Articulatory Phonetics and the International Phonetic Alphabet
Supplementary Readings

The following readings have been posted to the Moodle course site:

▶ Contemporary Linguistics: Chapter 2 (pp. 34-40)
Handouts for This Lecture

For this lecture, you should have printed out the following handout, which was posted to the course website:

- Chart of IPA Symbols
Online Tutorials

Some helpful online tutorials (and related stuff) have been posted to the course website, under the page “Readings and Tutorials”
Review: The Need for a Phonetic Alphabet

- For the next few weeks, we’ll be studying the sound systems of human languages

- Therefore, we need a way of representing speech sounds (phones)

- Conventional spelling systems (like for English) are no good for this:
  - They are ambiguous (‘read’ ≈ ‘reed’ or ‘red’)
  - They only represent some phones
Review:
The International Phonetic Alphabet

The International Phonetic Alphabet (IPA)

- A unambiguous notation that represents the phones of all the worlds languages
  - Every phone is represented by one symbol
  - Every symbol represents only one phone

- The symbols are defined by a description of the sound’s *articulatory phonetics*
  - (How the sound is produced / articulated)
Articulatory Phonetics of Consonants

In English, there are four (main) parameters for describing the articulatory phonetics of consonants:

- **Voicing**: whether the sound is *voiced* or *voiceless*
- **Nasality**: whether the sound is *nasal* or *oral*
- **Place** of Articulation: where the vocal tract is manipulated
  - Bilabial
  - Labio-Dental
  - Dental
  - Alveolar
  - Alveopalatal
  - Palatal
  - Velar
  - Glottal
- **Manner** of articulation: how the vocal tract is manipulated
  - Stop
  - Fricative
  - Affricate
  - Approximant
Review:
Articulatory Phonetics of Consonants

Some IPA Symbols and their Definitions:

[t]  voiceless oral alveolar stop
[m]  voiced nasal bilabial stop
[θ]  voiceless oral dental fricative
[j]  voiced oral palatal approximant
Today Class:

- We will now extend this discussion to vowels:
  - We’ll discuss their articulatory phonetics
  - We’ll define the IPA symbols used for their transcription

- We will practice IPA transcription of English sentences together.
To define the IPA symbols for vowels, we will need to discuss their articulatory phonetics.

In English, there are four main parameters for describing the articulatory phonetics of a vowel:

- **Tongue Height** (how close to roof of the mouth)
- **Tongue Backness** (how far back in mouth)
- **Lip Rounding** (whether lips are ‘puckered’)
- **Tenseness** (how ‘tense’ the tongue is)
Vowel Height

One key difference between vowels: their ‘**height**’

- The distance between the tongue and the roof of the mouth

- "Heat": your tongue is near the roof of your mouth
- "Hat": your tongue is lower to your jaw
  (and your jaw is also lowered some, too...)
Vowel Height

- One key difference between vowels: their ‘height’
  - The distance between the tongue and the roof of the mouth

- To feel this, alternate between saying “heat” and “hat”
  - “Heat”: your tongue is near the roof of your mouth
  - “Hat”: your tongue is lower to your jaw
    - (and your jaw is also lowered some, too...)
Vowel Height

When describing height, three values are used:

- **High:** very close to the roof of the mouth
  - [i] “ee”-sound (heat)
  - [u] “oo”-sound (hoot)

- **Mid:** mid-way between roof of mouth and jaw
  - [e] “ay”-sound (hate)
  - [o] “oh”-sound (hope)

- **Low:** lowered to the jaw
  - [æ] “a”-sound (hat)
  - [ɑ] “ah”-sound (hot)
Vowel Backness

- Another key difference between vowels: ‘backness’
  - How far back in the mouth the tongue is positioned
Vowel Backness

- Another key difference between vowels: ‘backness’
  - How far back in the mouth the tongue is positioned

- To feel this, alternately say “heat” and “hoot”
  - “Heat”: your tongue is ‘bunched up’ near the front
  - “Hoot”: your tongue is ‘bunched up’ near the back
Vowel Backness

When describing backness, three values are used:

► Back: close to the back of the mouth
  - [u] “oo”-sound (hoot) high back
  - [o] “oh”-sound (hope) mid back
  - [a] “ah”-sound (hot) low back

► Central: midway between back and front
  - [ʌ] “uh”-sound (cut) low central
  - [ə] “uh”-sound (sofas) mid central
  - [ɪ] “uh”-sound (roses) high central

► Front: at the front of the mouth
  - [i] “ee”-sound (heat) high front
  - [ɛ] “ay”-sound (hate) mid front
  - [æ] “a”-sound (hat) low front
Rounding

- So far, the parameters for describing vowels involve the position of the tongue...

- But another difference involves the lips: ‘rounding’
  - Whether the lips are ‘rounded’ (puckered) when you make the sound
Rounding

- So far, the parameters for describing vowels involve the position of the tongue...

