LIN 001: Introduction to Linguistics (Spring 2024)

Week 2 (Phonetics + Phonology) - Sections A05 and A06

Instructor: Dr. Luna Filipović-Hawkins, TA: Nick Aoki

Agenda

1. **Materials Needed for Today**
2. Assignment 1 Questions [Part B Only]
3. Review Key Terms and Additional Concepts Not Covered in Assignment 1
4. Resources + Study Tips
5. Open Floor

Materials Needed for Today

- Week 2 Lecture Slides (Phonetics + Phonology)
- Homework (Assignment 1, Part B)
- Consonant and Vowel IPA Charts
    - Files => Lectures => Week 2 => Phonetics Handouts
    - “consonants.pdf”, “Vowels2.pdf”

Agenda

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Phonetics and Phonology

- phonetics: the production and perception of speech sounds
    - Q11, 12, 13 (ex. place and manner of articulation, tongue height…)
- phonology: the patterns and abstract structure of speech sounds
    - How do discrete sounds come together to form words?
    - Q14 + 15 (ex. minimal pairs, allophones…)
- See Slides 3 and 25 of the Week 2 Slides for full definitions of both terms

Agenda

2. Assignment 1 Questions [Part B Only]

- Question 11: Describe consonants in terms of voicing, place of articulation, and manner of articulation.

- Question 12: Describe vowels in terms of vertical tongue position, horizontal tongue position, and tensity (tense or lax).

- Question 13: Write the symbols corresponding to phonetic descriptions.

- Question 14: Identify whether pairs of words are minimal pairs and explain.

- Question 15: Use linguistic data to identify whether two sounds are phonemes or allophones.

Consonants, Vowels, and Glides

- Consonants: produced with narrow or complete closure in the vocal tract

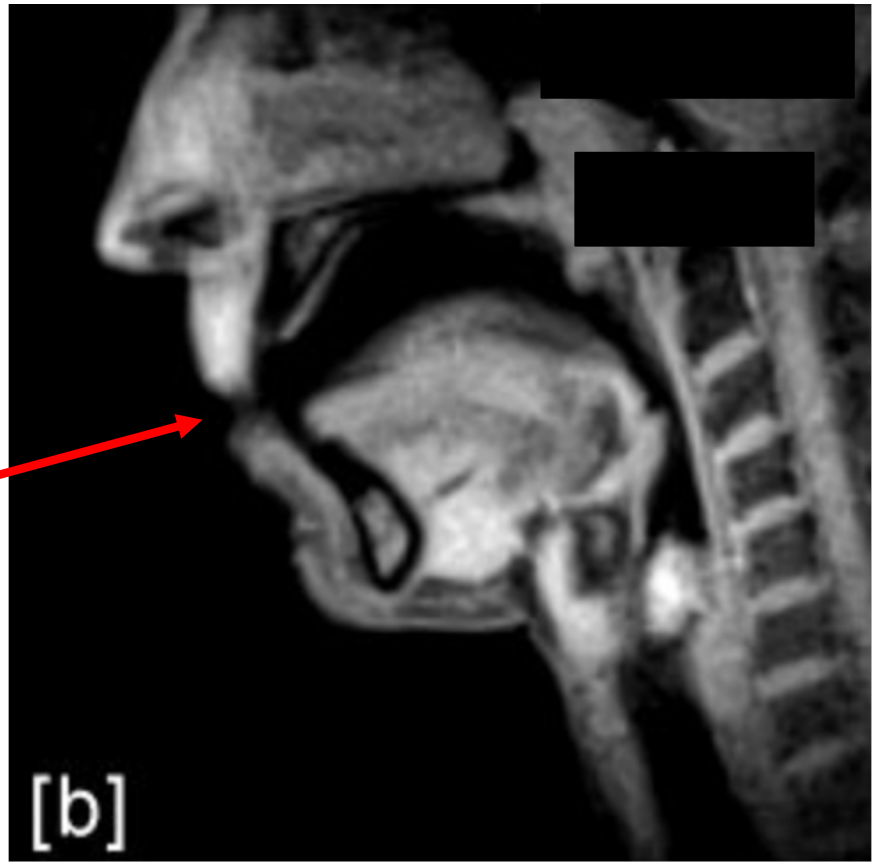
- Vowels: produced with a relatively open vocal tract (little obstruction)

Vowels: Open Vocal Tract

https://www.youtube.com/watch?v=jalquq_4560

Consonants: Restricted Vocal Tract

[b] = bilabial consonant
(closure at the lips)



Link to Image

Consonants, Vowels, and Glides

- Consonants: produced with narrow or complete closure in the vocal tract
- Vowels: produced with a relatively open vocal tract (little obstruction)
- Glides: properties of consonants and vowels
    - phonetically similar to vowels, but less sonorant (more on sonority later!)

Phonetic Description of Consonants

- There are 3 basic ways to differentiate consonants: (1) voicing; (2) place of articulation; (3) manner of articulation.

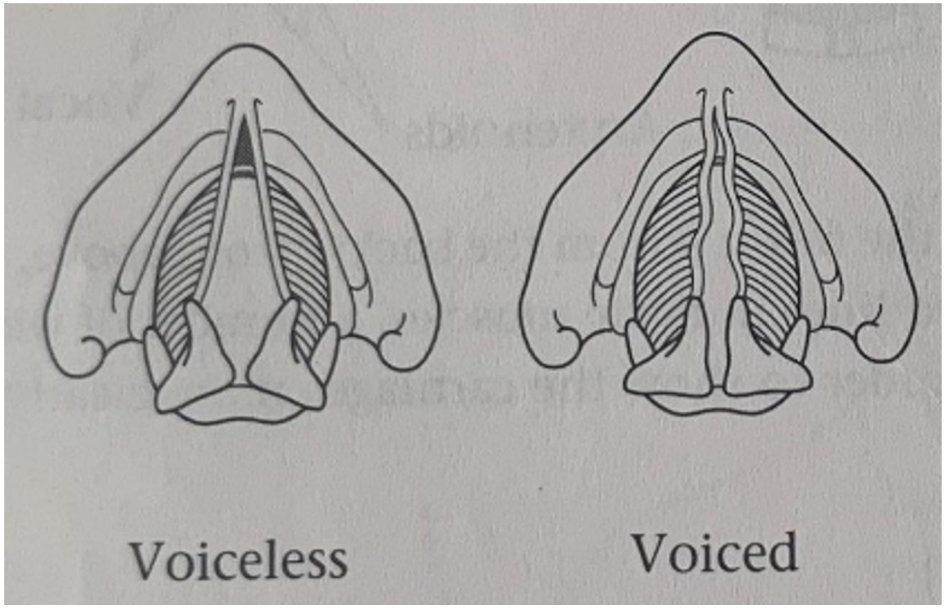
1. Voicing: Are the vocal folds vibrating or not?

    - Options: Voiceless (No Vibration), Voiced (Vibration)

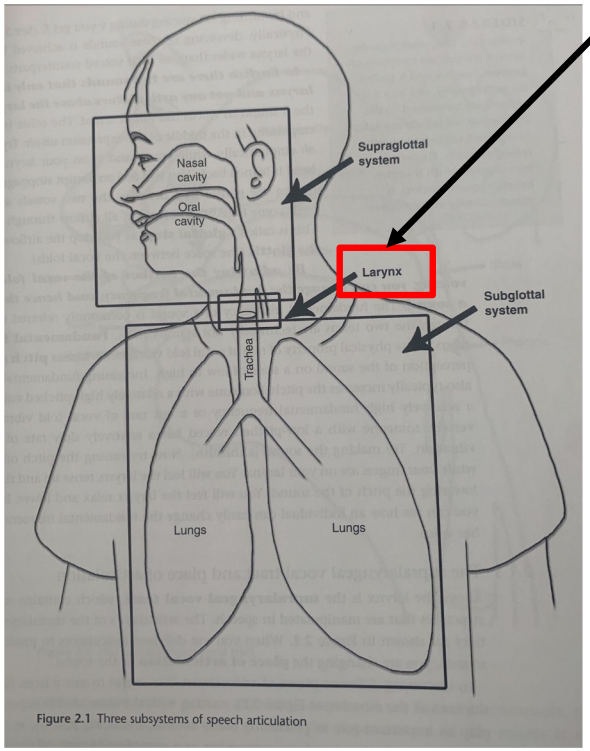
Voicing: Vocal Fold Vibration

- Click the link below for a video demonstration of voicing:

https://www.youtube.com/watch?v=9TIpkdq8a8c



Vocal folds are located in the larynx



Phonetic Description of Consonants

- There are 3 basic ways to differentiate consonants: (1) voicing; (2) place of articulation; (3) manner of articulation.

