

WEEK 3: LANGUAGE SOUND SYSTEMS

OLLI, March 13, 2023

Sue Ingels

Speech samples

Sample 1: Stress

Stress can be defined in mathematical terms ... You are exerting force on some body.

Sample 2: Means of egress

Means of egress is like for fire safety... So how do you escape?...There can be some elevators are set for fire use.

Sample 3: Toughness

I'll first talk about toughness...There are different type of toughness...Sometimes we do a flexural toughness test.

Language Sound Systems

Intonation

>50% of Ls use tones
meaning of word, phrase

Stress

Pitch
Loudness
Syllable duration

Sounds

Consonants
Vowels
Approximants
Syllabic consonants

Prosody or suprasegmentals

Human vocal tract

Air source: lungs

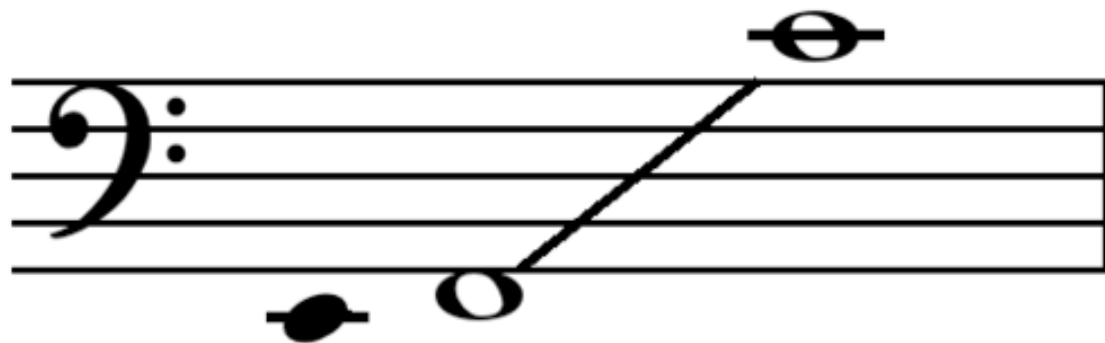
Sound vibration: Vocal chords

Resonant chambers: pharynx, mouth,
nasal cavity

For image, see:

https://thebrain.mcgill.ca/flash/capsules/outil_bleu21.html

Intonation



- Use of **pitch** (sound frequency: low, mid, high)
- **Pitch**: vocal folds tense or relax to modify pitch
- Used at word and phrase levels to signify different meaning

Intonation—“tone” languages

Mandarin: 4 tones distinguish meanings of words

- <https://www.youtube.com/watch?v=9MkRL33blc8>

Intonation—English

Conveys meaning at **phrase level**, rather than word level

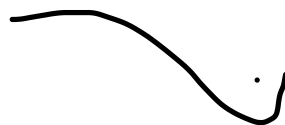
- fall



- rise



- fall-rise



Intonation

Falling

- end of an utterance/turn: *Let's go to the concert tonight.*
- shared information: *Last week we talked about critical periods.*
- wh- questions: *Where would you like to go?*

Rising

- repetition questions: **Where** would you like to go? You want to go **where?**

Fall-rise

- non-final, as in lists; also “holding the floor”: *I enjoy jazz, classical music, and the blues—really, a lot of different kinds of music.*

Stress (rhythm) – Word and phrase level

Word stress

- Changes in pitch, sometimes with change in loudness, syllable duration
- English: Stress helps in word identification
 - compare: ***com**edy, com**mit**tee*
- English: stress location is rule-based, though a bit complex
 - shifting word stress: **ph**otograph, phot**o**grapher, phot**o**graph**ic**
 - stress may change meaning: **re**cord, rec**or**d

Reduced (unstressed) vowels in General American English

Spelled a, o, u

→

/ə/

about

custom

illustrate

Spelled e, i, y

→

/ɪ/

or

/ə/

facet

analysis

Most common vowel in English: /ə/

schwa

Word stress

Some languages have (mostly) fixed word stress

- e.g., Polish, Spanish, Swahili

Pitch accent in Japanese (高低アクセント, *kōtei akusento*)

Example:

https://en.wikipedia.org/wiki/Japanese_pitch_accent

(This pitch accent feature sometimes used to tell “dad jokes”.)

