Class 4
Finishing up the IPA, and phonological features
9/24/19

1   Today's Agenda

- Finish up the IPA
- Phonological features
- Syllables and sonority

2   Vowels

- Vowels are made by moving the tongue body around the middle of the mouth (virtually no constriction)

- Linguists describe vowels with five primary features:

(1)   Primary vowel features

    (i)   **Height**
    (ii)   **Backness**
    (iii)   **Roundness**
    (iv)   **Tenseness**
    (v)   (**Monophthong or diphthong**)

2.1   Height

- Height refers to how high the tongue body is during articulation.
- Most linguists don't use the IPA's terminology (it makes more sense for phonetics than it does for phonology)
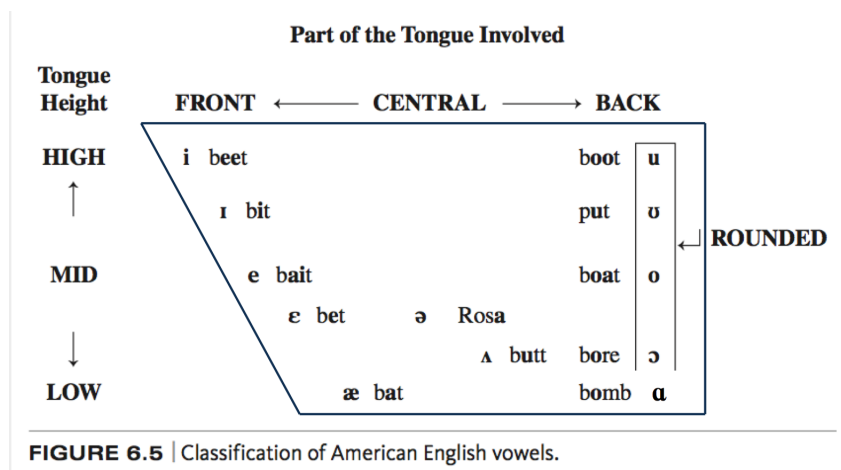- Instead we use a three-way distinction:

(2)   Vowel height   Vowels of English

    a.   **High**   [i,ɪ,u,ʊ]
    b.   **Mid**   [(eɪ),ɛ,ə,ʌ,(oʊ),ɔ]
    c.   **Low**   [æ,a]

(3)   English vowel chart with *high, mid, low* ("*ow*" and ɔ should both be mid; *a* should be back as in (4))

Simple & Glided Vowels

(4)   Similar chart with example words

FIGURE 6.5 | Classification of American English vowels.

2.2   Backness/frontness

- Backness refers to the front/back position of the tongue body during articulation.
- Three-way distinction:

(5)   Vowel Backness   Vowels of English
    a.   **Front**   [i,ɪ,eɪ,ɛ,æ]
    b.   **Central**   [ə,ʌ]
    c.   **Back**   [u,ʊ,oʊ,ɔ,a]

2.3   Roundness

- Roundness refers to whether the lips are rounded during articulation.
- Two-way distinction: rounded [+round] vs. unrounded [-round]

(6)   Vowel Roundness   Vowels of English
    a.   **Round**   [u,ʊ,oʊ,ɔ]
    b.   **Unround**   [i,ɪ,eɪ,ɛ,æ,ə,ʌ,a]

- In English, as in many languages, there's a correlation between backness and roundness: back vowels are round (except the low back vowel) and non-back vowels are unround.
  - There are plenty of languages with round front vowels (French) and unrounded back vowels (Mongolian).
- Implicational universals:
  - If a language has round vowels, some of those vowels are always back
  - If a language has unrounded vowels, some of those vowels are always front

2.4   Tenseness

- Tenseness refers to whether the vowel is articulated at the exterior of the vowel space (tense) or in the interior of the vowel space (lax).
- Two-way distinction: tense [+tense] vs. lax [-tense]

