Linguistics 341: Introduction to Phonetics

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What is phonetics?

Phonetics is the scientific study of speech sounds. It consists of three main sub-fields:

- Articulatory phonetics
  - = how speech sounds are produced (by the tongue, lips, vocal folds, etc.)
- Acoustic phonetics
  - = how speech sounds are transmitted from producer to perceiver
- Perceptual phonetics
  - = how listeners understand which speech sounds are being produced

What you will learn in this class

1. Phonetic transcription
    - The International Phonetic Alphabet (IPA)
2. How to produce the speech sounds of the languages of the world
    - including the exotic ones
3. The basics of:
    - the acoustic analysis of speech
    - how speech may be analyzed with a computer

Phonetic Transcription

- What is phonetic transcription?
- The basic idea:
  - represent speech as a sequence of segments.
  - i.e., with an alphabet.
- Deep thought questions:
- Which kind of alphabet should we use?
  - Should we use the English alphabet?

The Trouble(s) with English

- Some letters represent more than one different sound

  c: re**c**all vs. re**c**eive **g**ear vs. sie**g**e

- Some letters represent no sounds at all

  receiv**e** us**e**

- Sometimes two letters represent just one sound

  reca**ll** **ph**onetics

- Some letters represent two or more sounds at once

  ta**x** **u**se cou**gh** na**ti**on

- The same sound can be represented by many different letters

  sh: **sh**y, mi**ssi**on, ma**ch**ine, spe**ci**al, cau**ti**on

Phonetic Alphabet

- Solution: use a phonetic alphabet
- In a phonetic alphabet, sounds and symbols have a one-to-one relationship to each other
    - Each symbol represents one sound
    - Each sound is represented by one symbol
- The use of a phonetic alphabet to represent speech is called **phonetic transcription**.
- Our phonetic alphabet of choice:
    - The **International Phonetic Alphabet (IPA)**.

The IPA

- Presided over by the International Phonetic Association
- Created in 1886

ðə lɑ:st m.f.

əz membəz wɪl nəʊ, ðɪs ɪz ðə lɑ:st nʌmbər əv ðɪ **m.f.** ɪn ɪts preznt fɔ:m. ɑ: dʒɜ:nl wəz pʌblɪʃt fə ðə fɜ:st taɪm ɪn 1889, ðəʊ pri:vjəslɪ, frəm 1886, ɪt əd əpɪəd əz " ðə fənetɪk ti:tʃə ". ɪn 1889, ɑ:r əsəʊsɪeɪʃn hæd 321 membəz ɪn 18 kʌntrɪz, ðə mədʒɒrətɪ kʌmɪŋ frəm *swi:dn, *dʒɜ:mənɪ ən *frɑ:ns. tədeɪ, wi: hæv mɔ: ðn 800 membəz ɪn əʊvə 40 kʌntrɪz, ðə greɪt mədʒɒrətɪ kʌmɪŋ frəm ðə *jʊnaɪtɪd steɪts ən *greɪt brɪtn.

nɑʊ ðət wi: əv dɪsaɪdɪd tə prɪnt ɑ: nju: *Journal* ɪn ɔ:θɒgrəfɪ, fə ðə fɜ:st taɪm ɪn dʒu:n 1971, ɪt ɪz həʊpt ðət ðə ri:dəʃɪp wɪl bɪ ɪnlɑ:dʒd ən ðət kɒntrɪbju:ʃnz wɪl bɪ rɪsi:vd frəm ə waɪdə sɜ:kl əv fəʊnɪtɪʃnz ən ti:tʃəz. məʊst əv ɑ: membəz hu: əv rɪplaɪd tə ðə sɜ:kjələr ɪn ðə lɑ:st **m.f.** həv sɪgnɪfaɪd ðət ðeɪ wɪʃ tə kəntɪnju: tə səbskraɪb tə ðə nju: *Journal*. ðəʊz hu: əv nɒt jet ɪnfɔ:md əs əv ðɛər ɪntenʃnz ər ɜ:dʒd tə du: səʊ wɪðɑʊt dɪleɪ, sɪns ɑ: faɪnænsɪz wɪl nɒt əlɑʊ əs tə send ðə *Journal* tə fɔ:mə membəz hu:z səbskrɪpʃnz ə nɒt rɪnju:d.

Paul Passy, founder of the International Phonetic Association

The Relentless Pursuit of Phonetics

- The IPA is still active and evolving today
- The last addition to the IPA was the labio-dental flap in 2005.

àvᶹúrúŋgù

- = Mono word for “vehicle”
- (Mono is spoken in the Democratic Republic of the Congo)
- Let’s check out a labio-dental flap in action…

Principles of the IPA

1. The use of a symbol in a transcription is a shorthand method to describe the articulation of that sound.
    - It is essentially a claim that the speaker produced a certain combination of gestures.
2. Contrast:
    - “There should be a separate letter for each distinctive sound; that is, for each sound which, being used instead of another, in the same language, can change the meaning of the word.”
    - one symbol $\Leftrightarrow$ one sound

Minimal Pairs

- Sound contrasts can be shown to exist in a language by finding **minimal pairs**.
- A minimal pair consists of:

  two words that have different meanings, but differ from each other in only one sound.

