LING 450/550
10-Manner

How Do Linguists Study Articulation?

➢Challenge: Articulators are not readily visible

Static Palatography

Paint tongue (palatogram) or roof of the mouth (linguogram) with charcoal and oil. Observe which passive/active articulators are painted.

http://phonetics.linguistics.ucla.edu/facilities/physiology/Static_Pal/webpal.htm#Palatograms

https://www.youtube.com/watch?v=8Sh5hFnIuS4&list=PLNO0EjgGdvRc90Cb4gtb0qV0XVNKgvcEe&index=7

➢Advantages/Limitations

Electropalatography

Need custom pseudo-palates with electrodes fitted for subjects mouth, when tongue and electrodes make contact, get electronic signals.

- Accurate for time and location.
- Can cost ~1300 for a pseudo-palate.

https://www.youtube.com/watch?v=JBYZueK5r04

http://phonetics.linguistics.ucla.edu/facilities/physiology/epg.html

https://www.youtube.com/watch?v=UXM3gNxGO2M

➤Advantages/Limitations

Ultrasound

Imaging technology, sends sounds waves → reflected back by tissue, detect location of tissue/organ.

Can be used for pronunciation/speech therapy as well as linguistic research:

https://www.youtube.com/watch?v=bAhMozo85fg

➢Advantages/Limitations

Magnetic Resonance Imaging (MRI)

Detects movements by creating a magnetic field. Costs ~2000+ dollars to run.

https://www.youtube.com/watch?v=2BKA2sdr17Q

https://www.youtube.com/watch?v=uTOhDqhCKQs

➢Advantages/Limitations

Synthetic Models

Computer simulation modelling articulators. Can show mechanism of production and produce synthetic speech sounds.

- http://artisynth.magic.ubc.ca
- https://www.youtube.com/watch?v=tE8AetTaWq0
- (See e.g. research by Bryan Gick at UBC)-https://linguistics.ubc.ca/person/bryan-gick/

➢Advantages/Limitations

Consonants: Manner of Articulation

DEGREES AND TYPES OF VOCAL TRACT CONSTRICTION

READ LADEFOGED & JOHNSON, CHAPTER 7

adapted from slides by Richard Wright, Dan McCloy, and Valerie Freeman

Manner of Articulation

The main determiner of a consonant's *manner of articulation* is the degree of *constriction* (or *stricture*) between the active articulator and the target region.

◦ There are also several manner distinctions that are made based on the style of constriction or accompanying articulations or combinations of manners.

There are three basic degrees of constriction that are *contrastive* (i.e., are *phonemic*) in the world's languages: *stop*, *fricative*, and *approximant*.

Stops

A *stop* involves complete closure of the oral tract so that the airstream cannot escape through the mouth.

Stops often come in voiceless/voiced pairs, and may be made with a variety of airstream mechanisms, e.g.:

- Pulmonic egressive stops (*plosives*)
- Glottalic egressive stops (*ejectives*)
- Glottalic ingressive stops (*implosives*)
- Velaric ingressive stops (*clicks*)

Stops may be accompanied by the full range of phonation types (voiceless, modal, breathy, or creaky).

Examples: [p pʰ p' b bʱ b̤ ɓ kʘ] (bilabial stops)

Fricatives

Fricatives involve nearly complete closure of the oral tract, but with a narrow opening. Forcing all the air through a narrow opening accelerates the rate of airflow and creates *turbulence* (also called *frication*). Frication is audible and is what gives fricatives their "hissing" quality.

◦ Fricatives often come in voiceless/voiced pairs within a language.

◦ Pulmonic fricatives can be accompanied by the full range of phonation types.

◦ Many fricatives can be made with the glottalic egressive (ejective) airstream mechanism. Exceptions are the lower pharyngeal sounds [ħ ʕ] and the glottalic sounds [h ɦ].

Examples of fricatives (given in voiceless/voiced pairs):

◦ [ɸ β f v θ ð s z ʃ ʒ ʂ ʐ ç ʝ x ɣ χ ʁ ħ ʕ h ɦ]

Sibilant Fricatives

Fricatives can be divided by their auditory properties.