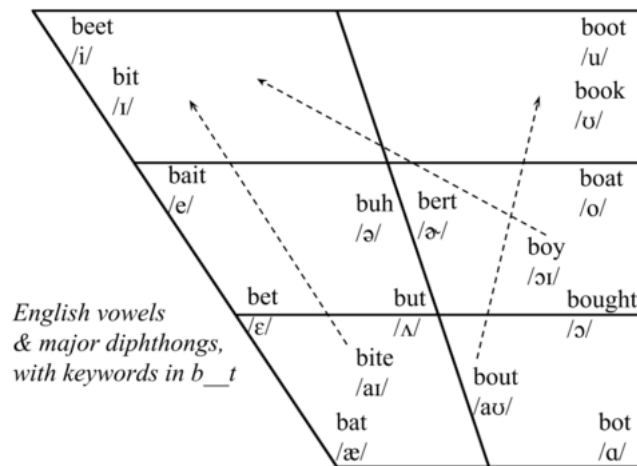(7)   English vowel chart with tenseness (and roundness)

(1) The vowels (monophthongs) of English.
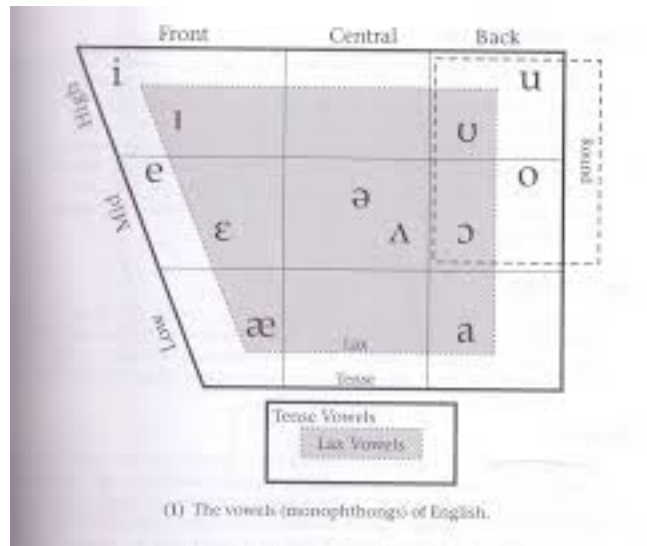
(8)   Vowel Tenseness   Vowels of English
        a.   **Tense**   [i,u,(eɪ,oʊ)]
        b.   **Unround**   [ɪ,ʊ,ɛ,ɔ,ə,ʌ,æ,a]

2.5   Monophthong vs. Diphthong

• Vowels can be single articulations (monophthongs) or movements from one articulation to another (diphthongs).

(9)   English vowel chart with diphthongs and example words

• English has three "real" diphthongs and two "inherent diphthongs" (tense mid vowels with a slight rise at the end)

(10)   English diphthongs
        a.   Real diphthongs: [aɪ] as in 'buy', [aʊ] as in 'cow', and [ɔɪ] as in 'boy'
        b.   Inherent diphthongs: [eɪ] as in 'bay', [oʊ] as in 'go'

3

2.6   Suprasegmental features on vowels

- Vowels can differ in their categorical **length**
    - Vowels can be either short [-long] or long [+long]
    - Long vowels have extra duration (usually around double a short vowel)
- Short vowels have no special diacritics
    - Long vowels use double triangles following the symbol: [aː]
    - (Sometimes people just use a colon [a:], or a macron above the symbol [ā], or just write the vowel twice [aa])

- Vowels can be marked for **stress**
    - Stress ≈ emphasis, by increased duration, loudness, and/or pitch
- Stress can either be primary/main or secondary
    - IPA marks primary stress with [ˈσ] at the beginning of the stressed syllable, secondary stress with [ˌσ] at the beginning of the stressed syllable.
    - Commonly, people use accent marks on vowels: acute for primary stress [á], grave for secondary stress [à].