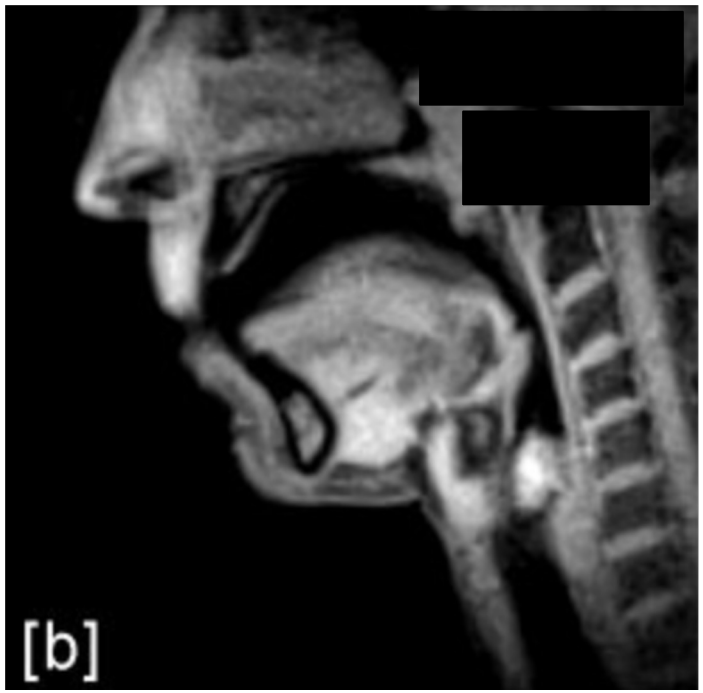
1. Voicing: Are the vocal folds vibrating or not?

    - Options: Voiceless (No Vibration), Voiced (Vibration)

2. Place of Articulation: Where does closure occur in the vocal tract?

    - Options: Bilabial, Labiodental, Interdental, Alveolar, Palatal, Velar, Glottal

Place of Articulation: Location of Vocal Tract Closure



[b] = closure at lips (bilabial)

[g] = closure at velum (velar)

Place of Articulation: Location of Vocal Tract Closure

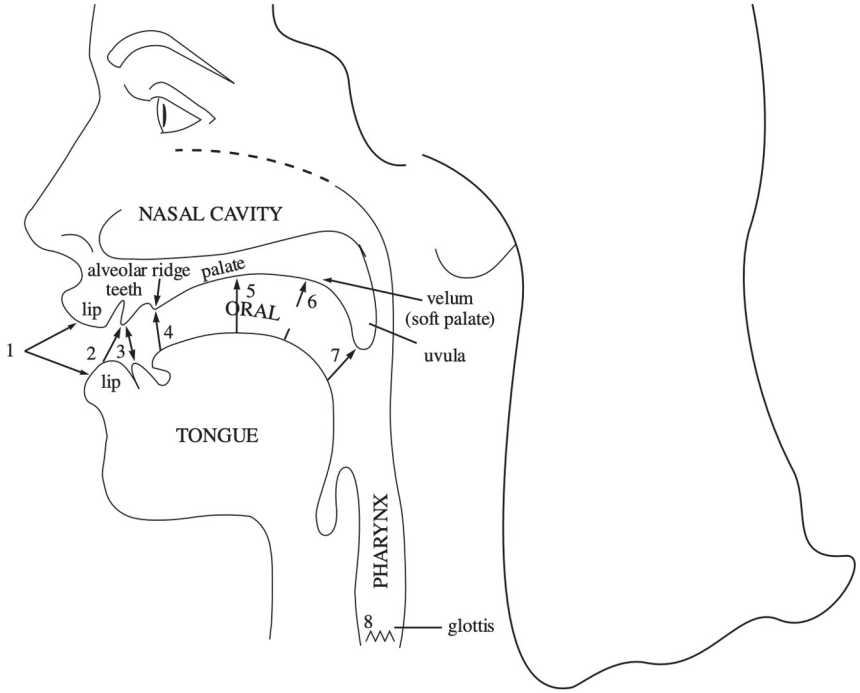


FIGURE 5.1 | The vocal tract. Places of articulation: 1. bilabial; 2. labiodental; 3. interdental; 4. alveolar; 5. (alveo)palatal; 6. velar; 7. uvular; 8. glottal.

* English doesn't have uvulars, so don't worry about it.

- Bilabial: lips (ex. [b])
- Labiodental: lips and teeth (ex. [f])
- Interdental: teeth (ex. [θ], or "th" in "thin")
- Alveolar: alveolar ridge (ex. [t])
- Palatal: palate (ex. [ʃ], or "sh" in "shin")
- Velar: velum (ex. [g])
- Glottal: glottis (ex. [h])
- These are basic definitions…see p. 195-197 of the textbook (10th ed) for more detail.

Phonetic Description of Consonants

- There are 3 basic ways to differentiate consonants: (1) voicing; (2) place of articulation; (3) manner of articulation.

1. Voicing: Are the vocal folds vibrating or not?

    - Options: Voiceless (No Vibration), Voiced (Vibration)

2. Place of Articulation: Where does closure occur in the vocal tract?

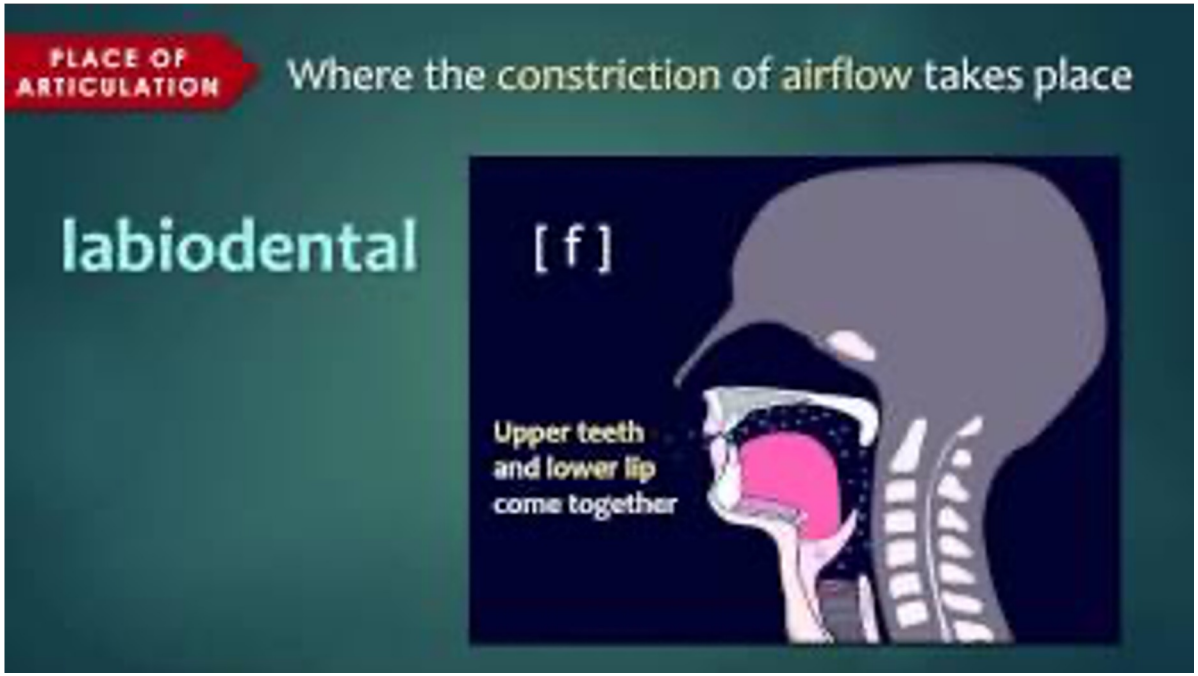
    - Options: Bilabial, Labiodental, Interdental, Alveolar, Palatal, Velar, Glottal

3. Manner of Articulation: How does airflow circulate through the vocal tract?

    - Options: Stop, Nasal, Fricative, Affricate, Glide, Liquid

Manner of Articulation: How Airflow Circulates

- Example: Stops vs. Fricatives (Video Timestamps: 3:15-3:50)



https://www.youtube.com/watch?v=dfoRdKuPF9I&t=228s

Manner of Articulation: How Airflow Circulates

- Comprehensive List (definitions from this video, an excellent visual resource):
  - Stop: complete restriction of airflow followed by a release of air
  - Fricative: the tongue approaches, but does not make contact with a place of articulation => airflow bottleneck, sound has a “friction-like” quality
  - Affricate: sequence of stop and fricative in rapid succession
  - Nasal: the velum is lowered, allowing air to pass through the nasal cavity
  - Liquid: air passes by one or both sides of the tongue
  - Glide: Very little airflow constriction (look ahead for a more detailed explanation)

Phonetic Description of Consonants: Putting It All Together

- Describe [p] in terms of (i) voicing, (ii) place of articulation, and (iii) manner of articulation.