◦ *Sibilants* are louder, with more energy in higher frequencies.

  ◦ Examples: [s z ʃ ʒ ʂ ʐ] and affricates with sibilants: [ts dz tʃ dʒ]

  ◦ English treats sibilants as a group when adding sibilant morphemes (e.g., [s] or [z] for plural, possessive, or 3rd person singular verb). Two sibilants can't be pronounced adjacently in the same syllable.

punt	[pʌnt]	→	*punts*	[pʌnts]
punch	[pʌntʃ]	→	*punches*	[pʌntʃəz]

◦ *Non-sibilants* (everything else) are quieter, with less energy.

  ◦ Examples: [ɸ β f v θ ð ç ʝ x ɣ χ ʁ ħ ʕ h ɦ]

  ◦ English doesn't restrict the combination of a non-sibilant + sibilant.

puffs	[pʌfs]	*myths*	[mɪθs]
gives	[gɪvz]	*bathes*	[beɪðz]

Approximants

Approximants involve a narrowing of the oral tract, but not enough to create turbulence in the airstream.

Approximants are always voiced and always made with a pulmonic egressive airstream mechanism. They may be accompanied by the three voiced phonation types (modal, breathy, creaky).

Examples: [ʊ l ɹ ɻ ʟ ɰ w]

Affricates

Affricates are a combination of two sounds: a stop released into a (usually) *homorganic* (same place of articulation) fricative with the same voicing and phonation type. Like fricatives, affricates can be either pulmonic egressive or glottalic egressive (ejective) sounds.

Examples: [pf bv ts dz tʃ dʒ kx gɣ]

- Some fonts include *precomposed digraphs* for the more common affricates (e.g., [dʒ]), but all affricates can also be written as a sequence of the separate stop and fricative symbols (e.g., [dʒ]).
- If you wish to emphasize that two sounds form an affricate and not separate sequential sounds, you may use a *tiebar* (e.g., [bv] or [gɣ]).

Oral Stops vs. Nasal Stops

As mentioned, stops involve momentary complete stoppage of airflow through the oral tract. However, airflow may pass through the nasal cavity if the velum is lowered. Such articulations are called *nasal stops* (in contrast to *oral stops* in which the velum is raised, closing off the *velo-pharyngeal port*).

◦ Generally, oral stops are simply called "stops" and nasal stops are called "nasals."

Nasals may be voiceless or voiced and may be accompanied by modal, breathy, or creaky phonation types.

◦ Nasal stops: [m̥ m n̥ n ɳ̊ ɳ ɲ̊ ɲ ŋ̊ ŋ ɴ̥ ɴ]

Stops may also be either pre-nasalized or post nasalized.

◦ Prenasalized stops: [mb nd ɳɖ ɲɟ ŋg ᴎɢ]
Postnasalized stops: [bm dn ɖɳ ɟɲ gŋ ɢᴎ]

Trills, Taps, and Flaps

Trills are generated by the airstream causing an articulator to vibrate, creating a series of rapid closures separated by brief moments of airflow past the constriction.

- ◦ Trill vibration is caused by the Bernoulli force: airflow over a semi-rigid articulator pulls the articulator toward the target (causing a closure) at which point pressure builds behind the closure (forcing it open again).
- ◦ Examples: [ʙ r ʀ]

Taps and *flaps* are ballistic: the active articulator is thrown towards and bounces off the target, resulting in a very brief stop-like closure. Taps move (more or less) straight toward their target; flaps move back-to-front (usually retroflex).

- ◦ Examples: [ⱱ ɾ ɾ̃ ɽ ɺ]

Nasal Tap

Nasal alveolar tap [ɾ̃]

◦ In American English, tapped /n/ occurs in the same places as where /t, d/ are tapped (after a stressed syllable, before a reduced vowel or syllabic consonant).

◦ Examples: *sinner, dinner, any, bunny, sunny, pony, kennel, funnel, penny, Jenny*, etc.

