1 Intro to Phonetics 450/550

Course Materials

Canvas Web Site:

- Syllabus and Course Info
- Lecture Slides
- Project Info
- Resources
- Homework, Quizzes, Exams

Workload

Readings 10-30 pages daily

- Important to keep up, due before class

HW ~Daily, 5-15 questions

Transcriptions -2/3 a week

Quizzes on Moodle -3 total, timed

Labs-2-3 total introduced in class few days before

Project 2 parts, given some class time to work on

Final Exam on Canvas, online

Your “Index Card”-Beginning Survey

1. Name – what you want me to call you + last name
2. Major/Program/Specialization
   - Optional: Why you’re taking this class, what you hope/expect to learn, if there’s something specific you want to know about
3. Where you grew up (general geographic area)
   - include ages (in childhood) if you lived in more than one place
4. Languages you are familiar with
   - How well known (native, fluent, high, low…)
   - How long known / studied
   - How you learned (at home, in school…)
5. Preference language family, geographic location

My “Index Card”

1. Marina Oganyan
2. Postdoctoral Researcher-Phonetics, Psycholinguistics, Acquisition
3. Ukraine-early childhood, Seattle
4. Languages you are familiar with
   - Russian-native, English-native
   - Hebrew-fluent
   - Ukrainian – moderate
   - Arabic – moderate
   - Armenian– very little, basic knowledge

Basic Phonological Terms

CONCEPTS YOU SHOULD KNOW BEFORE BEGINNING THIS CLASS

IF NECESSARY, REVIEW *LANGUAGE FILES* CH. 3

Phonology Defined

Phonology is the study of *sound systems* in language. This includes:

- describing what constitutes “the same sound” versus “different sounds”
- describing the way in which neighboring sounds influence each other.

Contrastive Sounds

The first stage in a phonological analysis of a language is accurately describing the set of *contrasts*. Contrastive sounds serve to differentiate words in a language.

Examples:

- the first sound in “wake” and “rake” differentiates the two words
- the last sound in “his” and “hiss” differentiates the two words
- the middle sound in “leather” and “lever” differentiates the two words

Phonemes and Minimal Pairs

Sounds that contrast belong to different *phonemes*. Two words that differ by a single contrastive sound (phoneme) are called a *minimal pair*. Larger groups of words that all differ by a single phoneme are called *minimal sets*.

- Minimal pairs:
  - “wake” / “rake”
  - “his” / “hiss”
  - “leather” / “lever”
- Minimal set:
  - “by” / “dye” / “guy”

Allophones

A single phoneme may be pronounced in a variety of ways that don't change the meanings of words. These non-contrastive sounds are called *allophones*.

You can think of a phoneme as an abstract mental unit comprising the set of all its allophones.

Example:

- in English, /t/ is sometimes pronounced with a puff of air (as in "tie") and other times without the puff of air (as in "bat"). These two different pronunciations are two of the allophones of the /t/ phoneme. (Note: the puff of air is called *aspiration*. In some languages, aspiration is a *phonemic contrast* — it can signal a change in word meaning).

Overview of Phonetics

(ESPECIALLY ARTICULATORY PHONETICS)

