Announcements

• Any questions on HW 1?
• Any interesting findings from Ethnologue?
• Mark your calendar for a talk by Prof. Norma Mendoza-Denton on Fri Feb 27 @ 4:30 in Robert A. Jones conference room.

Today’s agenda

• A crash course on articulatory phonetics and the International Phonetic Alphabet (IPA).
• So, to start, what’s articulatory phonetics?
• Articulatory phonetics focuses on the study of how speech sounds are articulated in human language.

IPA

• What’s the IPA?
• The IPA is a special alphabet to represent human speech in the form of symbols for individual sounds like [p], [s], [a], etc., as well as for other phonetic features that characterize pronunciation.

Some IPA links

• Link to the IPA chart.
• Link to an interactive chart to insert symbols. This will be quite useful when we do phonetic transcription exercises.
• Listen to IPA sounds. (Download it [HERE](#) if you’d like.)
• Or this [link](#).

Consonants vs. Vowels

• There are two major types of sounds in human language: consonants and vowels. How do they differ?
• In terms of articulation, consonants are produced when the airflow is obstructed in the vocal tract, while vowels are produced with relative free flow of the airstream in the vocal tract.
• Both consonants and vowels can be described in terms of a number of individual articulatory features.
• We start with consonants. But let’s look at the human vocal tract first.
Articulation of consonants

- Consonant sounds can be characterized according to three main phonetic properties:
  a) place of articulation,
  b) manner of articulation, and
c) voicing.

Places of articulation

- Labial, e.g., bilabial [p] and labiodental [f].
- Dental, e.g., French [d] in dire. English has interdental [th] as in thorn and [ð] as in there.
- Alveolar, e.g., [t], [s], [n], and [l].
- Alveopalatal, e.g., [ʃ] as in shoe, [ʒ] as in vision, [tʃ] as in choose, and [dʒ] as in jam.
- Palatal, e.g., [j] in yes.

Manner of articulation

- Speech sounds are also differentiated by the way the airflow is affected as it travels from the lungs up and out of the mouth and nose. This is referred to as the manner of articulation for the sound.

Stops, Fricatives, and affricates

- Stops, e.g., [b], [p], [t], [d], [k], [g], and [ʔ].
- When the air escapes through the nasal, rather than the oral, cavity, nasal stops are produced, e.g., [m], [n], and [ŋ].
- Fricatives, e.g. [f], [v], [s], [z], [θ], [ð], [ʃ], [ʒ], and [h].
- Affricates, e.g. [tʃ] as in church, and [dʒ] as in jump.
Fricatives and affricates

• Acoustically, fricatives and affricates can be divided into two types based on their relative loudness. The noisier ones are called stridents (aka as sibilants): [s], [z], [ʃ], [ʒ], [tʃ], and [dʒ]), whereas the quieter ones are called ([θ] and [ð]) are nonstridents.

Liquids (aka Approximants)

• Liquids: In the production of these sounds, there is some obstruction of the airflow in the mouth, but not enough to cause any real constriction or friction, e.g., [l] and [r].
• [l] is called a lateral sound, because the air escapes through the sides of the tongue.

Liquids (aka Approximants)

• There are several varieties of “r” in the world’s languages. The “r” could be a trill, as in Spanish perro (‘dog’), in which case it is transcribed as [r].
• The “r” could also be a retroflex, as the case is in American and Canadian English, and is transcribed as [ɹ] in the IPA.
• Another sound commonly identified with “r” is the flap, which occurs in North American English in words like writer and rider. This sound is transcribed as [ɾ].

Glides (aka Semi-vowels)

• Glides, e.g., [j] as in yes and [w] as in wood.
• Some English speakers produce a voiceless glide at the beginning of words like when, which, and where. It is transcribed as [ʍ].

Voicing

• Consonant sounds are also divided into two types, voiced and voiceless, based on whether they are produced with or without vibration of vocal cords.
  - [b], [d], and [z] are voiced.
  - [p], [t], and [s] are voiceless.

Describing consonants

• A consonant can thus be described in terms of these three parameters: place of articulation, manner of articulation, and voicing.
• For example, [p] is a bilabial, voiceless stop, whereas [z] is an alveolar, voiced fricative.
• Now, describe [f], [m], and [w].
English consonants

<table>
<thead>
<tr>
<th>Manner of Articulation</th>
<th>Place of Articulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops</td>
<td>Labial</td>
</tr>
<tr>
<td>Voiceless</td>
<td>p</td>
</tr>
<tr>
<td>Voiced</td>
<td>b</td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
</tr>
<tr>
<td>Lateral</td>
<td>f</td>
</tr>
<tr>
<td>Glide</td>
<td>w</td>
</tr>
</tbody>
</table>

An example of IPA diacritics: [ʰ] for aspiration

- The voiceless stops in the first words are characterized as “aspirated” sounds, which distinguish them from the unaspirated voiceless stops that do not occur initially.
- In phonetic transcription, we indicate this difference in aspiration by superscripting the aspirated sound with the diacritic [ʰ], e.g., pit [pʰɪt]; spit [spɪt].

