Phonetics

First lecture

Phonetics is the study of physical and measurable attributes of sounds

- How we use articulators in the vocal tract to produce sounds

- How we can group language sounds into classes

- How humans use tone, intonation, and sound length to create meaning

- How language sounds in context can be modified by neighboring sounds
- How we use special symbols, the International Phonetic Alphabet, IPA, to represent all the different sounds in human languages
- Descriptions of the world's speech sounds are based on precise measurements of their physical properties as well as on the movements of the various articulators.

Class of possible speech sounds is finite, and a portion of the total set will be found in the inventory of any human language.

•There are about 600 possible consonants and 200 vowels found in human languages.

- articulatory phonetics (production)
- auditory phonetics (perception)
- acoustic phonetics (physical properties of sounds): intensity, duration, and frequency.

Phonetics covers:

- How the mouth (speech organs) produces different sounds – articulatory phonetics

- The different properties of the sounds produced by the vocal tract – acoustic phonetics

Sounds of Human Language

Important:

Orthography (writing systems) is not the same as phonetics

How many sounds in these words?

…. and what are they?

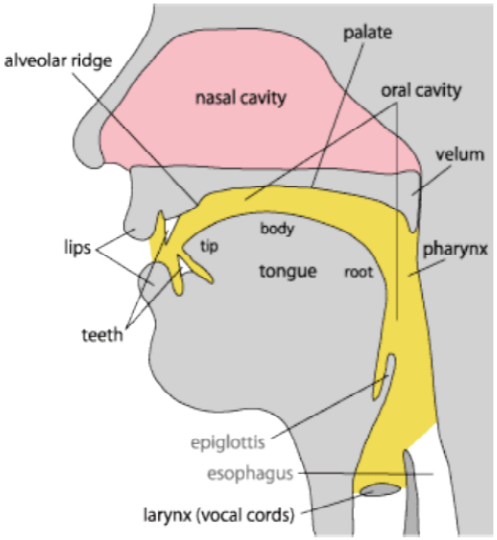
a)	dog	b)	fish
c)	bear, meat, read	d)	walk, talk, comb
e)	cell, call	f)	people
g	aisle	h)	exit
i)	thigh	j)	thy

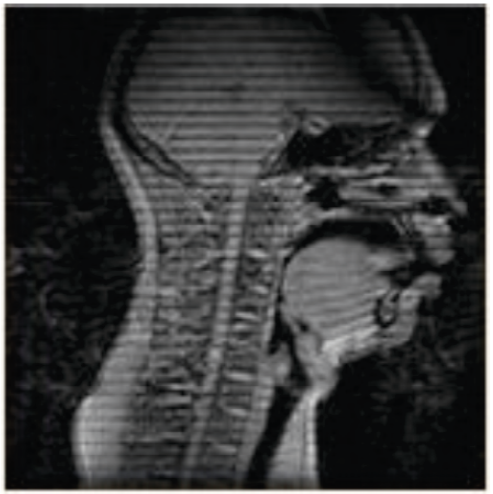
1. • Spelling can contain consonants that are not heard/pronounced
– knuckle
– bomb
– science
– listen
2. • Spelling can contain vowels that are not heard/pronounced
– force
– goat
– dead
3. • Spelling can contain consonants or consonant groups that are spelled differently but pronounced the same
– cider
– sour
– scent

4. • Spelling can contain vowels and vowel groups that are pronounced as one vowel
– pea
– sieve
– peer
5. • Spelling can contain a consonant that is pronounced differently in different contexts
– cease
– can
6. • Spelling can contain a vowel that is pronounced differently in different contexts
– he
– hem
– women

The vast differences between the written form and the spoken form shows that in most languages, here English, the writing system does not have a one-to-one correspondence with the spoken form.