READ LADEFOGED & JOHNSON, CHAPTER 1

slides by Elizabeth McCullough

Three Kinds of Phonetics

Articulatory phonetics

- Describes the way speech sounds are produced anatomically

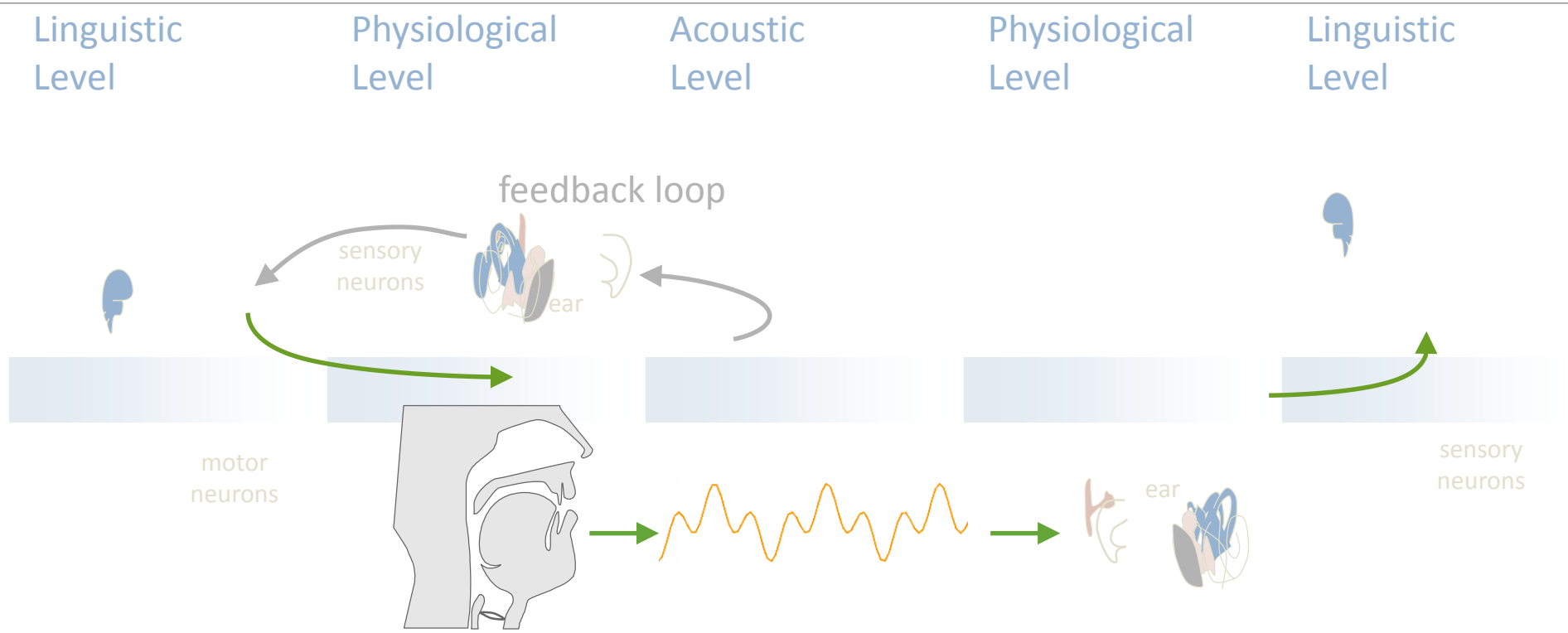
Acoustic phonetics

- Analysis of the sound waves (in air) produced by speech; typically analyzes *recorded speech* using specialized software

Auditory phonetics

- Concerned mostly with speech perception; often involves *synthesized speech* in tightly controlled experiments

