurk Effect**

  First listen and watch the video with your eyes open; then close your eyes - what do you hear?

Next Time: Introduction to Phonology

1. **Homework:** IPA and Orthography Problem Set
   - Start working on the problems now, in groups
   - Due next week - hand in one per group
   - (Put everyone's names and student numbers on the assignment)

2. **Instagram Homework:** (if you haven't already done it)
   IPA Production - 5 sounds

References I

Ladefoged, Peter. 2001. *A course in phonetics. 4th edition*. Orlando: Harcourt College Publishers.

Ladefoged, Peter & Keith Johnson. 2011. *A Course in Phonetics, 6th Edition*. Cengage Learning.

Ladefoged, Peter & Ian Maddieson. 1996. *The sounds of the world's languages*. Blackwell.