11-823: Conlanging

Human Phonetics and Phonology
The vocal tract

- alveolar ridge
- tongue tip
- tongue blade
- tongue body
- larynx
- hard palate
- soft palate
- uvula
- pharynx
- tongue root
- epiglottis
From meat to voice

- **Blow air through lungs**
  - Vibrate larynx
  - Vocal tract shape defines resonance
  - Obstructions modify sound
    - Tongue, teeth, lips, velum (nasal passage)
The ear

- Outer Ear
- Middle Ear
- Inner Ear
- Malleus
- Incus
- Facial Nerve
- Auditory Nerve
- Cochlea
- Ear Drum
- Stapes
- Ear Canal
Sound waves

- Vibrate ear drum
- Cause fluid in cochlear to vibrate
- Spiral cochlear
  - Vibrate hairs inside cochlear
  - Different frequencies vibrate different hairs
  - Converts time domain to frequency domainS
From grunts to meaning

- Grunts and vocalization
  - Lots of variation available
    - (continuous systems – not discrete)
  - Noises become distinct, recognizable
- Grow into languages, dialects and idiolects
- What are the fundamental units?
Electromagnetic Articulograph
Phonemes

- **Defined as fundamental units of speech**
  - *If you change it, it (can) change the meaning*

  - “pat” to “bat”
  - “pat” to “pam”
• One or two banded frequencies (formants)
# English (US) Vowels

<table>
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<tr>
<th>AA</th>
<th>wAshington</th>
<th>AE</th>
<th>fAt, bAd</th>
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<tr>
<td>AH</td>
<td>bUt, hUsh</td>
<td>AO</td>
<td>lAWn, mAll</td>
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<tr>
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<td>hOW, sOUth</td>
<td>AX</td>
<td>About, cAnoe</td>
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<tr>
<td>AY</td>
<td>hIde, bUY</td>
<td>EH</td>
<td>gEt, fEAther</td>
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<td>U</td>
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English Consonants

- **Stops:** P, B, T, D, K, G
- **Fricatives:** F, V, HH, S, Z, SH, ZH
- **Affricatives:** CH, JH
- **Nasals:** N, M, NG
- **Glides:** L, R, Y, W

**Note:** voiced vs unvoiced:
- P vs B, F vs V
Number of Phonemes in Language

- **US English: 43**
- **UK English: 44**
- **Japanese: 25**
- **Hindi: 81**

*Numbers aren’t definite though*

- Depends on who you ask,
- And what you want it for
Not all variation is Phonetic

- **Phonology:** linguistically discrete units
  - May be a number of different ways to say them
  - /r/ trill (Scottish or Spanish) vs US way

- **Phonetics vs Phonemics**
  - Phonetics: discrete units
  - Phonemics: all sounds

- **/t/ in US English:** becomes “flap”
  - “water” /w aʊ t ər/
  - “water” /w aʊ d ər/
Dialect and Idiolect

- **Variation within language (and speakers)**
- **Phonetic**
  - “Don” vs “Dawn”, “Cot” vs “Caught”
  - R deletion (Haavaad vs Harvard)
- **Word choice:**
  - Y’all, Yins
  - Politeness levels
Not all languages use the same set

- **Asperated stops (Korean, Hindi)**
  - *P vs PH*
  - *English uses both, but doesn’t care*
  - *Pot vs sPot (place hand over mouth)*

- **L-R in Japanese not phonological**

- **US English dialects:**
  - *Mary, Merry, Marry*

- **Scottish English vs US English**
  - *No distinction between “pull” and “pool”*
  - *Distinction between: “for” and “four”*
Different language dimensions

- **Vowel length**
  - *Bit vs beat*
  - *Japanese: shujin (husband) vs shuujin (prisoner)*

- **Tones**
  - *F0 (tune) used phonetically*
  - *Chinese, Thai, Burmese*

- **Clicks**
  - *Xhosa*
IPA

- Vowel Chart
- Consonant Lists
(Festival) IPA Features

- Voicing +/-
- Vowel Length: schwa, short, long, diphthong
- Vowel Height: high, mid, low
- Vowel Frontness: front, mid, back
- (Vowel) rounding: +/-
- Consonant Type: stop, fricative, affricative, nasal, lateral, approximant
- Consonant Place: labial alveolar, palatal, labio-dental, dental, velar, glottal
**Consonant Clusters**

- **Syllable structure:**
  - $UV \rightarrow V \rightarrow \text{vowel} \rightarrow V \rightarrow UV$

- **Syllable structure**
  - Stop (Af)Fricative, Stop, Nasal, Liquid, Vowel
  - Vowel, Liquid, Nasal, Stop (Af)Fricative) Stop
  - /S T R EH NG TH S/
  - /T S K L EH R N SH T/ (?)

- **Different languages have strong restrictions**
  - Borrowing may break this (id's origin)
  - /SH L …/, /ZH …/, / T S …/,
Co-articulation

- Voicing actually doesn’t always stop
  - “have honey”, “impossible”

- Nasalized voices, lip rounding
  - “min” vs “bit”, “sow” vs “see”

- Lexical stress:
  - EMphasis, emPHAsis
  - PROject, proJECT

- Reduction, contraction
  - “A boy is riding a bike”
  - “I want to go to Disneyland.”
  - “I will go tomorrow”