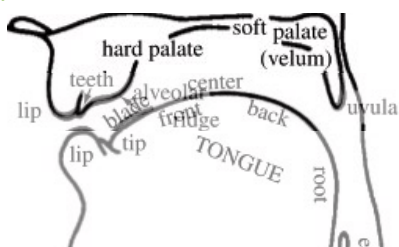


Week1 Summary

Spelling in English is inconsistent with its pronunciation, which call for study of **phonetics**, all about the speech sound. We look at the actual sound of a word, and use phonetic symbols to describe it. There are about 44 distinguishable sounds that form words: **phonemes**, much diversified than 26 letters in the English language. Each phoneme represents vowels(monophthongs, diphthongs) or consonants. The study area of phonetics can be divided into three categories; articulatory, acoustics, and auditory, each accounting for production, transmission, and hearing of speech sound.

* Articulation



Making a speech sound is related to physical movements of human organs. Depending on subtle changes in the vocal tract (pharynx, epiglottis, uvula, soft palate(velum), hard palate, alveolar ridge, teeth, tongue body, tongue tip, and lip) while air flows, different sounds are articulated. We can divide five speech organs which control constrictions: lip, tongue tip, tongue body, larynx(vocal cords), and velum.

(1) Articulatory process in lips/ tongue tip/ tongue body

- Constriction Location(CL)
 - lips(bilabial/labiodental): p, b, m, w, f, v
 - tongue tip(dental/alveolar/palate-alveolar/retroflex): θ, ð, t, d, s, z, n, l, ʃ, ʒ, ʧ, ʤ, r
 - tongue body(palatal/velar): j, k, g, ŋ, h (+ change in oral cavity makes different vowels)
- Constriction Degree(CD)
 - upper part(nearly closed)> stop(p, b, t, d, k, g) - fricative(f, v, θ, ð, s, z, ʃ, ʒ, h) - approximant(w, l, r, j) - vowels <lower part(opened)

(2) Phonation process in larynx(voice box)

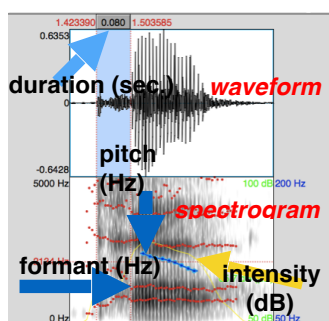
- Vocal cords(=vocal folds) vibrate in a varied degree when air flows from the lung.
- Voiced(vocal cords closed): b, d, g, v, ð, z, ʒ, ʤ, m, n, ŋ, l, r, w, j
- Voiceless(vocal cords opened): p, t, k, f, θ, s, ʃ, h, ʧ

(3) Oro-nasal process in velum

- When the velum is lowered, the nasal tract is opened, so we can breathe through nose and produce nasal sounds m, n, ŋ.
 - Velum: m, n, ŋ
- When the velum is raised, the nasal tract is closed, and we can produce every vowel and every consonant except for nasal sounds m, n, ŋ.

We can predict any phonemes with description of constricting environment, for example, "t," is a sound produced when velum is raised(not nasal sounds), larynx is opened(voiceless), constriction location is at tongue tip(alveolar) and constriction degree is upper part(stop).

* Acoustics



With Praat, we can examine the duration, intensity(loudness), pitch(65-200Hz for male speech, and 145-275Hz for female speech), spectrogram, formant(ed dots signify different vowels) of sounds.

Pitch is defined as the number of occurrences of repeating event per second(Hz). We can see the repeated event as the vocal cords vibrate repeatedly. For example, 236.5Hz means there was 236 times of vibration in vocal cords per second, single event took 0.004228 seconds to be concluded. A pure tone of certain frequency shows sine wave and every natural sound can be represented with simplified sine wave of same frequency.