The vocal tract





The vocal cords

- Larynx: The valve-like structure through which air flows
- Vocal cords: The two flaps in the larynx
- Glottis: the area through which air flows

The State of the Larynx

- Voiced: A voiced sound is produced when the vocal cords are close together for vibration
- Voiceless: A voiceless sound is produced when the vocal cords are in an open state when the air passes through (no vibration)

The vocal tract

Active articulators:

Larynx Velum Tongue tip

Tongue body Lips

Passive articulators:

Hard Palate Alveolar ridge Teeth

Sounds of Human Language: Consonants

Manner of articulation: The amount and type of obstruction and subsequent release in the vocal tract during the production of a sound

Stops: complete obstruction

Nasal: Lowered velum and oral obstruction

Fricative: partial obstruction; gradual release

Affricate: starts like a stop ends like a fricative

- ***manner of articulation***: the **amount** of obstruction in the vocal tract during a sound

"do" "chew" "zoo"

"new"

"loo" "rue" "you"

"eww"

manners of articulation:

- *stops*: complete obstruction … "do"
- *nasals*: oral obstruction only (lowered velum) … "new"
- *fricatives*: slightly open air flow (air hisses through) … "zoo"
- *affricates*: starts stop, ends fricative …"chew"

manners of articulation con'd:

- *approximants*: more open air flow
  (air is flowing, not hissing)

- *lateral approximants*:
  side(s) of the tongue lowered … "l̲oo"

- *central approximants*:
  tongue … bunched up … "r̲ue"
  … "y̲ou"

- vowels: open air flow … "eww"

Sounds of Human Language: Vowels

How to describe your basic VOWELS:

a. *Tongue Height: repeat the words seat, set, sat [i], [ɛ] [æ]*

What happens? You should be opening your mouth a bit wider as you change from [i] to [ɛ] and then a little wider as you go from [ɛ] to [æ].

These varying degrees of openness correspond to different degrees of tongue height: *high for [i], mid for [ɛ] and low for [æ].*

Sounds of Human Language: Vowels

b. High vowels like [i] are made with the front of the mouth less open because the tongue body is raised or high. The high vowels of English are [i, ɪ, u, ʊ] as in leak, lick, Luke, look.

c. Low vowels like [æ] in sat are pronounced with the front of the mouth open and the tongue lowered. The low vowels in English are [æ, a] as in sat/cat, cot.

Sounds of Human Language: Vowels

d. Mid vowels like [ɛ] set are produced with an intermediate tongue height; in English the mid vowels are [e, ɛ, ʌ, ɔ, o] as in bait, bet, but, bought, boat.

Note that the vowel [ə] as in the last syllable of sofa is simply unstressed [ʌ].

Sounds of Human Language: Vowels

e. Lip rounding:

Vowel quality also depends on lip position. When you say the [u] in two, your lips are rounded.

For the [i] in tea, they are unrounded. English has four rounded vowels: [u, ʊ, o, ɔ]as in loop, foot, soap, caught. All other vowels in English are unrounded.

Sounds of Human Language: Vowels

f. Tenseness: Vowels that are called tense have more extreme positions of the tongue or the lips than vowels that are lax.

The production of tense vowels involves bigger changes from a mid central position in the mouth.

On the vowel chart, you can see that the distance between tense vowels [i] and [u] is bigger than the distance between the lax vowels [ɪ] and [ʊ].

Sounds of Human Language: Vowels

For example, tense vowels are made with a more extreme tongue gesture to reach the outer peripherals of the vowel space.

What this means is that the tongue position for the tense high front vowel [i] is higher and fronter than for the lax high vowel [ɪ].

Lax vowels are not peripheral, on the outer edge of the possible vowel space. Compare tense [i] in meet with lax [ɪ] [in mitt, or tense [u] in boot with lax [ʊ] in put. In the latter case you will find the tensed vowel [u] is also produced with more and tighter lip rounding than the lax counterpart [ʊ].

Tense		**Lax**	
i	beat	ɪ	bit
e	bait	ɛ	bet
u	boot	ʊ	put
o	boat	ɔ	bore

Sounds of Human Language: Vowels

VIII. Sample descriptions of English vowels;

- [i] as in *beat, is high, (front) unrounded and tense.*
- [ɔ] as in *caught, is mid, (back), rounded and lax.*
- [a] as in *cot, is low, (back), unrounded and lax.*
- [e] as in *cake, is mid, (front) unrounded and tense.*

IX. DIPTHONGS

a. Sequence of two sounds, vowel + glide.

b. Simple vowel

c. The vowel sound in the word bite [bajt] has the [a] vowel sound of father followed by the [j] glide resulting in the dipthong [aj].

d. The vowel in bout [bawt] is [a] followed by the glide [w] resulting in the glide [aw].

e. The third diphthong that appears in English is the vowel sound in boy which is the vowel [ɔ] of bore (without the [r]) followed by the palatal glide [j] resulting in the dipthong [ɔj].