The Speech Cycle



Signal is initiated in speaker's brain

Signal articulated by the speech organs

Sound waves travel through the air

Listener detects the sound waves

Signal is interpreted by listener's brain

Articulatory Phonetics Defined

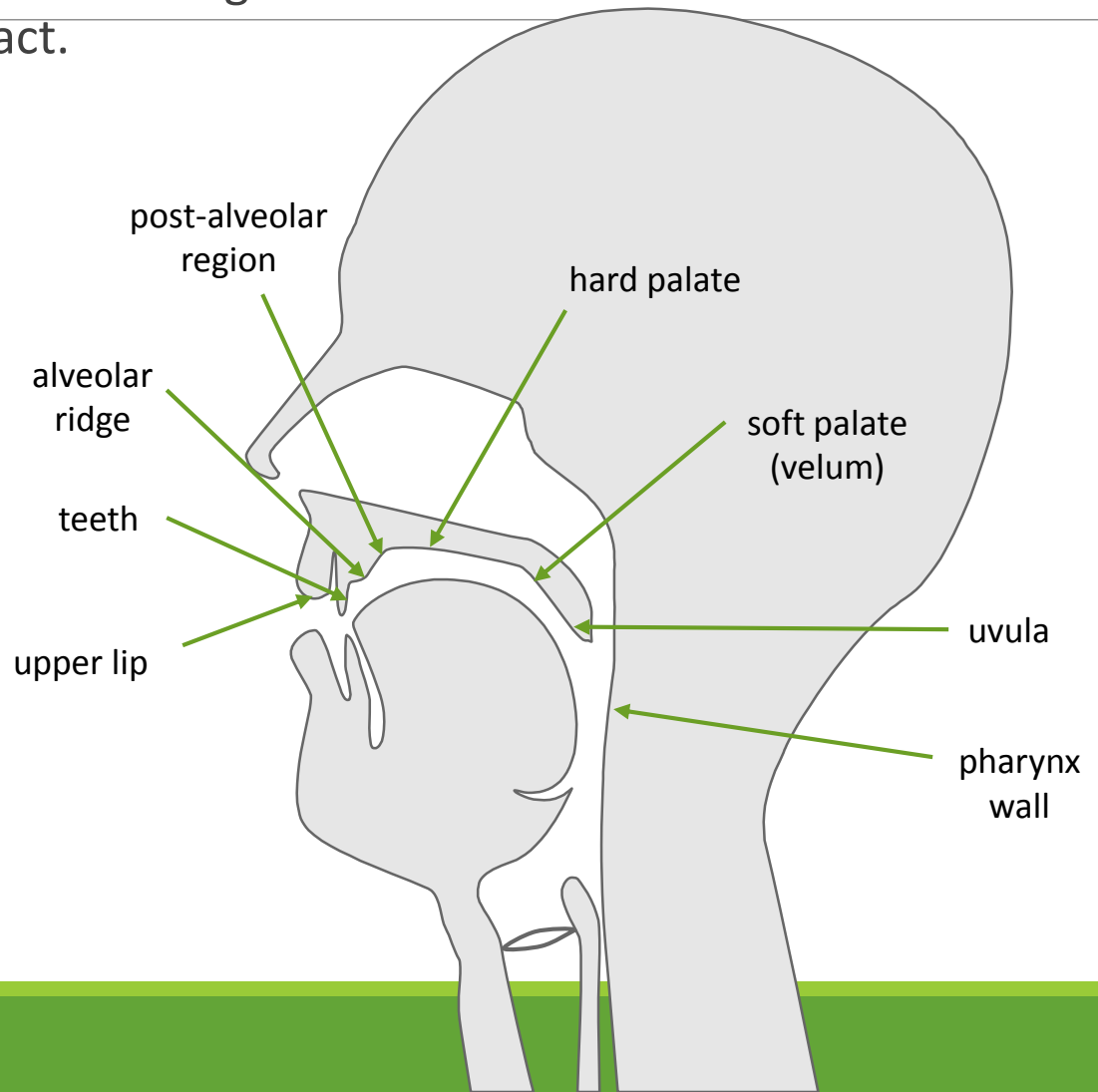
Articulatory phonetics is the study of how speech sounds are produced, and involves detailed and precise descriptions of tongue position, lip rounding, vocal fold vibration, and many other articulatory factors.

