• English consonants: Properties to know

Background reading:
• CL Ch 2, sec 2–5 (sec 4 is review)
• CL Ch 2, Table 2.16 (pp 43-44)
0. Consonants: Overview and learning guide

• The reading you have done in CL Ch 2, sec 1-5, contains a lot of information and detail

• Here is what you need to learn from this reading
  → These slides and links will help you!
  - The **consonant symbols** in Table 2.12, p 38 (but not [ʍ] or [ʔ]) (see previous slide set)
  - The **phonetic properties** of these sounds that we can use to describe them

• Other details and charts in the reading are there to help you understand this central information
1. How to describe a consonant

• Goal: Be able to describe all the consonants in Table 2.12 (CL p 38) except for [ʍ] and [ʔ]

• We will **describe** consonants using the following four (in special cases, five) **phonetic properties**:
  - voicing
  - place of articulation
  - oral/nasal
  - (addtional descriptor for **liquids** only)
  - **constriction type**  | note: this term is not used in *CL*

(The properties *other than place of articulation* are sometimes grouped together as “manner of articulation”)

2. Voicing: Voiced or voiceless?

• Voicing
  - **voiced** = vocal folds are vibrating
  - **voiceless** = vocal folds are not vibrating

• *Diagnose it for yourself:*
  For most consonants, you can rest your fingers on your larynx and feel whether there is vibration
  - Try it:
    - These are **voiceless**  [ f ] [ s ] [ θ ] [ ŋ ]
    - These are **voiced** [ m ] [ z ] [ ð ] [ ɹ ]
2. Voicing: Voiced or voiceless?

• *Diagnose it for yourself:* For most consonants, you can rest your fingers on your **larynx** and feel whether there is **vibration**

• *Exception:* These six consonants are difficult to articulate in isolation, without a vowel — and vowels are voiced — so these are hard to diagnose by feel

  - **Memorize** these:

    - [p][t][k] **voiceless**
    - [b][d][ɡ] **voiced**

    (After completing section 5, you will know what properties this class of six sounds has in common!)
3. Place of articulation

• **Place of articulation** was introduced on Monday
  - **Where in the vocal tract** is the consonant’s constriction?

• *Diagnose it for yourself:*
  Try to feel the **constriction** in the vocal tract
  - If the articulators are touching, wiggle them around to feel where the constriction is
  - If the articulators are not touching, form the sound and breathe in — you will feel colder air at the point of closest constriction
3. Place of articulation

- **See place of articulation in action:**
  Click the IPA symbols to see an MRI video of each sound
  (from USC [Speech Production and Articulation Knowledge Group](https://www.usc.edu/departments/communication-sciences-disorders/research-groups/speech-production-articulation-knowledge-group.html))

<table>
<thead>
<tr>
<th>PoA term</th>
<th>Constriction in vocal tract</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>bilabial</td>
<td>lips</td>
<td>[m]</td>
</tr>
<tr>
<td>labiodental</td>
<td>upper teeth + lower lip</td>
<td>[f]</td>
</tr>
<tr>
<td>(inter)dental</td>
<td>tongue tip or blade + upper teeth (or between teeth)</td>
<td>[θ]</td>
</tr>
<tr>
<td>alveolar</td>
<td>tongue tip + alveolar ridge</td>
<td>[n]</td>
</tr>
<tr>
<td>alveopalatal</td>
<td>tongue blade + post-alveolar region</td>
<td>[ɻ]</td>
</tr>
<tr>
<td>palatal</td>
<td>tongue body + hard palate</td>
<td>[j]</td>
</tr>
<tr>
<td>velar</td>
<td>back of tongue body + velum</td>
<td>[k]</td>
</tr>
<tr>
<td>glottal</td>
<td>glottis (space between vocal folds)</td>
<td>[h]</td>
</tr>
</tbody>
</table>
4. Nasality: Oral or nasal?

- **Oral/nasal**
  - **nasal** = airflow in nasal cavity (velum is **open**)
  - **oral** = no airflow in nasal cavity (velum is **closed**)

Drawings adapted from Daniel Currie Hall’s [interactive web site](http://www.danielcurriehall.com)
4. Nasality: Oral or nasal?

