

# The Mental Lexicon - LING 105 - Piñango/Fuchs

## Handout #2: The speech sounds of English: Phonetics/Phonology

September 8th, 2016

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### 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:<sup>1</sup>

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

- (1) a. [ bu'rito ] 'burrito' (Spanish)  
b. [ 'vʊʁst ] 'sausage' (German)  
c. [ ɑ̃'tʁe ] 'appetizer' (French)

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

- (2) a. [ bə'ɹɪrɪtʊ ] 'burrito' (English)  
b. [ 'wɜrst ] 'wurst' (English)  
c. [ ɑn'tɹɛ ] 'entrée' (English)

– **Possible contrasts** between words:

- (3) Spanish (but not English): [r] vs. [r̄]:  
a. [ 'karo ] 'car'  
b. [ 'karo ] 'expensive'

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<sup>1</sup>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. [ɪ]:

a. [ bit ] ‘beet’ / ‘beat’

b. [ bit ] ‘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), [ bu'rito ] 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) [ p<sup>h</sup>æs ] ‘pass’ vs. [ sæp ] ‘sap’.

(6) [ tɛnt ] ‘tent’ vs. [ tɛŋθ ] ‘tenth’.

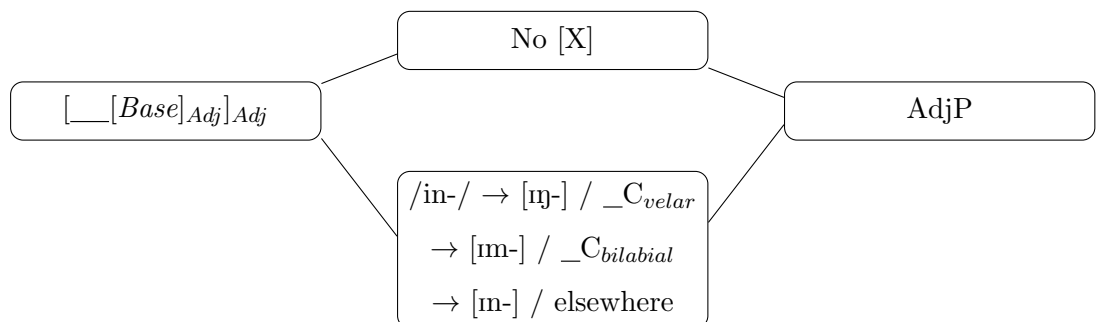
2. The restrictions on combining sounds: the **phonotactics** of a language:

(7) a. [ hæŋ ] ‘hang’ vs. [ ŋæh ] ‘ngah’.

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:

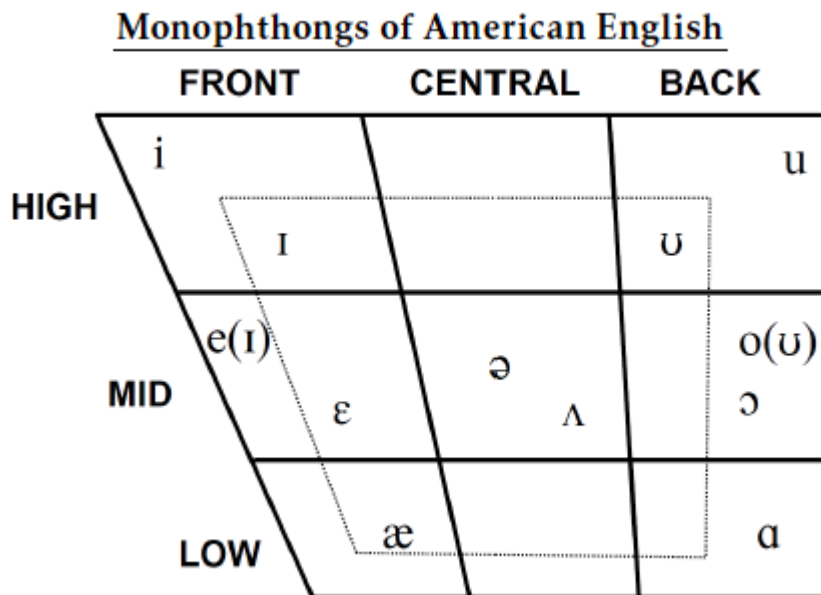
- a. it is applicable to all human languages.
- b. it has a one-to-one correspondence between symbols and sounds.
- c. it allows expressing different levels of sound/articulatory detail.