- Answer: [p] is a **voiceless bilabial stop**…What does that mean?

voiceless bilabial stop

Voicing: No vocal fold vibration

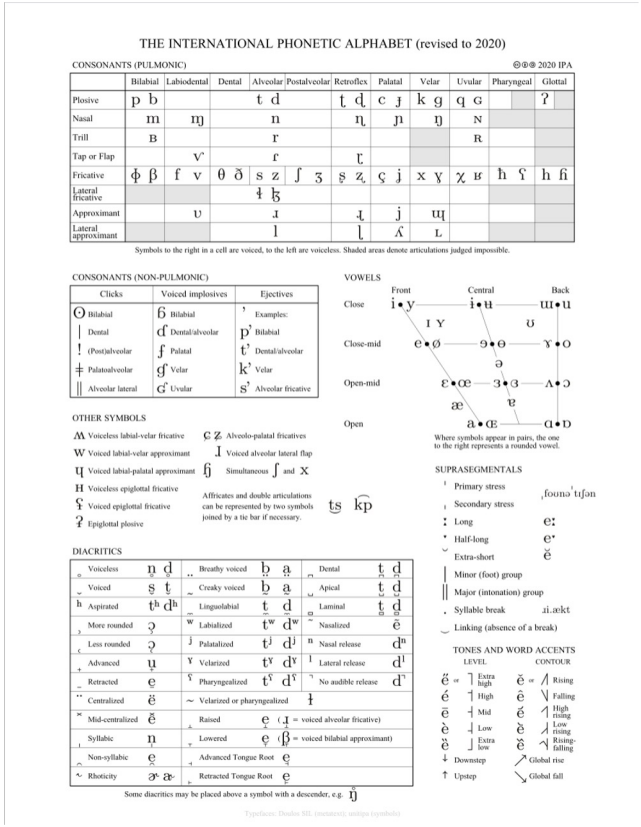
Place of Articulation: Closure at the lips

Manner of Articulation: Complete restriction of airflow, followed by a release

How to Learn the Phonetic Descriptions of Consonants: The International Phonetic Alphabet (IPA) Chart

- International Phonetic Alphabet: a standardized set of symbols representing the sounds of all the world's languages

- The full, comprehensive chart is shown on the left…see this link for a closer look.



…But you only need to know the American English consonants!

**** You will be given the chart to the right for the exam – you do not need to memorize the chart. ****

** Note that /w/ and /w/ are often called “labiovelar” because they have 2 places of articulation (lips + velum) **

Some Phonetic Symbols for American English Consonants

	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (oral)							
voiceless	p			t		k	ʔ
voiced	b			d		g	
Nasal (voiced)	m			n		ŋ	
Fricative							
voiceless		f	θ	s	ʃ		h
voiced		v	ð	z	ʒ		
Affricate							
voiceless					ʧ		
voiced					ʤ		
Glide							
voiceless	ʍ					ʍ	
voiced	w				j	w	
Liquid (voiced)							
(central)				r			
(lateral)				l			

Resource for mapping phonetic symbols to pronunciation

**** You will be given the chart to the right for the exam – you do not need to memorize the chart. ****

A Phonetic Alphabet for English Pronunciation

Consonants						Vowels			
p	**p**ill	t	**t**ill	k	**k**ill	i	b**ee**t	ɪ	b**i**t
b	**b**ill	d	**d**ill	g	**g**ill	e	b**ai**t	ɛ	b**e**t
m	**m**ill	n	**n**il	ŋ	ri**ng**	u	b**oo**t	ʊ	f**oo**t
f	**f**eel	s	**s**eal	h	**h**eal	o	b**oa**t	ɔ	b**o**re
v	**v**eal	z	**z**eal	l	**l**eaf	æ	b**a**t	a	p**o**t/b**a**r
θ	**th**igh	ʧ	**ch**ill	r	**r**eef	ʌ	b**u**tt	ə	sof**a**
ð	**th**y	ʤ	**g**in	j	**y**ou	aɪ	b**i**te	aʊ	b**ou**t
ʃ	**sh**ill	ʍ	**wh**ich	w	**w**itch	ɔɪ	b**oy**		
ʒ	mea**s**ure								

Question 11

I'd like 6 volunteers to come up to the whiteboard and write down the answers for the questions below. (Refer to the chart on Slide 14 of the Week 2 slides).

11. Describe the following consonants in terms of (i) voicing, (ii) place of articulation, (iii) manner of articulation.

(a) [d]

(b) [z]

(c) [f]

(d) [θ]

(e) [ɬ]

(f) [m]

Agenda

2. Assignment 1 Questions [Part B Only]

- Question 11: Describe consonants in terms of voicing, place of articulation, and manner of articulation.

- Question 12: Describe vowels in terms of vertical tongue position, horizontal tongue position, and tenseness (tense or lax).

- Question 13: Write the symbols corresponding to phonetic descriptions.

- Question 14: Identify whether pairs of words are minimal pairs and explain.

- Question 15: Use linguistic data to identify whether two sounds are phonemes or allophones.

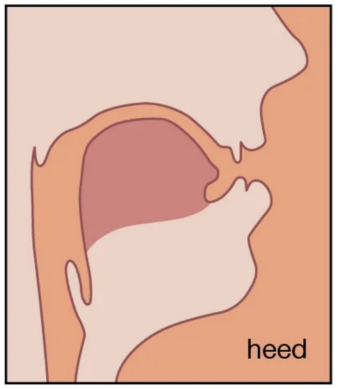
Phonetic Description of Vowels

- 4 basic ways to differentiate vowels: (1) tongue height (“vertical tongue position”); (2) tongue frontness (“horizontal tongue position”); (3) tenseness; (4) lip rounding.

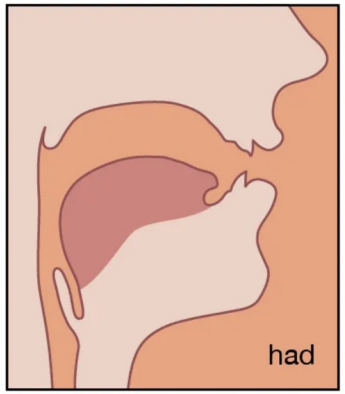
1. Tongue Height (“Vertical Tongue Position”): High, Mid, Low

Tongue Height ("Vertical Tongue Position")

High Vowel



/i/



/æ/

Low Vowel

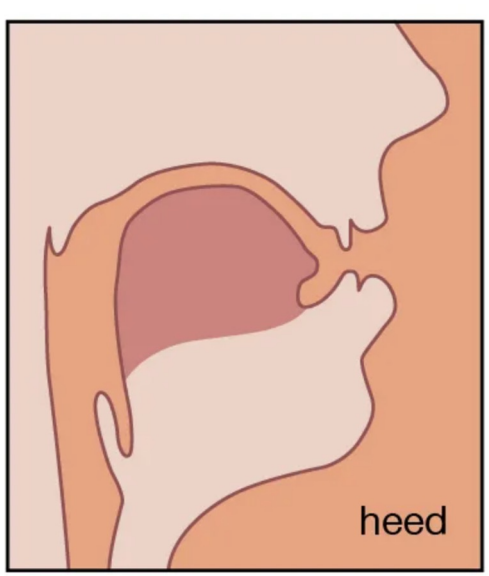
https://www.britannica.com/science/phonetics/Vowels

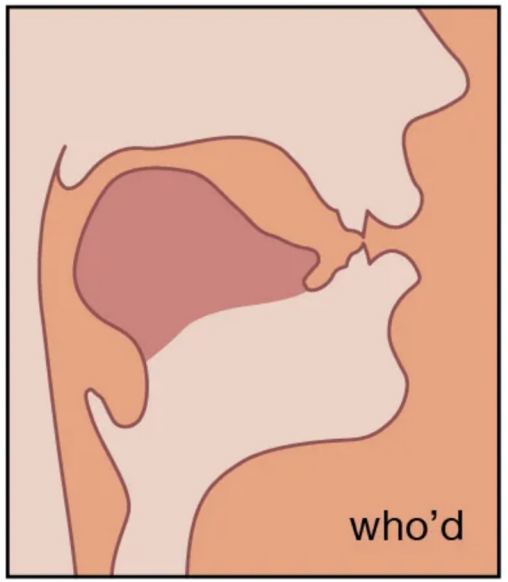
Phonetic Description of Vowels

- 4 basic ways to differentiate vowels: (1) tongue height (“vertical tongue position”); (2) tongue frontness (“horizontal tongue position”); (3) tenseness; (4) lip rounding.

1. Tongue Height (“Vertical Tongue Position”): High, Mid, Low
2. Tongue Frontness (“Horizontal Tongue Position”): Front, Central, Back

Tongue Frontness (“Horizontal Tongue Position”)





/i/ /u/

Front Vowel Back Vowel

Phonetic Description of Vowels

- 4 basic ways to differentiate vowels: (1) tongue height (“vertical tongue position”); (2) tongue frontness (“horizontal tongue position”); (3) tenseness; (4) lip rounding.

