1 Introduction

How to produce and perceive lexical items is a part of what we know when we know language. **Phonetics/Phonology** is the study of speech and sound. It can be restricted to:

- **Articulatory phonetics**: how speech sounds are produced.
- **Acoustic phonetics**: how are the characteristics of the speech sounds.
- **Auditory/Perceptual phonetics**: how humans process speech sounds.

Different languages have **different rules** governing speech sounds.\(^1\)

- **Possible words** in other languages are:

  (1)  
  a. [buˈriːto] 'burrito'  
  b. [ˈvʊəst] 'sausage'  
  c. [ˈɑːtɪzə] 'appetizer'

  (2)  
  a. [bəˈrɪroʊ] 'burrito'  
  b. [ˈwɜːrt] 'wurst'  
  c. [ənˈtrɛə] 'entrée'

- **Are these words of English? Could these be words of English? Why not? Think about their English adaptations. How do they differ?**

  (3) Spanish (but not English): [ɾ] vs. [r]:
  a. [ˈkaro] 'car'
  b. [ˈkaro] 'expensive'

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\(^1\)Many of these examples come from handouts in Prof. Ryan Bennett’s *Introduction to Phonological Analysis* course, which I highly recommend taking if you are interested in these topics.
(4) English (but not Spanish): [i] vs. [i]:
   a. [bit] ‘beet’ / ‘beat’
   b. [bɪt] ‘bit’

- These differences are not reducible to general capabilities of the articulatory system. Speakers of different languages have the same vocal, auditory and perceptual physiology...
- Therefore, these differences must be acquired. That is: languages have different sound repertoires.

* Just like *Arrived the train is not a well-formed sentence of English (but it’s fine in Spanish), [ buˈrito ] is not a well-formed word of English (but it’s ok in Spanish).

- So, what do speakers know when they know the sound system of a language?
  1. The inventory of all available speech sounds in their language:
     (5) [pʰæs] ‘pass’ vs. [sæp] ‘sap’.
     (6) [tɛnt] ‘tent’ vs. [tɛŋθ] ‘tenth’.
  2. The restrictions on combining sounds: the phonotactics of a language:
     b. [ækt] ‘act’ vs. [ætk] ‘atk’.
  3. The compositional processes that change the pronunciation of a sound depending on its context:
     (8) English negative prefix in- takes a different shape depending on the following sound.
2 Phonetic transcription

We need a method of writing down speech sounds in an unambiguous way (spelling does not tell us how a sound is pronounced!):

a. each symbol should represent one sound only and there should be one symbol for each sound (one-to-one correspondence).
b. if two sounds can distinguish one word from another, they should be represented by different symbols (thy vs. thigh).
c. if two sounds are very similar and their differences are predictable from context, we should be able to represent their similarity (pass vs. sap).

Why is English spelling bad for this?

a. same sound, different letters: see, scene, receive.
b. same letter, different sound: sign, pleasure.
c. many letters, one sound: lock, that.
d. one letter, many sounds: exit, use.
e. one letter, no sound: know, doubt, island.

The best solution is the International Phonetic Alphabet (IPA), because:

a. it is applicable to all human languages.
b. it has a one-to-one correspondence between symbols and sounds.
c. it allows expressing different levels of sound/articulatory detail.
3 The sound system of Standard American English

3.1 Vowels

3.1.1 Monophthongs

- tense [i], as in beat, we, heed, dean.
- lax [ɪ], as in bit, hid, gym.
- lax [ɛ], as in bet, head.
- [æ], as in bat, had, anger.
- [a], as in about, enough – and almost all unstressed vowels.
- [ʌ], as in but, tough, oven.
- tense [u], as in boot, who.
- lax [u], as in put, book, foot.
- [ɔ], as in bought, caught.
- [ɑ], as in cot, pot, father.

- How is the variation across speakers between merry, Mary, and marry best represented? How about Dawn, Don or caught, cot?
Vowels are produced by air that flows freely through the oral cavity, with narrowings articulated by the tongue. We classify them along four principal dimensions:

1. **Height**: [low, mid, high] or in IPA: [open, open-mid, close-mid, close]. ([i] vs. [e] vs. [æ])
2. **Backness**: [back, central, front]. ([e] vs. [o] vs. [ɔ])
3. **Roundness**: [rounded, unrounded] ([i] vs. [y])
4. **Tenseness**: [tense, lax] (it provides additional levels of height/centralization.) ([i] vs. [ɪ])

We can classify vowels in:

a. **Monophthongs**: simple vowels.

b. **Diphthongs**: complex configurations that we also consider to be simple vowels (because they act as the *nucleus* of just one syllable; cfr. *knives* vs. *naïve*).

### 3.1.2 Diphthongs

- [ai], as in *bite, I, aisle.*
- [au], as in *bout, brown, how.*
- [ɔi], as in *boy, annoy, rejoice.*
- [ou], as in *boat, grow, over.*
- [eɪ], as in *bait, reign, they.*

![Diphthongs of American English](image-url)
3.2 Consonants

- \[p\], as in *pit, tip, appear.*
- \[b\], as in *ball, globe, brick, bubble.*
- \[t\], as in *tag, pat, stick.*
- \[d\], as in *dip, card, drop, loved.*
- \[k\], as in *kit, character, scoot.*
- \[g\], as in *guard, bag, gate.*
- \[?]\(\hat{\text{a}}\), as in *uh-oh, Batman.*
- \[f\], as in *foot, laugh, coffee.*
- \[v\], as in *vest, dove, average.*
- \[o\], as in *through, wrath, teeth.*
- \[\ddot{\text{a}}\], as in *their, mother, either.*
- \[s\], as in *soap, descent, peace, cats.*
- \[z\], as in *zip, roads, design.*
- \[\underline{\text{f}}\], as in *shy, mission, nation.*
- \[s\], as in *measure, vision, casualty.*
- \[h\], as in *who, hat, whole.*
- \[\ddot{\text{t}}\], as in *choke, match, feature.*
- \[\dddot{\text{d}}\], as in *judge, George, region.*
- \[m\], as in *mouse, lamb, ample.*
- \[n\], as in *nap, snow, tan.*
- \[y\], as in *lung, think, ankle.*
- \[l\], as in *leaf, feel, mild.*
- \[\underline{\text{a}}\], as in *reef, fear, carp.*
- \[r\], as in *writer, butter, udder, cuter.*
- \[w\], as in *with, swim, queen.*
- \[j\], as in *you, feud, use.*
Consonants are produced with a constriction somewhere in the vocal tract that impedes free airflow. We classify them along three principal dimensions:

1. **Place of articulation**: *where* in the vocal tract is the main constriction. (e.g., [t] vs. [k])

2. **Manner of articulation**: what kind of constriction it is. (e.g., [t] vs. [s])

3. **Voicing**: the state of the vocal chords in the larynx. (e.g., [t] vs. [d])

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4 Types of speech sounds

What sound information can we transcribe?

1. **Suprasegmental**: information that applies to entire strings of speech (e.g., tone, stress, intonation).

2. **Segmental**: information on discrete units of the speech stream (e.g., consonants, vowels).

4.1 Syllable structure

Syllables are units of speech. Vowels and consonants play different roles in the structure of a syllable:

- The **nucleus** is usually a vowel, which can carry stress, volume, tone, pitch... However, there are also *syllabic consonants*, as in American English *butter* [ˈbʌtər]. These are *very* rare among languages of the world.

- The **onset** consists of the consonantal sounds before the nucleus.

- The **codas** represent the consonantal sounds after the nucleus.