Labiodental Flap

Voiced labiodental flap has a new symbol in IPA: [ⱱ].

◦ The textbook is out of date when it says there is no IPA symbol for this sound.

◦ This sound is produced by tucking the bottom lip behind the upper teeth and flapping against them.

◦ This sound occurs mainly in African languages, like Kera:

[ⱱīw]   'see something pass quickly'

[vìw]   'hearing something pass by'

[wīw]   'something attached

[pə̄ⱱā̄w]   'escape quickly'

[pā̄wā̄w]   'noise in forest'

Central vs. Lateral Consonants

Most speech sounds are *central* (they result from constriction along the center of the vocal tract).

Lateral sounds involve an obstruction at a point along the center of the vocal tract, but with incomplete closure along one or both sides of the tongue. Laterals may be approximants, fricatives, affricates, or flaps.

- Lateral approximants: [l ɭ ʎ ʟ]
- Lateral fricatives: [ɬ ɮ]
- Lateral affricates: [tɬ dɮ]
- Lateral flap: [ɺ]
- Lateral click: [ǁ]

Portuguese

NASAL VOWELS

adapted from slides by Sharon Hargus and Valerie Freeman

Portuguese Phonemes

	Bilabial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Uvular
Plosive	p b		t d				k g	
Nasal	m		n			ɲ		
Fricative		f v		s z	ʃ ʒ			ʁ
Tap				ɾ				
Lateral Approximant			l			ʎ		

Cruz-Ferreira, Madalena. 1999. Portuguese. In International Phonetic Association (eds.), *Handbook of the International Phonetic Association*, 126-130. Cambridge: Cambridge University Press.
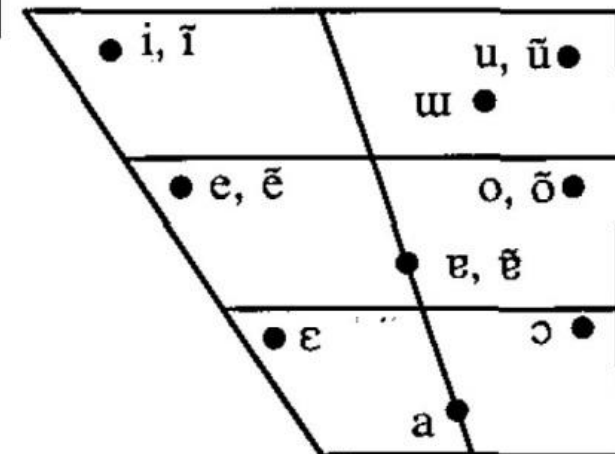
Portuguese Listening Practice

[vi] 'I saw'

[vĩ] 'I came'

[se] 'cathedral'

[va] 'he/she goes'

[sɔ] 'alone'

[so] 'I am'

[ˈmudu] 'mute' (masc.)

[peˈgɐɾ] 'to pay'

[pɯˈgɐɾ] 'to grip'

Portuguese Transcriptions

1. 'bad' (m. sg.)   [mau]
2. 'cactus'   [ˈkatu]
3. 'cat' (m.)   [ˈgatu]
4. 'den'   [ˈẽtru]
5. 'duck' (m.)   [ˈpatu]
6. 'hand' (n.)   [mãũ]
7. 'he/she goes out'   [sai]
8. 'he/she grinds'   [mɔi]
9. 'he/she saw'   [viu]
10. 'hundred'   [sẽi]
11. 'I am'   [so]
12. 'I came'   [vĩ]

1. 'I date'   [ˈdatu]
2. 'I enter'   [ˈẽtru]
3. 'I kill'   [ˈmatu]
4. 'I know'   [sei]
5. 'I strike'   [ˈbatu]
6. 'mine' (poss.m.)   [meu]
7. 'sound' (n.)   [sõ]
8. 'tact'   [ˈtatu]
9. 'thicket'   [ˈmoitɛ]
10. 'veil'   [vɛu]
11. 'world'   [ˈmũdu]

Reminders

- Airstream Wedneday

- Read L&J Ch 6

- Lab 1 due 11/4