1. Tongue Height (“Vertical Tongue Position”): High, Mid, Low
2. Tongue Frontness (“Horizontal Tongue Position”): Front, Central, Back
3. Tenseness: How tense are the tongue muscles? (Options: Tense, Lax)
4. Lip Rounding: Rounded, Unrounded

Vowel Rounding

Unrounded

/i/

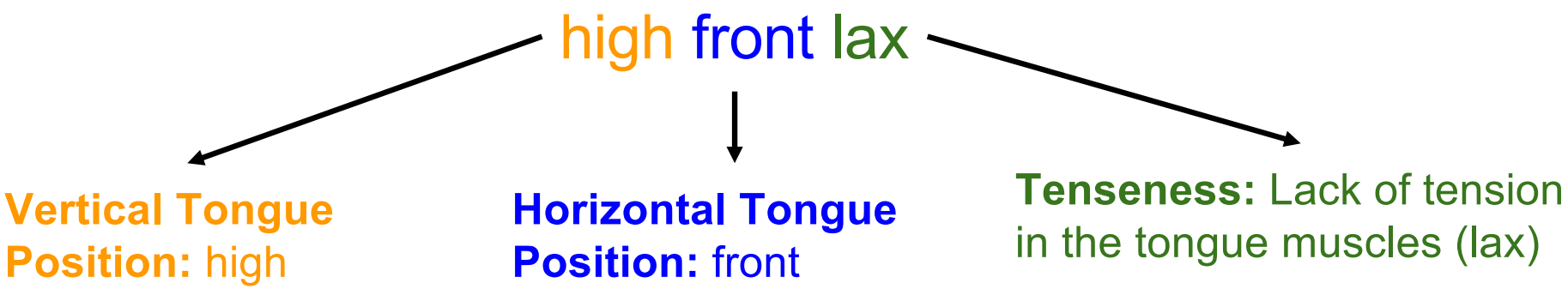
Rounded

/u/

Phonetic Description of Vowels: Putting It All Together

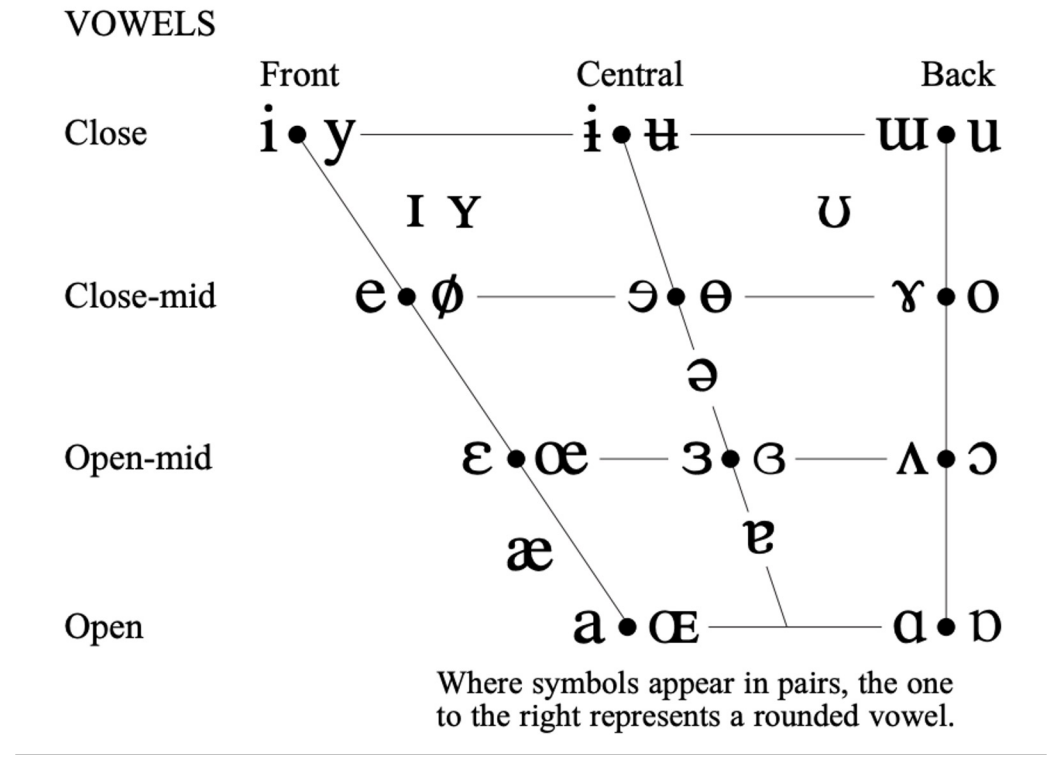
- Describe [I] in terms of (i) vertical tongue position (tongue height), (ii) horizontal tongue position (tongue frontness), and (iii) tense versus lax (tenseness).

- Answer: [I] is a **high front lax vowel**…What does that mean?



** Note that /I/ is also an unrounded vowel. **

How to Learn the Phonetic Descriptions of Vowels: The International Phonetic Alphabet (IPA) Chart



…But you only need to know the American English vowels!

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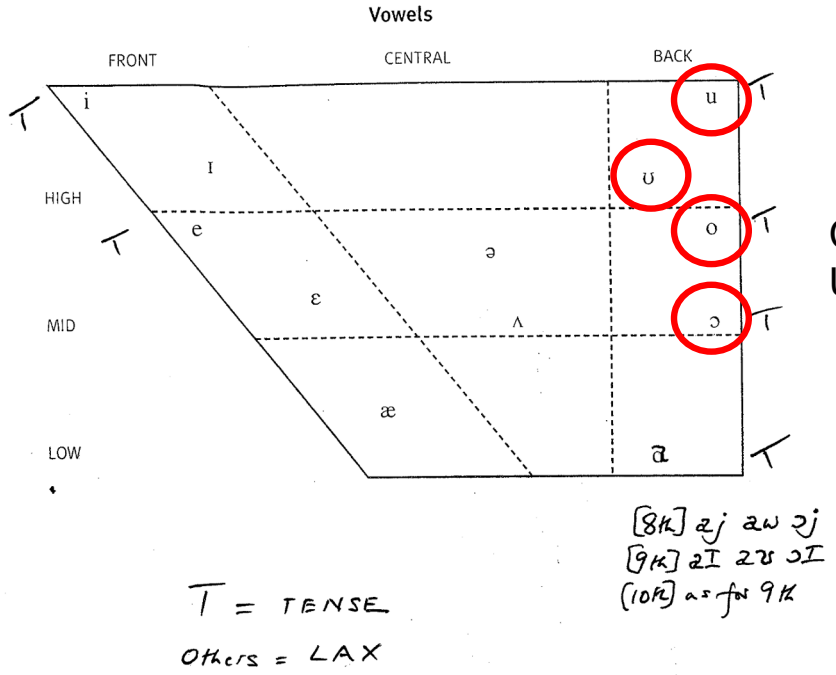

Circled vowels = rounded
Uncircled = unrounded

Resource for mapping phonetic symbols to pronunciation

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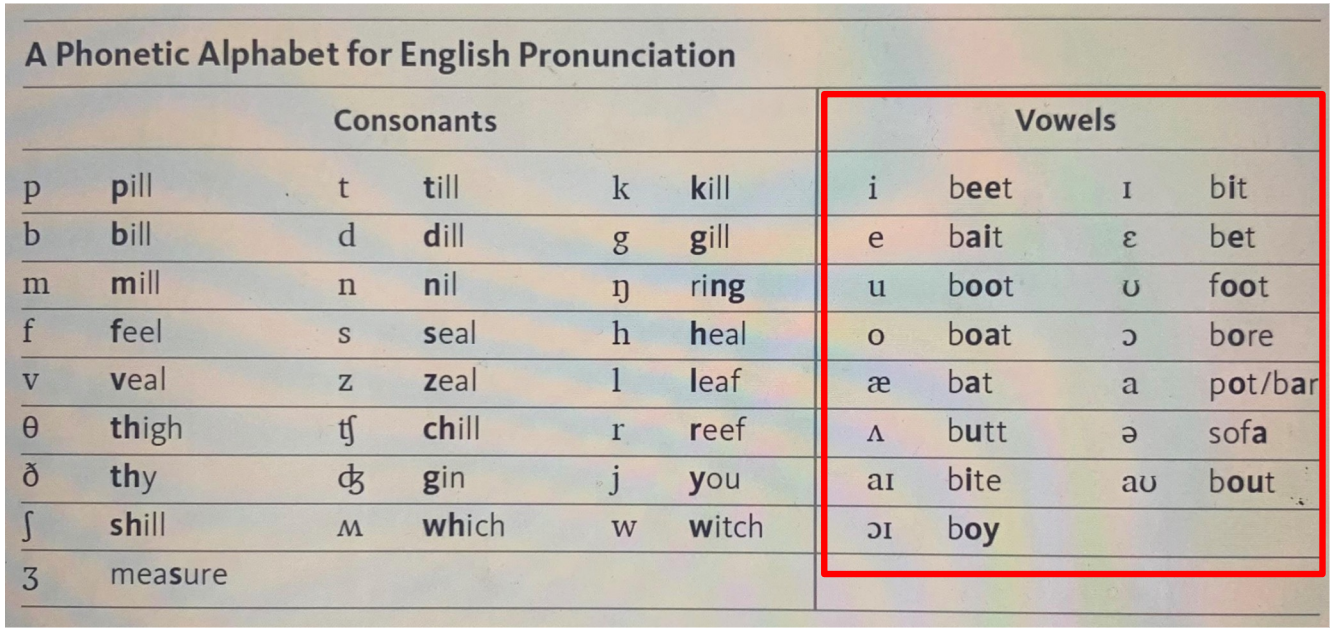

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m	**m**ill	n	**n**il	ŋ	ri**ng**	u	b**oo**t	ʊ	f**oo**t
f	**f**eel	s	**s**eal	h	**h**eal	o	b**oa**t	ɔ	b**o**re
v	**v**eal	z	**z**eal	l	**l**eaf	æ	b**a**t	a	p**o**t/b**a**r
θ	**th**igh	ʧ	**ch**ill	r	**r**eef	ʌ	b**u**tt	ə	sof**a**
ð	**th**y	ʤ	**g**in	j	**y**ou	aɪ	b**i**te	aʊ	b**ou**t
ʃ	**sh**ill	ʍ	**wh**ich	w	**w**itch	ɔɪ	b**oy**		
ʒ	mea**s**ure								

Question 12

I'd like 6 volunteers to come up to the chalkboard and write down the answers for the questions below. (Refer to the "Vowels2.pdf" file in the "Phonetics Handouts" folder).