- Some minimal pairs in English:

pit vs. **b**it	~ /p/ vs. /b/
bee**t** vs. bea**d**	~ /t/ vs. /d/
b**oa**t vs. b**oo**t	~ /o/ vs. /u/
carburetor vs. **g**arburator	~ /k/ vs. /g/

More IPA Principles

3. When any sound is found in several languages, the same sign should be used in all. This applies to very similar shades of sound.

E.g. French [u] = English [u] = Korean [u]

4. The alphabet should consist as much as possible of the ordinary letters of the Roman alphabet.

5. In assigning values to the Roman letters, international usage should decide.

E.g. vowel in English “bee” is transcribed with [i]

Yet More Principles

6. The new letters should be suggestive of the sounds they represent, by their resemblance to the old ones.

Ex:	[ŋ]	“si**ng**”
	[ʃ]	“**sh**eep”
	[ʒ]	“vi**si**on”

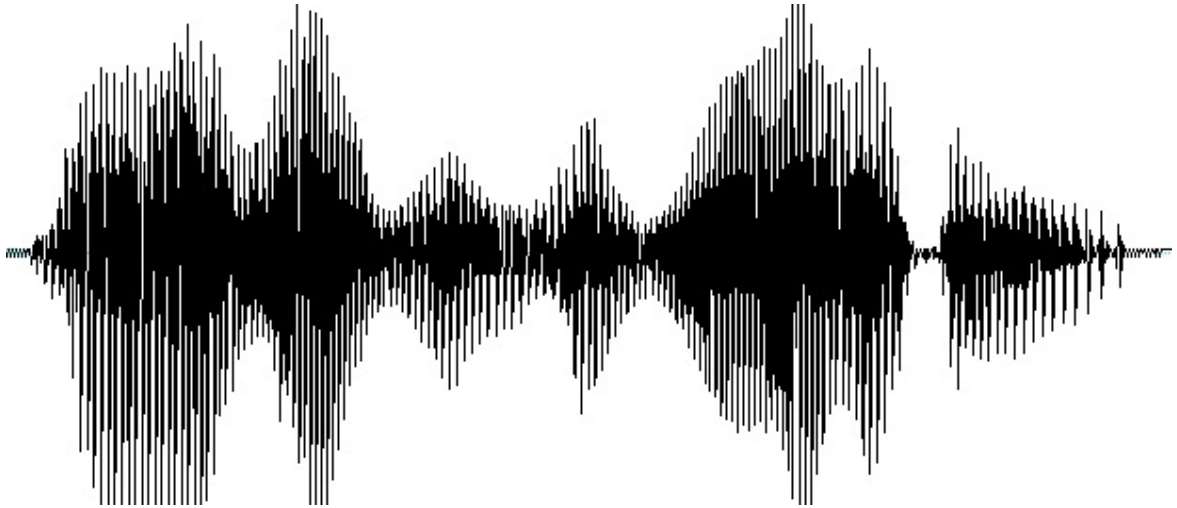
7. Diacritic marks should be avoided, being “trying for the eyes and troublesome to write.”

Caveats

- The IPA is not perfect.
    - It is a useful tool for representing speech as a sequence of segments.
- Phonetic transcription is an inexact science.
    - “Impressionistic”
    - Transcribers often disagree
- Perception is molded by your native language background.
- Production, too
    - (Try producing an unfamiliar sound)
- $\Rightarrow$ Mechanical analysis can come in handy

Phonetic Reality

- Here is an **acoustic waveform** of a sample of speech:



Where were you a year ago?

- Real speech lacks the discreteness and strict sequentiality of alphabetic representations.

- $\Rightarrow$ Phonetic transcriptions of speech are **always** abstract

The Problem of Abstractness

- How abstract should a phonetic transcription be?
- The IPA solution: only capture contrastive differences between sounds.
    - Contrast: **b**it vs. **p**it
    - Non-contrast: [bɪt] vs. [bɪt̚]
- How about “Don” and “Dawn”?
- Here’s the catch:
- The IPA must be able to represent all the contrasts between sounds that are found in language.
    - …including some which we cannot easily hear.

Phonemic Analysis

- A **phoneme** is a contrastive sound in a language
  - It may be used to distinguish between words in minimal pairs.
- **Allophones** are phonetic variants of a phoneme
  - Different allophones often occur in specific contexts.
- Phoneme: /t/

Allophone 1: [t^h]	‘**t**op’	
Allophone 2: [t]	‘s**t**op’	
Allophone 3: [ɾ]	‘me**t**al’	“flap or tap”
	(note: ‘medal’)	
Allophone 4: [ʔ]	‘mi**tt**en’	“glottal stop”

Broad and Narrow

- Broad transcriptions
  - Represent only contrastive sounds (*phonemes*)
  - Generally use only alphabetic symbols
- Narrow transcriptions [tɑp]
  - Capture as much phonetic detail as possible (*phones*)
  - Generally require use of diacritics [t^hɑp]

· Sliding scale between narrow and broad transcriptions

• Note: whenever you write out a phonetic transcription, enclose the IPA symbols in brackets: [ ]

• If you're spelling out the (abstract) phonemes, use slashes: / /

Morals of the Story

1. There can be more than one “right” way to transcribe an utterance.
2. The IPA enables us to record all the possibly meaningful phonetic detail in an utterance.

- It is also useful because:
  - it is portable
  - it does not require electricity
  - it is universal
  - it is traditional
  - it is (relatively) simple
- It is a very handy **tool** to have at your disposal.