Phrase stress

- English
 - Highlights focus and/or last word conveying new information
 - Shows contrast

I went to the **bank** today.

Sandra went to the bank **yesterday**.

L2 speakers of a language

L2 speakers of a language

- initially may default to their L1 intonation and stress patterns
- L2 speech is colored by L1 prosodic features
- Example: speakers of L2 English
 - Even intonation, or L1 intonation pattern
 - Even syllable stress—no prominence in a polysyllabic word
 - No noticeable phrase stress, or stress at end of phrase

Sounds--inventory

- ~7,000 Ls
- Half spoken by <10,000 people
- ~200 vowels
- > 600 consonants in the world's languages
 - In top 10 Ls: 100 consonants (~1/3 world population)
 - Most common (98% of Ls): /p, t, k/ voiceless stops
 - /tʰ/, tʰ/, /t/ are separate phonemes in Hindi

Sound articulation

Palatography (olive oil,
charcoal, camera):
palatogram, linguagram

Electropalatography

Sounds—Natural constraints

Constraints on how sounds develop (from native-speaker perspective)

- articulatory ease (what is physically possible)
- auditory distinctiveness (differences in sounds are perceptible)
- sufficient sound inventory to create manageable words lengths for short term memory
- gestural economy, e.g., groups of sounds articulated in nearly same way: voiced/voiceless; stop/fricative

Sounds: Phonemes and allophones

- Phoneme / /
 - A psychological construct
 - A sound category
 - A family of similar sounds
 - Distinguishes meaning: *mad* versus *bad* (nasal vs oral voiced bilabial stop)

- Allophones []
 - the actual sounds that are produced
 - the realization of a phoneme
 - [ã] (nasalized allophone of /a/, as in French *bon*)
 - [t^h] (aspirated allophone of /t/, as in English *type*)

Minimal pairs: Testing for phonemes and allophones

- Two words that vary by one sound in the same position and have different meanings
- Finnish example--phonemes
 - [kate] “cover” vs. [kade] “envious”, also two phonemes, /t/ and /d/
 - Exchanging these two sounds changes meanings of the two words
- English example--allophones
 - [part^hi]: *party* in British English
 - [parɪ]: *party* in American English
 - allophones of the same phoneme, /t/; meaning is not changed when using the different pronunciations

Phonemes or allophones?

- In English, /l/ and /r/ are contrastive (different sound categories)
 - minimal pairs: [lɪp] [rɪp]
- in Korean, [l] and [r] are *not* contrastive (not different phonemes!)
- they represent one phoneme /l/
 - /l/ is an alveolar flap [r] at beginning of syllables: [rupi] [kiri]
 - /l/ elsewhere [pal] [ilkop]
 - (some exceptions exist)
- How might a native speaker of Korean starting to learn English pronounce the word “lip”?

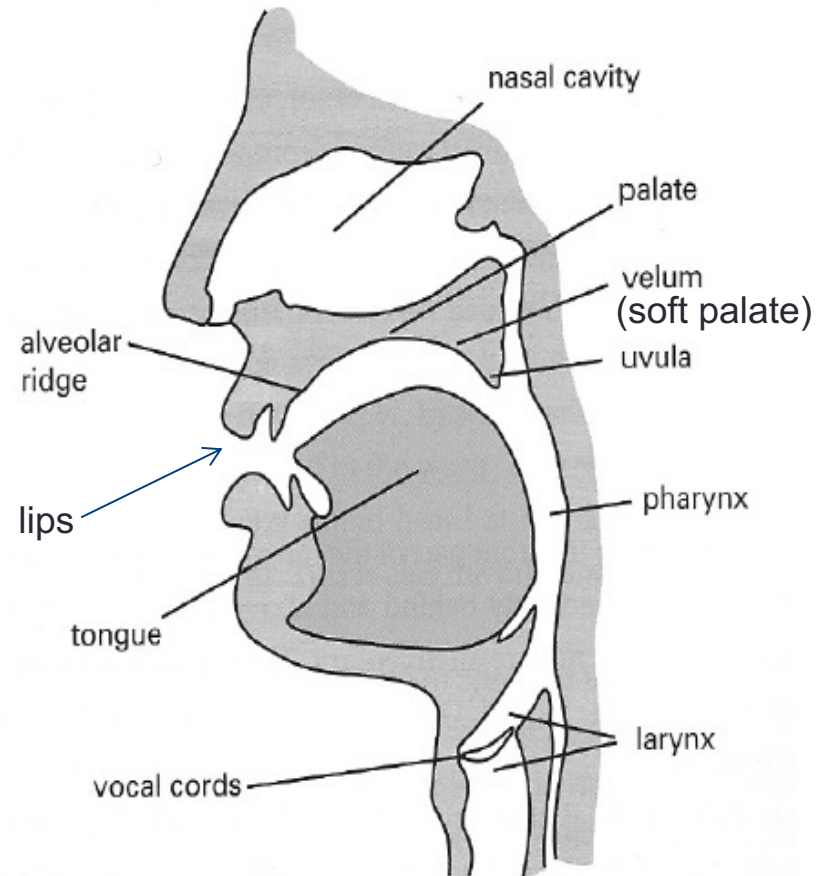
Description of how consonant sounds are produced