12. Describe the following consonants in vowels of (i) vertical tongue position, (ii) horizontal tongue position, (iii) tense versus lax.

(a) [ʊ̈]

(b) [a]

(c) [i]

(d) [e]

Agenda

2. Assignment 1 Questions [Part B Only]

- Question 11: Describe consonants in terms of voicing, place of articulation, and manner of articulation.

- Question 12: Describe vowels in terms of vertical tongue position, horizontal tongue position, and tensity (tense or lax).

- Question 13: Write the symbols corresponding to phonetic descriptions.

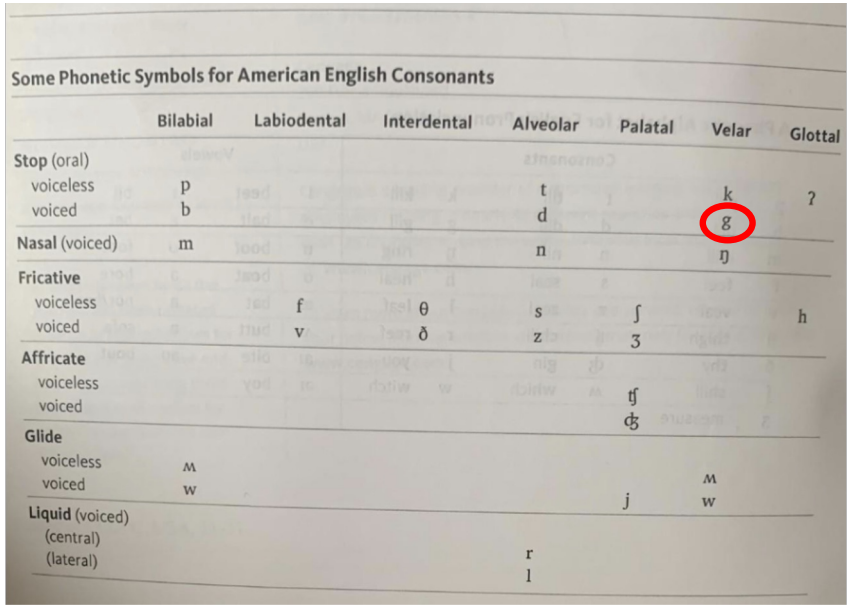
- Question 14: Identify whether pairs of words are minimal pairs and explain.

- Question 15: Use linguistic data to identify whether two sounds are phonemes or allophones.

Question 13: Example

- Write the symbol that corresponds to each of the following phonetic description: “voiced velar stop”.

  - To answer this question, all you need to do is the reverse of Questions 11 + 12.



Some Phonetic Symbols for American English Consonants

	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (oral)							
voiceless	p			t		k	ʔ
voiced	b			d		g	
Nasal (voiced)	m			n		ŋ	
Fricative							
voiceless		f	θ	s	ʃ		h
voiced		v	ð	z	ʒ		
Affricate							
voiceless					ʧ		
voiced					ʤ		
Glide							
voiceless	ʍ					ʍ	
voiced	w				j	w	
Liquid (voiced)							
(central)				r			
(lateral)				l			

Question 13 Answers

In the interest of time, I will write the answers to Q13 on the chalkboard myself.

13. Write the symbol that corresponds to each of the following phonetic descriptions.

(a) unaspirated voiceless alveolar stop

(b) voiced velar nasal

(c) aspirated voiceless velar stop

(d) palatal glide

(e) high back tense vowel

(f) voiced palatal affricate

(g) high front lax vowel

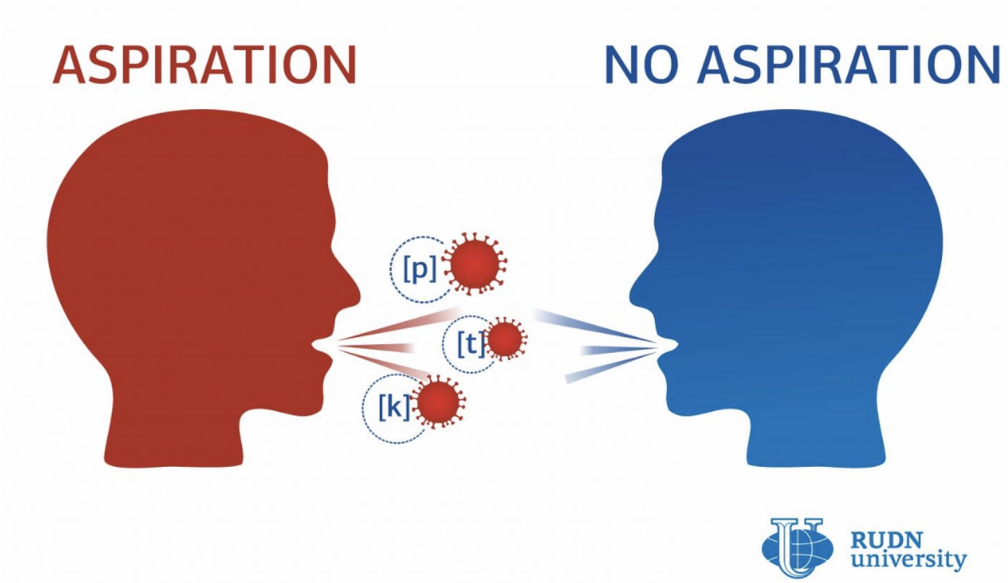
(h) high back lax vowel

(i) voiced labio-velar glide

(j) voiceless palatal affricate

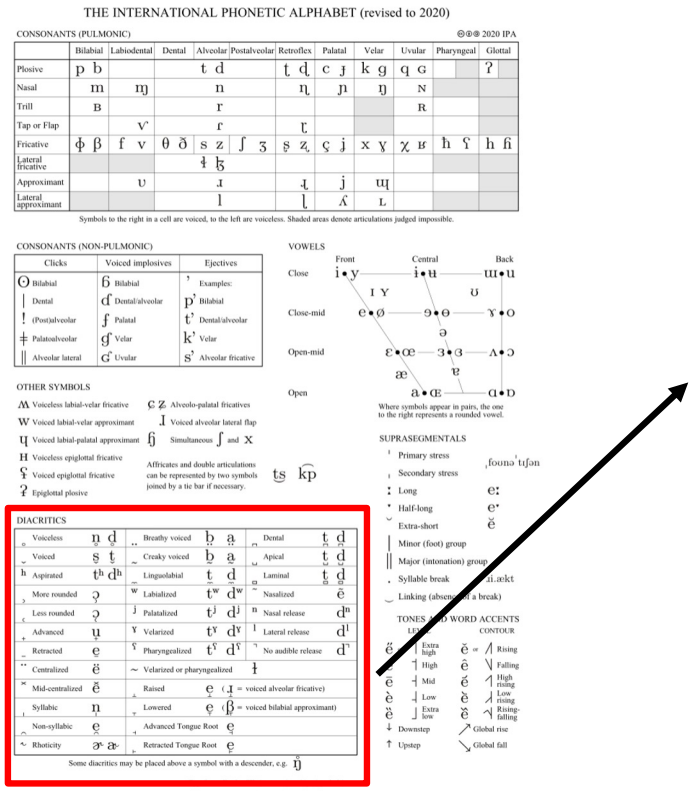
Aspiration

- aspiration: puff of air (in stop consonants, follows the release)
  - Voiceless Aspirated: “top”
  - Voiceless Unaspirated: “stop”



https://www.eurekalert.org/news-releases/668383

Aspiration in the IPA Chart


THE INTERNATIONAL PHONETIC ALPHABET (revised to 2020)

CONSONANTS (PULMONIC) ©℗® 2020 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		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		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
ʘ Bilabial	ɓ Bilabial	ʼ Examples:
ǀ Dental	ɗ Dental/alveolar	pʼ Bilabial
ǃ (Post)alveolar	ʄ Palatal	tʼ Dental/alveolar
ǂ Palatoalveolar	ɠ Velar	kʼ Velar
ǁ Alveolar lateral	ʛ Uvular	sʼ Alveolar fricative

OTHER SYMBOLS

ʍ Voiceless labial-velar fricative
W Voiced labial-velar approximant
ɥ Voiced labial-palatal approximant
ʜ Voiceless epiglottal fricative
ʢ Voiced epiglottal fricative
ʡ Epiglottal plosive
ɕ ʑ Alveolo-palatal fricatives
ɺ Voiced alveolar lateral flap
ɧ Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary. t͡s k͡p

VOWELS

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

SUPRASEGMENTALS

ˈ Primary stress ˌfoʊnəˈtɪʃən
ˌ Secondary stress
ː Long eː
ˑ Half-long eˑ
˘ Extra-short ĕ
| Minor (foot) group
‖ Major (intonation) group
. Syllable break ɹi.ækt
‿ Linking (absence of a break)