- But another difference involves the lips: ‘rounding’
  - Whether the lips are ‘rounded’ (puckered) when you make the sound

- To feel this, alternately say “heat” and “hoot”
  - “Hoot”: your lips are puckered and extended
  - “Heat”: your lips are not puckered in this way
Rounding

When describing rounding, two values are used:

- **Rounded:** lips are rounded when vowel is made
  - [u] “oo”-sound (hoot)  high back rounded
  - [o] “oh”-sound (hope)  mid back rounded
  - [ɔ] “aw”-sound (caught)  mid back rounded

- **Unrounded:** lips are not rounded when vowel is made
  - [i] “ee”-sound (heat)  high front unrounded
  - [e] “ay”-sound (hate)  mid front unrounded
  - [æ] “a”-sound (hat)  low front unrounded
  - [ɑ] “ah”-sound (hot)  low back unrounded

*Note:* In English, all rounded vowels are back vowels.
*Note:* In some parts of the US, people don’t have [ɔ] ▶ For them, “cot” and “caught” both have [ɑ]
Rounding

When describing rounding, two values are used:

- **Rounded**: lips are rounded when vowel is made
  - [u] “oo”-sound (hoot) high back rounded
  - [o] “oh”-sound (hope) mid back rounded
  - [ɔ] “aw”-sound (caught) mid back rounded

- **Unrounded**: lips are not rounded when vowel is made
  - [i] “ee”-sound (heat) high front unrounded
  - [ɛ] “ay”-sound (hate) mid front unrounded
  - [æ] “a”-sound (hat) low front unrounded
  - [ɑ] “ah”-sound (hot) low back unrounded

**Note**: In English, all rounded vowels are back vowels.

**Note**: In some parts of the US, people don’t have [ɔ]
  - For them, “cot” and “caught” both have [ɑ]
Tenseness

- The final parameter for vowels is ‘tenseness’
  - Before we define it, let’s get an intuitive feel for it.

  - Before we define it, let’s get an intuitive feel for it.
    - Alternate between saying “heat” and “hit”.
      - A few things seem to happen:
        - “Heat”: vowel lasts longer than with “hit”
        - “Heat”: tongue is closer to the roof of mouth
        - “Heat”: tongue ‘tensed’ more than with “hit”
    - Alternate between saying “sale” and “sell”.
      - A few things seem to happen:
        - “Sale”: vowel lasts longer than with “sell”
        - “Sale”: tongue is closer to the roof of mouth
        - “Sale”: tongue ‘tensed’ more than with “sell”
Tenseness

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  - Before we define it, let’s get an intuitive feel for it.

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The final parameter for vowels is ‘tenseness’

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A few things seem to happen:
  ▶ “Heat”: vowel lasts longer than with “hit”
  ▶ “Heat”: tongue is closer to the roof of mouth
  ▶ “Heat”: tongue ‘tensed’ more than with “hit”

Alternate between saying “sale” and “sell”.
A few things seem to happen:
  ▶ “Sale”: vowel lasts longer than with “sell”
  ▶ “Sale”: tongue is closer to the roof of mouth
  ▶ “Sale”: tongue ‘tensed’ more than with “sell”
Tenseness

These differences between “heat.hit” and “sale.sell” illustrate tenseness.
Tenseness

These differences between “heat/hit” and “sale/sell” illustrate **tenseness**.

In describing tenseness, two values are used:

- **Tense Vowels** (“heat”, “sale”)
  - Pronounced with greater “tensing” of the tongue
  - Tongue is closer to roof of the mouth
  - Pronounced with greater duration (length)

- **Lax Vowels** (“hit”, “sell”)
  - Pronounced with less “tensing” of the tongue
  - Tongue is further from roof of the mouth
  - Pronounced with less duration (length)
Tenseness

- Let’s now run through all the tense vowels and all the lax vowels of English.

- By doing this, we will also exhaustively list all the IPA symbols for the (simple) vowels of English.
Tenseness

The Tense Vowels:

- [i] ‘ee’-sound (heat)  high, front, unrounded, tense
- [e] ‘ay’-sound (hate)  mid, front, unrounded, tense
- [u] ‘oo’-sound (hoot)  high, back, rounded, tense
- [o] ‘oh’-sound (hope)  mid, back, rounded, tense
- [a] ‘ah’-sound (hot)  low, back, unrounded, tense

As we will see, there are many more lax vowels in English than tense vowels...
Tenseness

The Lax Vowels:

[i] ‘i’-sound (hit) high, front, unrounded, lax
[ɛ] ‘e’-sound (sell) mid, front, unrounded, lax
[æ] ‘a’-sound (hat) low, front, unrounded, lax

[i] “uh”-sound (roses) high, central, unrounded, lax
[ə] “uh”-sound (sofas) mid, central, unrounded lax
[ʌ] “uh”-sound (cut) low, central, unrounded, lax

[u] “u”-sound (put) high, back, rounded, lax
[o] “aw”-sound (caught) mid, back, rounded, lax
Diphthongs

We’ve just learned:

- The four parameters for describing the articulatory phonetics of (English) vowels
- The IPA symbols for all of the (simple) vowel sounds of English...
Diphthongs

We’ve just learned:

- The four parameters for describing the articulatory phonetics of (English) vowels
- The IPA symbols for all of the (simple) vowel sounds of English...