The varieties of sound made during human speech are the result of changes in the *vocal tract*. Most of these changes are the result of movements of the lips, tongue, and jaw, and involve the creation of some degree of *constriction* in the vocal tract.

- When constriction is created in the vocal tract, it is typically the result of an *active articulator* (like the tongue) moving toward a *passive articulator* (like the hard palate).

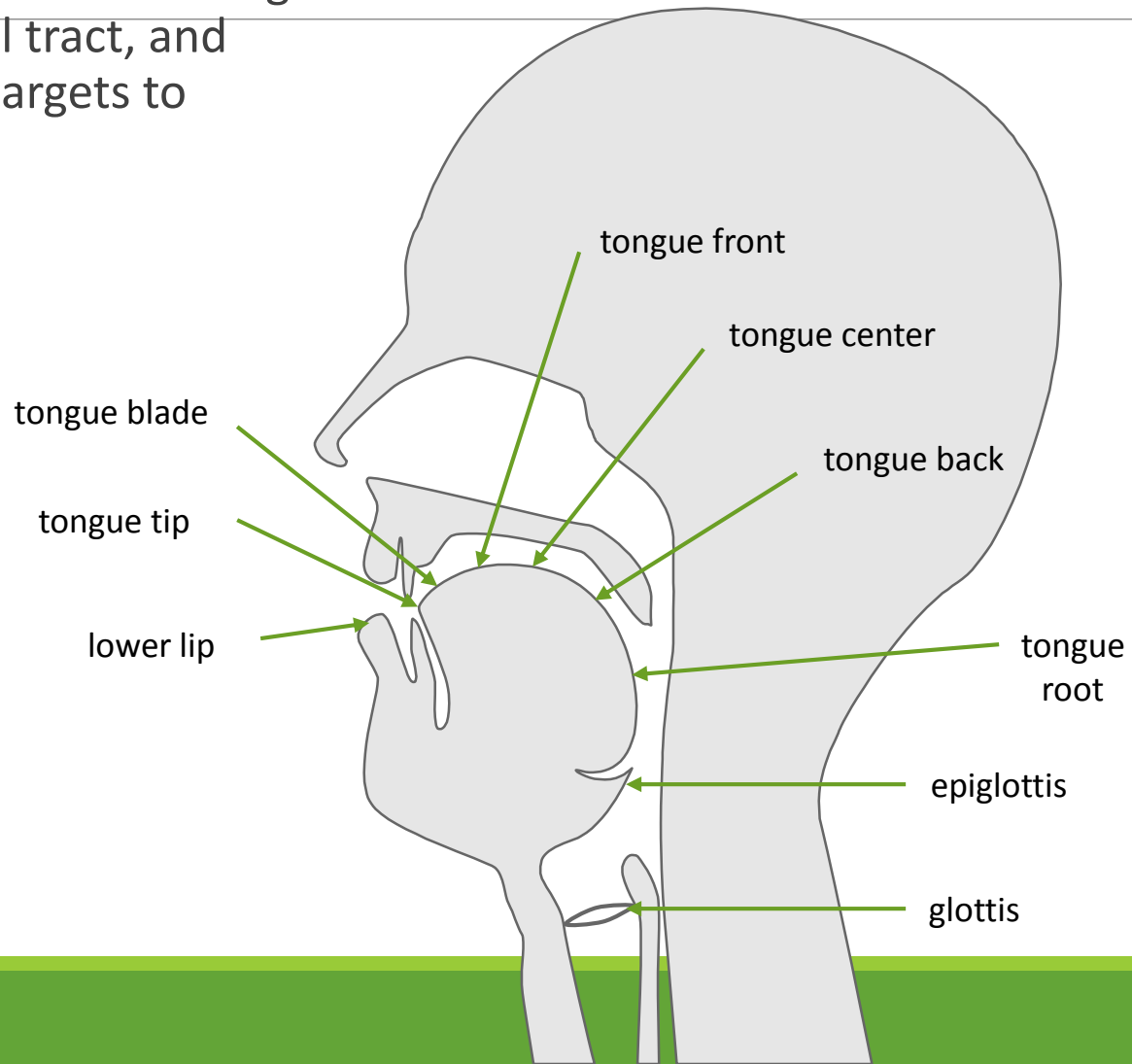
Passive Articulators

Most *passive articulators* are located along the upper surface of the oral tract.



Active Articulators

Most *active articulators* are located along the lower surface of the oral tract, and move toward their passive targets to create a constriction.



Describing Articulations

There are many details that must be specified to give a complete description of a speech articulation:

- *Place of articulation*
- *Manner of articulation*
- *State of the velum* (specified as *oral* vs *nasal*)
- *State of the glottis* (also called *laryngeal setting* or *voicing*)
- *Laryngeal timing* (a special measure for stop consonants, usually called *voice onset time* or *VOT*)
- *Airstream mechanism*
- *Sound duration*
- *Pitch*

Describing Articulations: Place of Articulation

Place of articulation describes which active and passive articulators are creating constriction. Examples:

- *Bilabial* (lower lip to upper lip)
- *Labiodental* (lower lip to upper incisors)
- *Dental* (tongue tip/blade to upper incisors)
- *Alveolar* (tongue tip/blade to alveolar ridge)
- *Palatoalveolar* (tongue blade to region between alveolar ridge and palate)
- *Retroflex* (tongue tip or underblade to region between alveolar ridge and palate)
- *Palatal* (tongue center to palate)
- *Velar* (tongue back to velum)
- *Uvular* (tongue back to uvula)
- *Pharyngeal* (tongue root to pharynx wall)
- *Epiglottal* (epiglottis to pharynx wall)
- *Glottal* (vocal folds to each other)
- http://sail.usc.edu/span/rtmri_ipa/

Describing Articulations: Manner of Articulation

Manner of articulation describes the degree and quality of constriction in the vocal tract. Examples:

- *Stop*: complete closure of the oral tract airstream
- *Fricative*: near-complete closure causing turbulence in the airstream
- *Approximant*: closure broad enough to prevent turbulence
- *Affricate*: a stop that is released only slightly, causing an immediately following fricative at the same place of articulation
- *Tap/Flap*: an extremely brief stop closure (the active articulator is flung toward the passive articulator and bounces off it)
- *Trill*: a rapid series of flap-like closures