TONES AND WORD ACCENTS

LEVEL: ˥ Extra high, ˦ High, ˧ Mid, ˨ Low, ˩ Extra low, ↓ Downstep, ↑ Upstep

CONTOUR: ˩˥ Rising, ˥˩ Falling, ˧˥ High rising, ˨˩ Low rising, ˥˩˥ Rising-falling, ↗ Global rise, ↘ Global fall

DIACRITICS

◌̥ Voiceless	n̥ d̥	◌̤ Breathy voiced	b̤ a̤	◌̪ Dental	t̪ d̪
◌̬ Voiced	s̬ t̬	◌̰ Creaky voiced	b̰ a̰	◌̺ Apical	t̺ d̺
◌ʰ Aspirated	tʰ dʰ	◌̼ Linguolabial	t̼ d̼	◌̻ Laminal	t̻ d̻
◌̹ More rounded	ɔ̹	◌ʷ Labialized	tʷ dʷ	◌̃ Nasalized	ẽ
◌̜ Less rounded	ɔ̜	◌ʲ Palatalized	tʲ dʲ	◌ⁿ Nasal release	dⁿ
◌̟ Advanced	u̟	◌ˠ Velarized	tˠ dˠ	◌ˡ Lateral release	dˡ
◌̠ Retracted	e̠	◌ˤ Pharyngealized	tˤ dˤ	◌̚ No audible release	d̚
◌̈ Centralized	ë	~ Velarized or pharyngealized		ɫ	
◌̽ Mid-centralized	e̽	◌̝ Raised	e̝ (ɪ̝ = voiced alveolar fricative)		
◌̩ Syllabic	n̩	◌̞ Lowered	e̞ (β̞ = voiced bilabial approximant)		
◌̯ Non-syllabic	e̯	◌̙ Advanced Tongue Root	e̙		
◌˞ Rhoticity	ɚ a˞	◌̘ Retracted Tongue Root	e̘		

Some diacritics may be placed above a symbol with a descender, e.g. n̊ʲ

DIACRITICS

◌̥ Voiceless	n̥ d̥	◌̤ Breathy voiced	b̤ a̤	◌̪ Dental	t̪ d̪
◌̬ Voiced	s̬ t̬	◌̰ Creaky voiced	b̰ a̰	◌̺ Apical	t̺ d̺
◌ʰ Aspirated	tʰ dʰ	◌̼ Linguolabial	t̼ d̼	◌̻ Laminal	t̻ d̻
◌̹ More rounded	ɔ̹	◌ʷ Labialized	tʷ dʷ	◌̃ Nasalized	ẽ
◌̜ Less rounded	ɔ̜	◌ʲ Palatalized	tʲ dʲ	◌ⁿ Nasal release	dⁿ
◌̟ Advanced	u̟	◌ˠ Velarized	tˠ dˠ	◌ˡ Lateral release	dˡ
◌̠ Retracted	e̠	◌ˤ Pharyngealized	tˤ dˤ	◌̚ No audible release	d̚
◌̈ Centralized	ë	~ Velarized or pharyngealized		ɫ	
◌̽ Mid-centralized	e̽	◌̝ Raised	e̝ (ɪ̝ = voiced alveolar fricative)		
◌̩ Syllabic	n̩	◌̞ Lowered	e̞ (β̞ = voiced bilabial approximant)		
◌̯ Non-syllabic	e̯	◌̙ Advanced Tongue Root	e̙		
◌˞ Rhoticity	ɚ a˞	◌̘ Retracted Tongue Root	e̘		

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Agenda

2. Assignment 1 Questions [Part B Only]

- Question 11: Describe consonants in terms of voicing, place of articulation, and manner of articulation.

- Question 12: Describe vowels in terms of vertical tongue position, horizontal tongue position, and tensity (tense or lax).

- Question 13: Write the symbols corresponding to phonetic descriptions.

- Question 14: Identify whether pairs of words are minimal pairs and explain.

- Question 15: Use linguistic data to identify whether two sounds are phonemes or allophones.

Minimal Pairs and Phonemes

- minimal pair: a pair of words that differ in only one sound in the same position
    - Minimal Pair: **p**ot, **b**ot
    - Not a Minimal Pair: **c**a**p**, **b**a**t**
        - differs in more than one sound
    - Not a Minimal Pair: to**p**, **b**ot
        - differs in more than one sound, but not in the same position
- phoneme: smallest unit of sound capable of distinguishing the meaning of one word from another (ex. in English, /p/ and /b/ are separate phonemes)

How To Know If Two Sounds Are Phonemes: Use The Minimal Pair Test

- Imagine you have two sounds (ex. [t] and [n]) are asked if they are phonemes. With the minimal pair test, you are essentially asking: Is there a pair of words that only differs in those 2 sounds in the same position?

- Answer: Yes. One relevant minimal pair is “meat” and “mean”. Both are exactly the same except for the final consonant. By placing [t] and [n] in the same position, we create a change in word meaning, implying that [t] and [n] are phonemes.

- Note that there are many other minimal pairs for [t] and [n] (e.g., not and tot, snack and stack, etc.). However, as soon as you find 1 minimal pair, you are done - you have already proven that the 2 sounds of interest are phonemes.

All of the symbols in the chart below are English phonemes

A Phonetic Alphabet for English Pronunciation

Consonants						Vowels			
p	**p**ill	t	**t**ill	k	**k**ill	i	b**ee**t	ɪ	b**i**t
b	**b**ill	d	**d**ill	g	**g**ill	e	b**ai**t	ɛ	b**e**t
m	**m**ill	n	**n**il	ŋ	ri**ng**	u	b**oo**t	ʊ	f**oo**t
f	**f**eel	s	**s**eal	h	**h**eal	o	b**oa**t	ɔ	b**o**re
v	**v**eal	z	**z**eal	l	**l**eaf	æ	b**a**t	ɑ	p**o**t/b**a**r
θ	**th**igh	ʧ	**ch**ill	r	**r**eef	ʌ	b**u**tt	ə	sof**a**
ð	**th**y	ʤ	**g**in	j	**y**ou	aɪ	b**i**te	aʊ	b**ou**t
ʃ	**sh**ill	ʍ	**wh**ich	w	**w**itch	ɔɪ	b**oy**		
ʒ	mea**s**ure								

Important: Words that rhyme are not necessarily minimal pairs.

- Example: Rhyming + Minimal Pair
    - scar vs. star
    - /s**k**ɑr/ vs. /s**t**ɑr/ (differ in only 1 sound in the same position)
- Example: Rhyming + Not A Minimal Pair
    - scar vs. afar
    - /**sk**ɑr/ vs. /**ə f**ɑr/ (differ in more than 1 sound)

Question 14

I'd like 6 volunteers to come up to the chalkboard and write down the answers for the questions below. (No need for a phonetic transcription).

14. Please say which of these are minimal pairs and which are not and explain why.

(a) bled & fled

(b) cry & fry

(c) mane & slain

(d) pit & wit

(e) bring & sing

(f) cream & beam

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Allophones

- allophone: members of the same phoneme that are predictable from the surrounding context

    - Let's see some examples…

A Strategy for Determining Allophone Distribution

- Question: Are [n̪] (the dental nasal) and [n] phonemes or allophones in English? If they are allophones, find their distribution.

- Step 1: Examine the data to see if there are any minimal pairs.

  - No minimal pairs (ex. [n̪aɪf] and [naɪf] aren't separate words) => [n̪] and [n] are likely allophones.

- Step 2: For each instance of [n] and [n̪] in the data set, list the preceding and following consonant ("the environment").

n	n̪
A - #_aɪ	D - ʌ_θ
B - #_u	E - ə_θ
C - eɪ_#	F - æ_θ

** '#' refers to the beginning or ending of a word **

Step 3: Find a systematic pattern in the data. Is there a sound or group of sounds that always precedes or follows one allophone, but not another?

Yes. Based on these data, [n̪] only appears before θ - otherwise only [n] appears.

Data:

A - [naɪf] knife

B - [nu] new

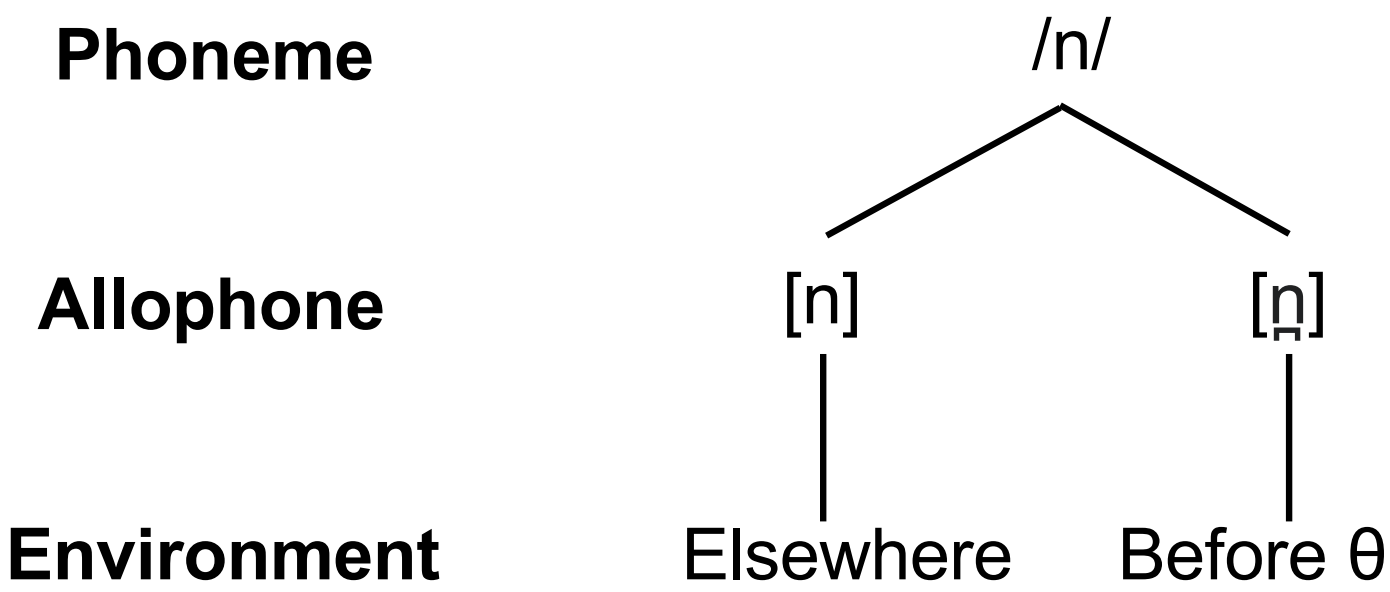
C - [feɪn] feign

D - [mʌn̪θ] month

E - [bɪljən̪θ] billionth

F - [pæn̪θɝ] panther

English: The Distribution of [n] and [n̪]



** Note that the actual distribution of [n] and [n̪] in English is more complex, but this is all we can conclude based on the data provided. **

Data:

A - [**n**aɪf] knife

B - [**n**u] new

C - [feɪ**n**] feign

D - [mʌ**n̪**θ] month

E - [bɪljə**n̪**θ] billionth

F - [pæ**n̪**θɝ] panther

Phonemes vs. Allophones

Phonemes (ex. /n/ and /w/ in English)

- Unpredictable From Context
    - Given a particular context or environment (ex. #_aɪf,) either /n/ or /w/ could be inserted to form a novel word (“knife”, “wife”).
- Contrastive Distribution

Allophones (ex. [n] and [n̪] in English)

- Predictable From Context
    - Given the context #_aɪf, we know that only [n] could appear in the blank space, since [n̪] only appears before [θ].
- Complementary Distribution

** Note that we use slashes for phonemes and square brackets for phones (individual sounds). **

Expanding on Step 3 of the Strategy…

- Step 3 says: “Find a systematic pattern in the data. Is there a sound or group of sounds that always precedes or follows one allophone, but not another?”

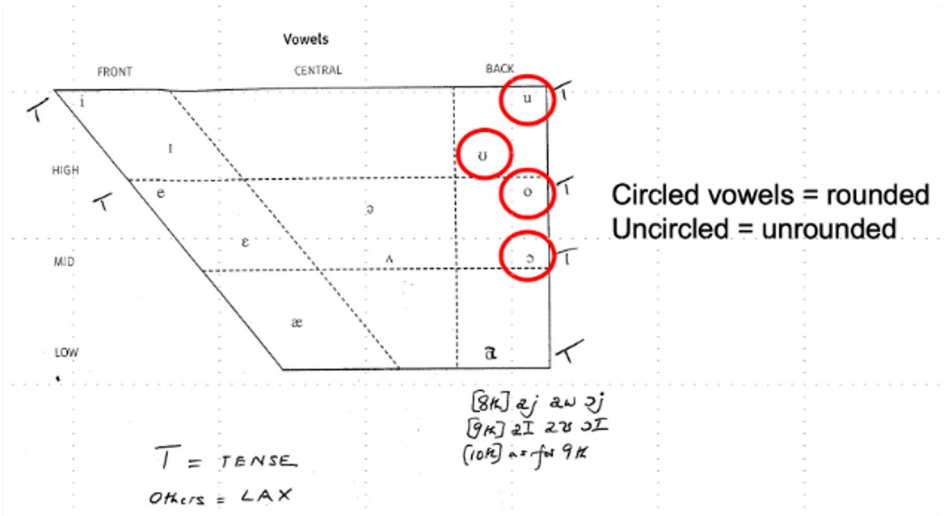
- You might be wondering…what is meant by a “systematic pattern” and a “group of sounds”?

Natural Classes

- Recall that sounds can be grouped together based on their articulatory properties:
  - Consonants: voicing, place of articulation, manner of articulation
  - Vowels: height, frontness, tenseness, roundedness

Some Phonetic Symbols for American English Consonants

	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (oral)							
voiceless	p			t		k	ʔ
voiced	b			d		g	
Nasal (voiced)	m			n		ŋ	
Fricative							
voiceless		f	θ	s	ʃ		h
voiced		v	ð	z	ʒ		
Affricate							
voiceless					ʧ		
voiced					ʤ		
Glide							
voiceless	ʍ					ʍ	
voiced	w				j	w	
Liquid (voiced)							
(central)				r			
(lateral)				l			



Natural Classes

- Sounds with similar properties form *natural classes*. Here are some examples:
    - Alveolar consonants: {t, d, n, s, z, r, l)
        - Alveolar stop consonants: {t, d}
        - Voiceless alveolar stop consonants: {t}
        - Front vowels: {i, I, e, }
        - High front vowels: {i, I}
        - High front tense vowels: {i}
        - Vowels: {i, I, u, a, …}
        - Consonants: {p, b , t, d, …}

Natural Classes and Step 3 of the Strategy

- Step 3 says: “Find a systematic pattern in the data. Is there a sound or group of sounds that always precedes or follows one allophone, but not another?”

- By “systematic pattern”, we mean that in the data, one allophone should always be preceded or followed by a member of a *natural class*.

n	n̪
A - #_aɪ	D - ʌ_θ
B - #_u	E - ə_θ
C - eɪ_#	F - æ_θ

In the environments of [n] and [n̪] (see above), we see that [n̪] is always followed by a member of the same natural class: the voiceless interdental fricative [θ].

Question 15

Discuss the question below in groups of 3. Write down your collective answer (1-2 sentences only) on a sheet of paper. (Note that Slides 14 and 18 of the Week 2 slides can be helpful).

15. Look at the word list in Spanish below. Are [d] and [ð] phonemes or allophones? Define and explain their distribution.

1. [drama] “drama”	5. [laðo] “side”	9. [sueldo] “salary”
2. [dolor] “pain”	6. [oðio] “hatred”	10. [durar] “pain”
3. [dime] “tell me”	7. [komiða] “food”	11. [toldo] “tell me”
4. [kaða] “each”	8. [anda] “each”	12. [falda] “each”

Example #2: Determining Allophone Distribution

- Question: Are [n] (voiced alveolar nasal) and [ŋ] (voiced velar nasal) phonemes or allophones in Italian? If they are allophones, find their distribution.

- Step 1: Examine the data to see if there are any minimal pairs.

    - No minimal pairs (ex. [tinta] and [tiŋta] aren't separate words) => [n] and [ŋ] are likely allophones.

- Step 2: For each instance of [n] and [ŋ] in the data set, list the preceding and following consonant ("the environment").

n	**ŋ**
A - a_a	D - i_**g**
B - ɛ_d	E - e_**g**
C - a_t	F - a_**k**

Step 3: Find a systematic pattern in the data. Is there a sound or group of sounds that always precedes or follows one allophone, but not another? (Hint: Look at the IPA chart on Slide 14 of the Week 2 Slides).

Yes. Based on these data, [ŋ] only appears before velar stop consonants ([g] and [k]) - otherwise only [n] appears.

Italian Data:

A - [ra**n**a] frog

B - [tɛ**n**da] tent

C - [da**n**tsa] dance

D - [ti**ŋ**go] I dye

E - [te**ŋ**go] I keep

F - [bja**ŋ**ka] white

Italian: The Distribution of [n] and [ŋ]

Phoneme /n/

Allophone [n] [ŋ]

Environment Elsewhere Before Velars

Italian Data:

A - [ti**n**ta] dye

B - [tɛ**n**da] tent

C - [da**n**tsa] dance

D - [ti**ŋ**go] I dye

E - [te**ŋ**go] I keep

F - [bja**ŋ**ka] white

** Note that /n/ and /ŋ/ are phonemes in English (ex. “sin” vs. “sing”; see the IPA chart). **This shows cross-linguistic differences in allophones and phonemes.** **

More practice with phonemes and allophones…

Look at the word list in Finnish below. Are [t] and [d] phonemes or allophones? Define and explain their distribution.

1. [ratas] “wheel”
2. [kate] “cover”
3. [maton] “of a rug”
4. [kade] “envious”
5. [kadot] “failures”
6. [radan] “of a track”

More practice with phonemes and allophones…

Look at the word list in Kenyang (a Mamfe language spoken in Cameroon) below. Are [k] (the voiceless velar stop) and [q] (the voiceless uvular stop) phonemes or allophones? Define and explain their distribution.