Points of articulation
(don't move)

Articulators (move)

Breath flow

Vocal chord vibration



Consonant chart--partial (IPA)

https://en.wikipedia.org/wiki/IPA_pulmonic_consonant_chart_with_audio

Articulators

Place of Articulation

two lips (bilabial)	lip & teeth (labio- dental)	tongue & teeth (tip- dental)	tongue & tooth ridge (tip- alveolar)	tongue & hard palate (blade- alveo- palatal)	tongue & soft palate (back- velar)	throat (glottal)
------------------------	--------------------------------------	---------------------------------------	--	---	--	---------------------

pay
bay

five
vine

thank
than

tie
die

choke
joke

cold
gold

hot

/p/
/b/

/f/
/v/

/θ/
/ð/

/t/
/d/

/tʃ/
/dʒ/

/k/
/g/

/h/

Voicing

	Place of Articulation						
Voicing	two lips (bilabial)	lip & teeth (labioden- tal)	tongue & teeth (tip- dental)	tongue & tooth ridge (tip- alveolar)	tongue & hard palate (blade- alveopala- tal)	tongue & soft palate (back- velar)	throat (glottal)
voiceless	/p/ pay			/t/ tie		/k/ cold	
voiced	/b/ bay			/d/ die		/g/ gold	

Manner of Articulation

English Consonants

		Place of Articulation						
Air Flow	Voicing	two lips (bilabial)	lip & teeth (labiodental)	tongue & teeth (tip-dental)	tongue & tooth ridge (tip-alveolar)	tongue & hard palate (blade- alveopalatal)	tongue & soft palate (back-velar)	throat (glottal)
STOPS	voiceless	/p/ pay			/t/ tie		/k/ cold	
	voiced	/b/ bay			/d/ die		/g/ gold	
AFFRICATES (stop + fricative)	voiceless					/tʃ/ choke		
	voiced					/dʒ/ joke		
CONTINUANTS:								
Fricatives	voiceless		/f/ fine	/θ/ thank	/s/ sip	/ʃ/ she		/h/ hot
	voiced		/v/ vine	/ð/ than	/z/ zip	/ʒ/ vision		
Nasals	voiced	/m/ meet			/n/ now		/ŋ/ ring	
Liquids	voiced				/l/ last	/r/ red		
Glides	voiced	/w/ walk				/y/ yet		

Vowels

Need new descriptors for vowels

- Articulators don't come into contact
- All English vowels are voiced (some Ls have unvoiced vowels)
- All are continuants

Vowels—partial list

https://en.wikipedia.org/wiki/IPA_vowel_chart_with_audio

Vowel descriptors

- Tongue height (how open the mouth is)

- Say “eat, it, ate, at, ought”



- Tongue position (tongue is toward front, center, or back of mouth)

- Say “cat, coat”



- Lip rounding

- Compare “cute” and “cut”

- Tenseness of tongue muscles

- Compare “heat” and “hit”

(gently place thumb and finger just under lower jaw, at base of tongue; feel change in muscle tenseness)

Vowels: diphthongs

- “2 sounds”
- boy /ɔɪ/
- bough /aʊ/
- buy /aɪ/
- bay /eɪ/

Comments, thoughts, questions?

Sue Ingels

ingels@Illinois.edu