IPA diacritics

- There is a list of diacritics on the IPA chart for phonetic features that characterize consonants. You do not need to know what each one signifies; but when you see them in a dataset, you now know what they are.

Ingressive pulmonic consonants

- The consonants we talked about so far are all produced by egressive pulmonic airstream.
- Ingressive pulmonic consonants are typically used for emotional effects. Examples from Swedish and Scottish.
Nonpulmonic consonants

- Human languages also have consonants that are produced by nonpulmonic airstream, either glottally or velarically.
- Glottalic airstream gives us ejectives and implosives, whereas velaric airstream gives us clicks.

Articulatory sequence for an Ejective Velar Stop [k’]

Articulatory sequence for a Bilabial Implosive [ɓ]

Articulatory sequence of an Alveolar click [!]  

Peter Ladefoged’s sound files

- Ejectives in Lakhota
- Implosives in Sindhi
- Clicks in !Xóõ
- Hear nonpulmonic sounds on the interactive IPA chart [HERE].
- For a non-linguist demonstrating and teaching clicks in Xhosa, you may watch this youtube video.

Vowels
Vowels

- Vowels are distinguished from consonants in that the passage through which the air travels is never so narrow as to obstruct the free flow of the airstream.
- It's not possible, however, to characterize vowels according to the same features that we have used in characterizing consonants. Why?

Parameters for vowel articulation

- Therefore, to distinguish between different vowels, we rely on four other features:
  (a) Tongue height: High, Mid, and Low
  (b) Which part of the tongue is involved: Front, Central, and Back
  (c) Lip rounding: Rounded and Unrounded
  (d) Tenseness or laxness of the vocal tract: Tense and Lax

American English vowels

![Figure 2.9 American English vowels (tense vowels are circled)](image)

American English vowels

![Figure 6.5 | Classification of American English vowels.](image)

Diphthongs

- Two vowels may combine together to form a diphthong. Examples of diphthongs in American English are given below:
  - [ai] as in die
  - [au] as in now
  - [əʊ] as in toy
- Note that the vowels in boat and boot are also typically pronounced as diphthongs, and are therefore frequently transcribed as [eɪ] and [ou], respectively.
- In many books, the second vowel of an English diphthong is frequently represented as a glide: [eɪ] or [ow].

Another example of IPA diacritics: Nasalization of vowels

- Vowels can be either oral or nasal.
- In English, nasal vowels typically occur before nasal consonants. Compare, for example, the vowel in bat and ban. In transcription, the diacritic [~] is placed over the vowel to indicate that it is a nasalized vowel, as in ban [bæn] and boom [bʊm].
Now visit this link again for the articulation of the vowels of American English (German and Spanish are also available if you like to check out these).

Transcription

- **Phonetic transcription** is a representation of the pronunciation of a word using IPA symbols.
- Transcription could be **broad**, in which case a minimal amount of phonetic detail is given, or **narrow**, in which case more detailed phonetic differences are provided (e.g., aspiration of voiceless stops and nasalization of vowels are marked with diacritics).

<table>
<thead>
<tr>
<th>Word</th>
<th>Broad Transcription</th>
<th>Narrow Transcription</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>[jenən]</td>
<td>[jenən]</td>
</tr>
<tr>
<td>?</td>
<td>[lekʃə] or [lekʃə]</td>
<td>[lekʃə] or [lekʃə]</td>
</tr>
<tr>
<td>?</td>
<td>[saʊndz]</td>
<td>[saʊndz]</td>
</tr>
<tr>
<td>?</td>
<td>[fænetɪks]</td>
<td>[fænetɪks]</td>
</tr>
<tr>
<td>?</td>
<td>[tʌŋg]</td>
<td>[tʰʌŋg]</td>
</tr>
</tbody>
</table>

Transcribing sentences

Broad:
[nɔm tʃəmskɪ iz e lŋgwist hu tɪtʃiz æt ɛm ai ti]

Narrow:
[nɔm tʃəmskɪ iz a lŋgwist hu tʰıtʃiz ət ɛm ai tʰi]

Next class agenda

- We start morphology. Read Chapters 1-2 of Lieber.

References

- Michael Dobrovolsky’s chapter on phonetics in O’Grady et al’s (2005).