But, we’re not done yet...
...because we haven’t yet talked about **diphthongs**
What is a ‘Diphthong’?

- **Pure Vowel**: One that does not show a noticeable change in quality during its production
  - That is, the vowel ends in the same place it starts
  - Basically, it’s just one single, simple sound
  - Examples: “bah”, “bee”, “boo”

- **Diphthong**: One that does show a noticeable change in quality during its production
  - That is, the vowel ends differently from how it starts
  - Basically, it’s a combination of vowel sounds
  - Examples: “buy”, “boy”, “bow” (of a ship)
The Major Diphthongs

[aj] “eye”-sound eye, lie, buy, rye, etc.
[aw] “ow”-sound now, how, bow, loud etc.
[ɔj] “oy”-sound boy, toy, joy, Freud etc.

Note:
As with affricates, the IPA representation of a diphthong is a pair of symbols:

- The first is the sound the diphthong starts with
- The second is the sound the diphthong ends with
The Minor Diphthongs

- These are not the only diphthongs of English...
The Minor Diphthongs

- These are not the only diphthongs of English...
- But before I introduce you to the others, I need to make a confession...
The Minor Diphthongs

- These are not the only diphthongs of English...

- But before I introduce you to the others, I need to make a confession...

- I lied to you earlier when I said the following:
  - English contains the following vowels: [e], [o]
  - [e] is the sound in “hate”, [o] is the sound in “hope”
The Minor Diphthongs

- These are not the only diphthongs of English...

- But before I introduce you to the others, I need to make a confession...

- I lied to you earlier when I said the following:
  - English contains the following vowels: [e], [o]
  - [e] is the sound in “hate”, [o] is the sound in “hope”

- The Truth:
  - Modern American English does not have the pure vowels [e] and [o]
  - In Modern American English, the sounds in “hate” and “hope” are **diphthongs**
The Minor Diphthongs

- Pronounce the word “lay” very slowly

▶ Pronounce the word “lay” very slowly

▶ It starts off as an \[e\] ...

▶ But, it ends somewhere different (near \[i\])

▶ So, we really represent this sound in IPA as \[ej\]

▶ Pronounce the word “low” very slowly

▶ It starts off as an \[o\] ...

▶ But, it ends somewhere different (near \[u\])

▶ So, we really represent this sound in IPA as \[ow\]

▶ We call \[ej\] and \[ow\] the ‘minor diphthongs’ of English.
The Minor Diphthongs

▶ Pronounce the word “lay” very slowly
  ▶ It starts off as an [e]...
  ▶ But, it ends somewhere different (near [i])
  ▶ So, we really represent this sound in IPA as [ej]
The Minor Diphthongs

- Pronounce the word “lay” very slowly
  - It starts off as an [e]...
  - But, it ends somewhere different (near [i])
  - So, we really represent this sound in IPA as [ej]

- Pronounce the word “low” very slowly
  - It starts off as an [o]...
  - But, it ends somewhere different (near [u])
  - So, we really represent this sound in IPA as [ow]

We call [ej] and [ow] the ‘minor diphthongs’ of English.
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  - It starts off as an [e]...
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  - So, we really represent this sound in IPA as [ej]

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  - It starts off as an [o]...
  - But, it ends somewhere different (near [u])
  - So, we really represent this sound in IPA as [ow]
The Minor Diphthongs

- Pronounce the word “lay” very slowly
  - It starts off as an [e]...
  - But, it ends somewhere different (near [i])
  - So, we really represent this sound in IPA as [ej]

- Pronounce the word “low” very slowly
  - It starts off as an [o]...
  - But, it ends somewhere different (near [u])
  - So, we really represent this sound in IPA as [ow]

- We call [ej] and [ow] the ‘minor diphthongs’ of English.
Practice Time!

- You now know all the IPA symbols necessary for phonetic transcription of English.

- Let’s put this knowledge to practice!

- Feel free to consult the chart of IPA symbols you (were supposed to have) brought to class!
Practice Time!

Let’s read the following together:

[fənələfɪsts mɛst kip ðeɪr ɪrz spɛktækjuˈləri klin]
Practice Time!

Let’s read the following together:

[fənələfɪsts mʌst kɪp ðeɪɾ iɾz spɛktəkjuˈləri klin]

(Phonologists must keep their ears spectacularly clean.)
Practice Time!

Let’s read the following together:

[ju majt fajnd ðə un lajn tutcəriəlz un ðə klæs websajt həlpvl]
Practice Time!

Let’s read the following together:

[ju majt fajnd ə an lajn tутциээлэц an ə klæs wэbsajt hэlpфял]

(You might find the on-line tutorials on the class website helpful.)