Describing Articulations: Velic Closure

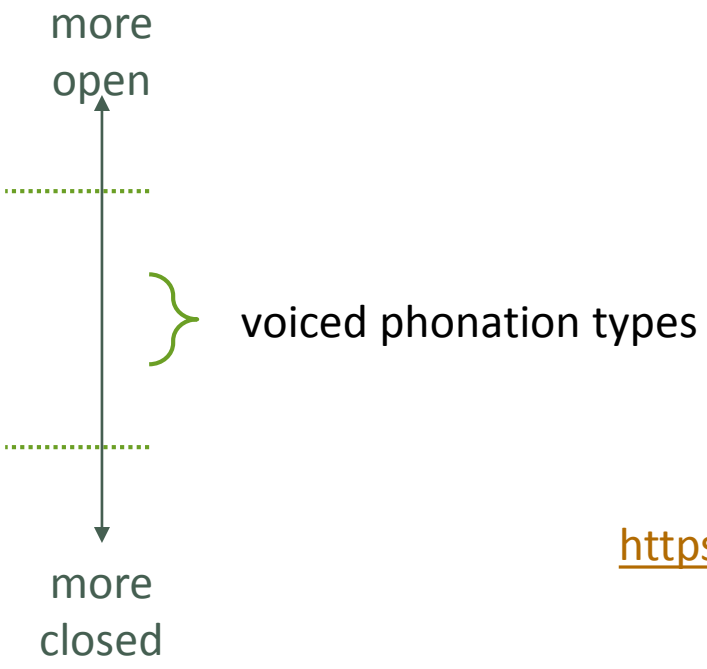
During most articulations, it is possible to have the velum either raised or lowered, thereby closing or opening the velopharyngeal port.

- Velic closure can affect the quality of both consonants and vowels.
- The most common distinction is between *oral stops* (velum up/velopharyngeal port closed) and *nasal stops* (velum down/velopharyngeal port open).

Describing Articulations: State of the Glottis

State of the glottis (also called *laryngeal setting*, *phonation type*, or *voicing*) describes the degree of vocal fold closure and the quality of vibration.

- Voiceless
- Breathy
- Modal
- Creaky
- Closed



https://www.youtube.com/watch?v=P2pLJfWUjc8

Describing Articulations: Laryngeal Timing

Voice onset time (*VOT*) is a measure of time (typically in milliseconds) between the release of a stop closure and the onset of voicing.

- When voicing has already begun before the stop is released, the VOT is negative; when voicing begins after the stop is released, the VOT is positive.
- Positive VOT values lead to *aspiration noise* (a burst of fast-moving air exiting past the stop closure as it is released).
- Different languages divide the VOT continuum in different ways:
  - English stops: “voiced” = VOT near zero; “voiceless” = long VOT
  - French stops: “voiced” = negative VOT; “voiceless” = short VOT
  - Thai stops: “voiced” = negative VOT; “voiceless” = short VOT; “aspirated” = long VOT

Describing Articulations: Airstream Mechanisms

All articulations require the movement of air to generate sound. The *airstream mechanism* describes the way in which air is caused to move.

- The vast majority of speech sounds rely on the *pulmonic egressive* airstream mechanism (air pushed out from the lungs).
- The *glottalic egressive* airstream mechanism causes air movement *out of* the oral cavity by closing the vocal folds and moving the larynx *up*, thereby *compressing* the air between the larynx and the oral closure. When the closure is released, air moves past the constriction, generating sound. Such sounds are called *ejectives*.

Describing Articulations: Airstream Mechanisms

All articulations require the movement of air to generate sound. The *airstream mechanism* describes the way in which air is caused to move.

- The *glottalic ingressive* airstream mechanism causes air movement *into* the oral cavity by closing the vocal folds and moving the larynx *down*, thereby *rarefying* the air between the larynx and the oral closure. When the closure is released, air moves past the constriction, generating sound. Such sounds are called *implosives*.
- The *velaric ingressive* airstream mechanism causes air movement *into* the oral cavity by making two oral closures and moving the tongue *down*, thereby *rarefying* the air between the two closures (one is always at the velum). When the front closure is released, air moves past the constriction, generating sound. Such sounds are called *clicks*.

Describing Articulations: Duration

Both vowels and consonants can vary in their duration; in some languages the length of a sound can signal *lexical contrast* (i.e., change the meaning of a word).

- Contrastive consonant length: Italian, Swedish, Finnish, Japanese
  (ex: Japanese 来た *kita* “came/arrived” vs. 切った *kitta* “cut/sliced”)
- Contrastive vowel length: Danish, Korean, Swedish, Finnish, Japanese
  (ex: Croatian *hrom* [hrôm] “lame” vs. *krom* [hrô:m] “chrome”)


Describing Articulations: Pitch

Pitch can signal lexical contrast in some languages (e.g., Mandarin Chinese, Vietnamese, Hausa, Zulu). This is called *lexical tone*. Example:

- ma 55 (媽) “mother” 
- ma 214 (馬) “horse” 
- ma 35 (麻) “hemp” 
- ma 51 (罵) “scold” 

In other languages, pitch marks other aspects of meaning (e.g., emotion or emphasis). This is called *intonation*.

Reminders

Do Beginning of Quarter Survey on Canvas

Do font/audio support test on Canvas (Quiz 0)

- Download Charis SIL font

Read Ladefoged & Johnson chapter 1,2