1. [enɔq]	“tree”	6. [nɑq]	“brother-in-law”
2. [ndek]	“European”	7. [eket]	“house”
3. [pɔbrik]	“work project”	8. [nek]	“rope”
4. [enoq]	“drum”	9. [ntʃiku]	“I am buying”
5. [ngɑq]	“knife”	10. [ekɑq]	“leg”

Articulatory Explanations for Allophone Distributions

- You might be wondering: “Why are allophones distributed in one way, but not another?”. For example, in Italian, why is it the velar nasal [ŋ], as opposed to the alveolar nasal [n], that comes before velar consonants? The answer is that there is often (but not always) an *articulatory* explanation for allophone distribution.

- Sounds tend to *assimilate* - it is easier to produce two adjacent sounds when they have similar articulatory properties. Thus, it makes sense for the velar nasal to come before velar consonants because both share the same place of articulation.

- The same logic applies when consonants and vowels are adjacent. Front vowels often come next to consonants whose place of articulations is more front in the mouth, while back vowels often come next to consonants whose place of articulation is further back in the mouth!

Articulatory Explanations for Allophone Distributions

- You should know that the columns of the consonant IPA chart are organized so that as you go from left to right, the tongue is placed further back in the mouth (compare the images below!)

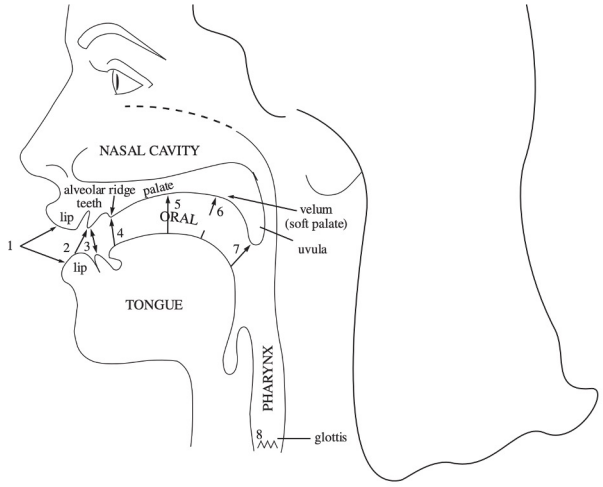


FIGURE 5.1 | The vocal tract. Places of articulation: 1. bilabial; 2. labiodental; 3. interdental; 4. alveolar; 5. (alveo)palatal; 6. velar; 7. uvular; 8. glottal.

Some Phonetic Symbols for American English Consonants

	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
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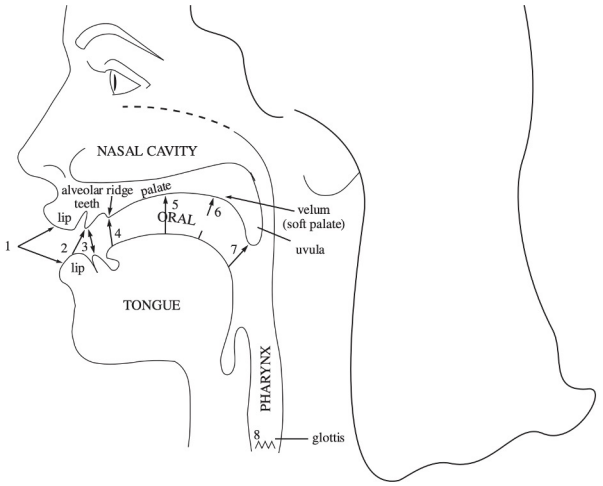
voiced	b			d		g	
Nasal (voiced)	m			n		ŋ	
Fricative							
voiceless		f	θ	s	ʃ		h
voiced		v	ð	z	ʒ		
Affricate							
voiceless					ʧ		
voiced					ʤ		
Glide							
voiceless	ʍ					ʍ	
voiced	w				j	w	
Liquid (voiced)							
(central)				r			
(lateral)				l			

Articulatory Explanations for Allophone Distributions

Let's return to this example from Kenyang. Provide an articulatory explanation for the distribution of [k] (the voiceless velar stop) and [q] (the voiceless uvular stop).

1. [enɔq] "tree"
2. [ndek] "European"
3. [pɔbrik] "work project"
4. [enoq] "drum"
5. [ngɑq] "knife"
6. [nɑq] "brother-in-law"
7. [eket] "house"
8. [nek] "rope"
9. [ntʃiku] "I am buying"
10. [ekɑq] "leg"



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1. Materials Needed for Today
2. Assignment 1 Questions [Part B Only]
3. **Review Key Terms and Additional Concepts Not Covered in Assignment 1**
4. Resources + Study Tips
5. Open Floor

Recall that for the exam, you have to know the key terms for each week…

Key terms:

Sounds: Consonants & Vowels
Places of articulation (e.g. bilabial, labiodental, etc.)
Manners of articulation (stop, fricative, etc.)
Obstruent vs. sonorant
International Phonetic Alphabet (IPA)
Coarticulation
Suprasegmental
Phonemes & Allophones
Minimal pair
Contrastive & Complementary distribution
Phonotactics
Syllabic vs. nonsyllabic sounds

See Slide 2 in the Week 2 Slides

What we've covered and what we haven't covered in discussion so far:

- Sounds: Consonants & Vowels 
- Places of articulation 
- Manners of articulation 
- Obstruent vs. sonorant 
- International Phonetic Alphabet (IPA) 
- Coarticulation 

- Suprasegmental 
- Phonemes 
- Minimal Pair 
- Contrastive & Complementary distribution 
- Phonotactics 
- Syllabic vs. nonsyllabic sounds 

Where to Learn More About the Key Terms We Haven't Covered So Far

- Obstruent vs. sonorant (textbook, p. 209)

- Coarticulation (textbook p. 243-245)

- Suprasegmentals, Pitch, Tone, Intonation (Slides 5, 22-24; textbook p. 210-213)

- Phonotactics (Slide 35; textbook p. 257)

- Syllabic vs. nonsyllabic sounds, glides (Slides 8-9; textbook p. 202, 210)

refers to Week 2 slides and the
10th edition of the textbook

Where to Learn More About the Key Terms We Haven't Covered So Far

- Note that orthography (spelling) does not always align with phonetics (Slide 10; textbook p. 192-194)

- Diphthongs (Slide 15; textbook p. 207-208)

- Assimilation, epenthesis, other types of articulatory processes (Slide 21; textbook p. 243-248)

- Glottal States (Slide 6)

refers to Week 2 slides and the 10th edition of the textbook

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YouTube Videos Explaining Phonemes and Allophones

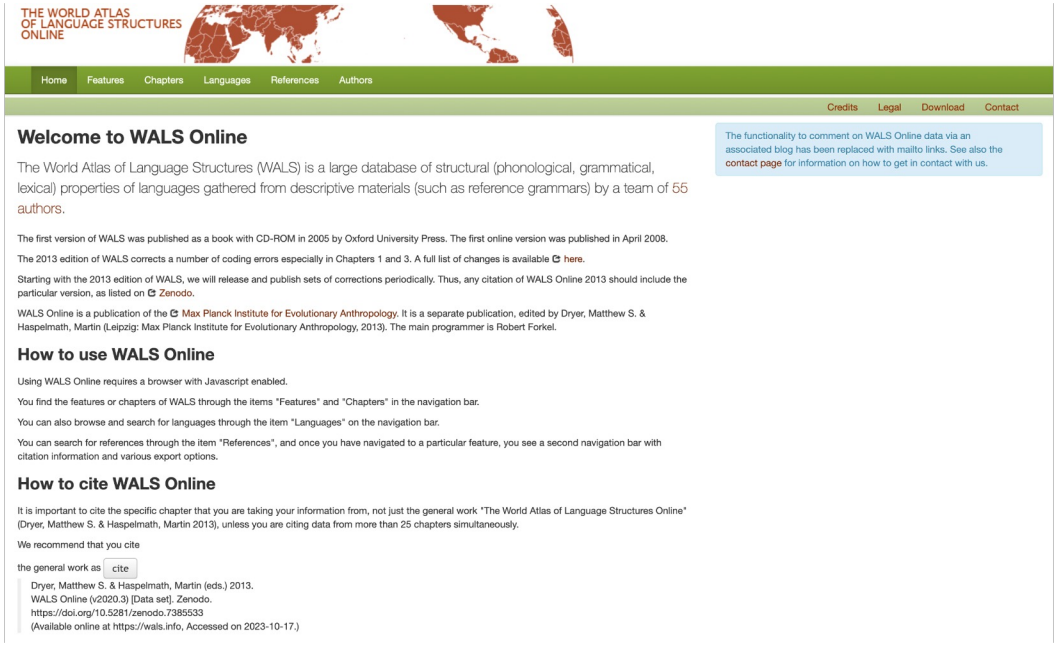
1. Explanation of Phonemes and Allophones:
https://www.youtube.com/watch?v=zGM8dSLCnyc

2. Allophone Practice Problems:
https://www.youtube.com/watch?v=ZWmY5XBFQsE

3. More Practice Problems:
https://www.youtube.com/watch?v=SAABG01KUu4

4. I encourage you to find other videos (also feel free to drop by my office hours!).

World Atlas of Language Structures (WALS): Learn more about other languages' phonology!



https://wals.info/

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Any questions, comments, or concerns?

Office Hours: Tuesday (10am-1pm), Thursday (12-3pm) in Kerr 261