(11)   Stress marking

	IPA	standard
Primary	[ˌprɛ.zɪ.ˈdɛn.tʃəl]	[prɛ̀.zɪ.dɛ́n.tʃəl]
Secondary	[ˌprɛ.zɪ.ˈdɛn.tʃəl]	[prɛ̀.zɪ.dɛ́n.tʃəl]

- Vowels can also bear **tones**
    - Specifications about the *pitch* of the vowel
- IPA uses accent marks on the vowel
    - This can get confusing, because people often use these marks to indicate stress.
    → Languages usually don't have both stress and tone, so it's usually not ambiguous.

(12)   Basic types of tone (IPA notation)
    a.   High: [á]
    b.   Low: [à]
    c.   Mid(/level): [ā]

- There can also be contour tones (rising, falling, rising-falling, etc.).

3   Phonological features

- In addition to the phonetic features the IPA uses to describe sounds, there are additional *phonological* features that group phonetic features into larger **natural classes**.
    ↪ A **natural class** is a set of sounds that share a particular set of properties and (can) pattern together with respect to phonological processes and sound changes.
- Phonological features are typically **binary** (a "+" value and a "−" value).

3.1   Vowels

- For vowels, there's not much beyond the five basic phonetic features (height, backness, roundness, tenseness, monophthong/diphthong).

- One noteworthy thing is the treatment of *height*. Phonologists derive the *three*-way height distinction in terms of *two* binary features: [±high] and [±low].

(13) a. High vowels = [+high,-low]
      b. Mid vowels = [-high,-low]   (no feature [±mid])
      c. Low vowels = [-high,+low]
      ✗   [+high,+low] is physically impossible

  ○ We can use "mid" as a term of convenience, but [±mid] is not a feature.

• The two types of mid vowels (IPA's "close-mid" [e,o] vs. "open-mid" [ɛ,ɔ]) are distinguished by their tenseness:
  ○ "Tenseness" is sometimes called "Advanced Tongue Root" (ATR): [+tense] ↔ [+ATR], [-tense] ↔ [-ATR]

(14) a. "Close-mid" = [-high,-low,**+tense**] or [-high,-low,**+ATR**]
      b. "Open-mid" = [-high,-low,**-tense**] or [-high,-low,**-ATR**]

• Backness is also a binary feature: back vowels = [+back], front vowels = [-back]
  ○ We don't typically use [±front]
  ○ Not completely clear how characterize central vowels using just [±back]...

3.2   Consonants

• Most of the larger-grouping phonological features have to do with consonants.

3.2.1   Place

• We've already seen the "major place" features:

(15) a. [Labial] = bilabial, labiodental, (labiovelar)
      b. [Coronal] = dental, interdental, alveolar, postalveolar, retroflex, palatal, (alveopalatal)
      c. [Dorsal] = velar, uvular, (labiovelar)
      d. [Pharyngeal] = pharyngeal, epiglottal, (glottal)

  ○ Major place features are usually thought of as "**privative**" — each of these features is either present or not present, rather than multivalued.
  ○ e.g., bilabial and velar cannot be grouped together as [-Coronal]

3.2.2   Manner

• Many important phonological features have to do with **manner** (≈constriction).

(16)   Phonological manner features

| [±**continuant**]	TYPE OF SOUND	[±**sonorant**]	[±**consonantal**]	[±**syllabic**]
[**-cont**]	STOPS			
[+/-*cont*]	AFFRICATES	[-son]		
[+cont]	FRICATIVES		[+cons]	[-syll]
[**-cont**]	NASALS			
	LIQUIDS			
[+cont]	GLIDES	[+son]		
	VOWELS		[-cons]	[+syll]

• **Continuants:** sounds that don't fully obstruct oral airflow
  ○ [+continuant] = fricatives, liquids, glides, vowels
  ○ [-continuant] = stops, nasals
  → Affricates have a [-cont] portion at the beginning and a [+cont] portion at the end