- The **velum** (soft palate) is itself a place of articulation
  - But it can also **open and close** to allow or block air from entering the nasal cavity

- **See oral/nasal in action:**
  - Watch [this MRI video](#) of *vowel + [ m ] + vowel* (from USC Speech Production and Articulation Knowledge Group)
  - Before/after speech (ordinary breathing) — velum is **open** for breathing through the nose
  - The two vowels are **oral** — velum is **closed**
  - The [ m ] is **nasal** — velum is **open**
4. Nasality: Oral or nasal?

- *Diagnose it for yourself:* Use your fingers to **pinch your nose closed** while you articulate a sound
  - If the sound changes when the nose is closed, it is **nasal** — try [m]
  - If not, it is **oral** — try [b] or [f]

- Memory aid: The *only* nasal sounds in English are [m] [n] [ŋ]
5. Constriction type

- **Constriction type** has to do with the degree or type of constriction in the oral cavity (i.e., disregarding nasal airflow)
5. Constriction type

• Which consonants can’t be audibly prolonged, because the air in the vocal tract is completely obstructed?
  - These sounds are oral stops
    (often just called “stops”)
5. Constriction type

• Which consonants can’t be audibly prolonged, because the air in the vocal tract is **completely obstructed**?

  - These sounds are **oral stops** (often just called “stops”)
    
    \[
    \begin{array}{c|c}
    \text{voiceless} & \text{voiced} \\
    \hline
    [\text{p}] & [\text{b}] \\
    [\text{t}] & [\text{d}] \\
    [\text{k}] & [\text{ɡ}] \\
    \end{array}
    \]

  - Because oral stops can’t be prolonged, they are difficult to test for voicing using the larynx-vibration test — just memorize their voicing
5. Constriction type

- Which consonants have a complete closure in the **oral cavity**, but airflow in the **nasal cavity**?
  - These sounds are **nasal stops** (often just called “nasals”)
5. Constriction type

• Which consonants have a complete closure in the **oral cavity**, but airflow in the **nasal cavity**?
  - These sounds are **nasal stops** (often just called “nasals”)
    
    \[
    \text{[m][n][ŋ]}
    \]
  
  - All nasal stops in English have the same voicing status. Are they voiceless or voiced?
5. Constriction type

• Which consonants have a **hissing or buzzing sound**, caused by forcing air through a very narrow opening in the oral cavity?
  
  - These sounds are **fricatives**
5. Constriction type

• Which consonants have a **hissing or buzzing sound**, caused by forcing air through a very narrow opening in the oral cavity?
  - These sounds are **fricatives**
    
    \[
    \text{[f]} \quad \text{[θ]} \quad \text{[s]} \quad \text{[ʃ]} \quad \text{[h]} \\
    \text{[v]} \quad \text{[ð]} \quad \text{[z]} \quad \text{[ʒ]} \\
    \]

  - All fricatives in English have the same status for oral/nasal. Which are they?
  - The noisier fricatives (and affricates; see below) are called **stridents** or **sibilants**
5. Constriction type

• Which consonants are **combinations of oral stop + fricative** (at the same place of articulation)? *(CL describes these as like a stop, but with a slow or gradual release (p 32))*
  - These sounds are **affricates**
    (note: **NOT** “affricatives”)*
5. Constriction type

• Which consonants are combinations of oral stop + fricative (at the same place of articulation)? (CL describes these as like a stop, but with a slow or gradual release (p 32))
  - These sounds are affricates
    (note: NOT “affricatives”)
    
    [ʧ] [ʤ]

  - Are affricates in English oral or nasal?
5. Constriction type

• The remaining consonants of English are the **liquids** and **glides**

\[ [l][\text{\textasciitransliteration}}] \quad \text{[w][j]} \]

- Liquids and glides in English are **oral**

- Liquids and glides in English are usually **voiced**, but can sometimes be voiceless

  • You can add a small circle beneath the phonetic symbol to indicate voicelessness
5. Constriction type

- **Liquids** need an *extra descriptor*, since most liquids are voiced, alveolar, and oral
  - A **lateral** liquid has air moving along the sides of the tongue but blocked in the center of the oral tract — [ɻ]

- A **retroflex** liquid has the tongue tip curled back behind the alveolar ridge — [ɾ]

(Note: Many American English speakers use an *alternative* way of producing the same sound, where the tongue body is bunched up but the tongue tip is not actually curled back)
5. Constriction type

- **Glides**: A glide is essentially the same as a very rapidly articulated vowel
  - [ j ] is a glide that is **palatal**
  - [ w ] is a glide that is **labial AND velar**, i.e., **labiovelar**