### 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*.
- [ə], as in *about, enough* –and almost all unstressed vowels.
- [ʌ], as in *but, tough, oven*.
- tense [u], as in *boot, who*.
- lax [ʊ], 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]. ([ɪ] vs. [ɛ] vs. [æ])
2. **Backness:** [back, central, front]. ([ɛ] vs. [ə] vs. [ɔ])
3. **Roundness:** [rounded, unrounded] ([i] vs. [y])
4. **Tenseness:** [tense, lax] (it provides additional levels of height/centralization.) ([i] vs. [ɪ])

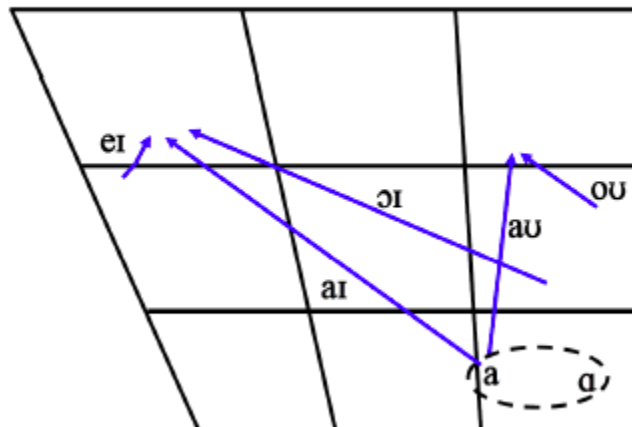
We can classify vowels in:

- 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. *naive*).

### 3.1.2 Diphthongs

- [aɪ], as in *bite*, *I*, *aisle*.
- [aʊ], as in *bout*, *brown*, *how*.
- [ɔɪ], as in *boy*, *annoy*, *rejoice*.
- [oʊ], as in *boat*, *grow*, *over*.
- [eɪ], as in *bait*, *reign*, *they*.

#### Diphthongs of American English



## 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*.
- [ʔ], as in *uh-oh*, *Batman*.
- [f], as in *foot*, *laugh*, *coffee*.
- [v], as in *vest*, *dove*, *average*.
- [θ], as in *through*, *wrath*, *teeth*.
- [ð], as in *their*, *mother*, *either*.
- [s], as in *soap*, *descent*, *peace*, *cats*.
- [z], as in *zip*, *roads*, *design*.
- [ʃ], as in *shy*, *mission*, *nation*.
- [ʒ], as in *measure*, *vision*, *casualty*.
- [h], as in *who*, *hat*, *whole*.
- [tʃ], as in *choke*, *match*, *feature*.
- [dʒ], as in *judge*, *George*, *region*.
- [m], as in *mouse*, *lamb*, *ample*.
- [n], as in *nap*, *snow*, *tan*.
- [ŋ], as in *lung*, *think*, *ankle*.
- [l], as in *leaf*, *feel*, *mild*.
- [ɹ], 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])

	BILABIAL	LABIO-DENTAL	DENTAL	ALVEOLAR	POST-ALVEOLAR	PALATAL	VELAR	GLOTTAL
STOPS	p b			t d			k g	ʔ
AFFRICATES					tʃ dʒ			
FRICATIVES		f v	θ ð	s z	ʃ ʒ			h
NASALS	m			n			ŋ	
GLIDES	w					j		
LIQUIDS				l ɹ				
TRILL OR FLAP				r				

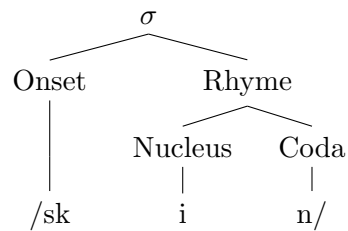
## 4 Types of speech sounds

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* [ 'bʌ.t̩.ɹ̩ ]. These are *very* rare among languages of the world.
- The **onset** consists of the consonantal sounds before the nucleus.
- The **coda** represents the consonantal sounds after the nucleus.