- **Sonorants:** sounds that don't substantially obstruct airflow
  - ○ [+sonorant] = nasals, liquids, glides, vowels
  - ○ [-sonorant] = stops, affricates, fricatives
  - → Correlates with "sonority scale" (see below)
- **Consonantal** sounds: sounds that obstruct airflow at least a little bit
  - ○ [+consonantal] = stops, affricates, fricatives, nasals, liquids
  - ○ [-consonantal] = glides, vowels
  - → In some languages, (certain) glides have greater constriction and pattern with [+cons]
- **Syllabic** sounds: sounds that form a syllable nucleus
  - ○ [+syll] = vowels
  - ○ [-syll] = everything else (usually...)
  - → In certain languages, under specific circumstances, consonants can function as syllable nuclei, and thus be [+syll] (more below)

- One other feature that cross-cuts place and manner: [±**strident**]
  - ○ Refers to sounds that have loud frication noise
  - ○ [+strident] sounds also known as "sibilants", basically "s"-like sounds
  - ○ English [s,z,ʃ,ʒ,tʃ,dʒ] = (non-interdental) Coronal fricatives and affricates

4   Syllables and Sonority

- Words are divided up into syllables.
  - ○ Syllable boundaries are indicated by periods: [prɛ.zɪ.dɛn.tʃəl]
  - ○ Syllable is often abbreviated as sigma σ.

- Syllables are built around vowels
  - → Every vowel creates its own syllable.

- Syllables consist of three parts:

(17)   Components of a syllable
  - a. **Onset:** initial consonant or consonants
  - b. **Nucleus:** the vowel (can be a monophthong or a diphthong)
  - c. **Coda:** final consonant or consonants

- Nucleus and coda form a constituent called the **rhyme** (or rime)

(18)   Syllable tree
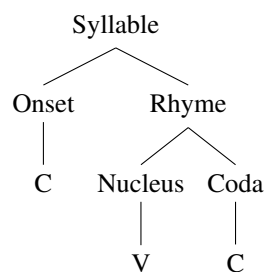
- A consonant between two vowels always gets syllabified as an onset, not a coda: [prɛ.**zɪ**.**d**ɛn.tʃəl]
  - When there are multiple consonants between vowels, syllabification is based on "sonority" (more below).

- Consonants can sometimes function like vowels and form the nucleus of a syllable.
  - When they do this, we mark them with a vertical line below: [m̩]

(19)   Syllabic final consonants
        bottle [ˈba.ɾl̩]   *bottom* [ˈba.ɾm̩]
        butter [ˈbʌ.ɾɪ]   *button* [ˈbʌ.ʔn̩]

- While [±sonorant] chunks "sonority" into two groups, sonority also functions as a scale.

(20)   Sonority scale

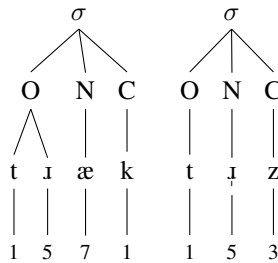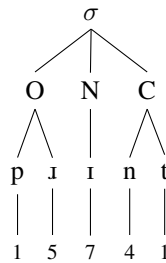| 1	2	3	4	5	6	7
Stop	Affricate	Fricative	Nasal	Liquid	Glide	Vowel
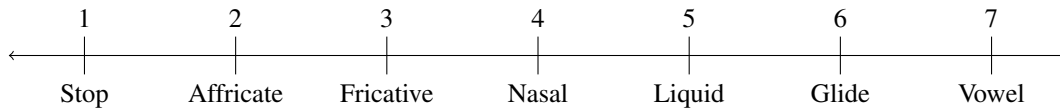
- Syllables are generally constructed around **sonority peaks** (which usually means vowels).
  - The nucleus is the sonority peak.
  - Sonority normally *rises* from the beginning of the syllable (the onset) to the nucleus.
  - Sonority normally *falls* from the nucleus to the end of the syllable (coda).
  ↪ In English, and many other languages, [s] can show up in places where it violates these sonority principles.

(21)   Example syllable trees
        a. Syllable tree for *tractors*   b. Syllable tree for *print*   c. Syllable tree for *sprints*