

Phonetics

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1 Basic properties of sounds and what is phonetics

- Phonetic competence: this is the ability to know what sounds are in the language and how they may be ‘strung’ together to form meaningful units.
- Phonetics is thus the study of how we human produce, perceive, and analyze speech sounds.
- The first step to study speech sounds is 1) to know what an individual sound (segment) is, 2) to find out how each sound differs from all others; 3) to segment one stream of sounds into parts.
- Some characteristics in producing speech sounds:
 - a. no relation with spelling: not, knot, psycho
 - b. produce sounds together [continuous signal]
 - (1) a. kee pout
b. a napron → an apron
 - (2) a. The sun’s rays meet.
b. The sons raise meat.
 - c. ambiguous
- But if you know a language you have no difficulty segmenting the continuous sounds.
- This knowledge includes
 - a. to ignore nonlinguistic differences in speech
 - b. capable of making many sounds that we know intuitively are not speech sounds in our language.
 - (3) a. tsk tsk tsk
b. think [θ]

- Branches of phonetics
 1. articulatory phonetics: the study of how the vocal tract produces the sounds of language (speaker's encoding meaning into sounds produced by using the tongue, lips and other articulatory organs)
 2. acoustic phonetics: study of the physical properties of the sounds such as intensity, frequency, and duration, sound vibration by spectrograph (transmission of the sounds through the air to the hearer)
 3. auditory phonetics: the study of the way listeners perceive these sounds (translation of the sounds into the meaning by the hearer)
- What is it good for?
 1. help us understand certain phonological changes (e.g., assimilation)
 - (4) a. illegal, impossible, inadequate, indifference
 - b. prescription, subscription, presumptive, redemptive
 2. help us to sort out the difference between pronunciation and spelling
 - (5) a. cats vs. dogs
 - b. hiss vs. buzz
 3. help us capture the relation between one sound and another by comparing their characteristic properties
 - (6) a. t/d
 - b. s/z
 4. help us to learn new sounds more easily
 - (7) a. k/g
 - b. x (palatal fricative as in *Bach*)

2 Relationship between spelling vs. speech sounds

- There is no one-to-one relationship between sounds and spellings:
 1. The same sound [i]/[u] can be realized as different letters.
 - (8) sea see scene receive thief
to too two through threw
 - (9) meat, meet, city, key, ceiling, people, niece, evil, quay

2. The same letters (s/a) have different sounds.

(10) damage, educate, picked
sign pleasure resign
father all about apple any age

3. A combination of letters (ck, th, oo, sh, th, sh, gh, bb, etc) can produce a single sound

(11) throne, itch, inn, lock that book shop
bath fish enough rabbit

4. A single letter (x, s, x) can have more than one sound

(12) exit use xerox

5. A letter can have no sound

(13) knee, lamb, receipt, right, psalm, salmon, know doubt though island hour

3 IPA system

- To allow any sound (including English, Korean, etc) that we humans produce to be written down uniformly, linguists developed a phonetic alphabet, IPA (International Phonetic Association) System. This phonetic alphabet is one-to-one and universal.
- all IPA sounds are represented by the bracket []
- IPA Table of English Consonants and Vowels: You should memorize all these: page 233/p237

4 Articulatory Phonetics

- Production of sounds: English sounds are produced when air is existing (egressive) from the lungs (pulmonic). The air in the lung travels up to the wind pipe (trachea) and through the larynx (Adam's apple: voice box). Across the larynx, there are two muscles called vocal cords which open during normal breathing but close during eating. The space between the cords when they are open is known as the glottis. The vocal cords can be relaxed so that the flow of air coming up from the lungs passes through freely (voiceless) or held close together so that they vibrate as air passes through (voiced). Check this difference with your Adam's apple.
- The air then moves to either the oral or the nasal cavities. The oral cavity, generating speech sounds via the active articulators such as the tongue and the lower lip, or the passive articulators such as the teeth and the roof of the mouth

- nasal vs. oral sounds: The velum functions as the guide of air either to the oral or the nasal cavity.
- voiced vs. voiceless sounds: when the vocal cords are widely separated and fairly taut, no noise is produced (glottis is opened), producing a voiceless sound. When the vocal cords may also be set in vibration, we produce voiced sounds.
- Consonants vs. vowels: In producing consonants, the flow of breath is temporarily obstructed or blocked. Vowels are produced with a relatively free outward flow of breath

5 Articulation and descriptions of English consonants:

- Voiced vs. voiceless: voiced vs. voiceless
- Place of Articulation: bilabial, labio-dental, interdental, alveolar, (alveolar) palatal, velar, glottal
- Manner of articulation: stop, fricative, affricate, liquid (lateral/retroflex), glide, approximants, flap (tap)

5.1 Voiced vs. voiceless

p/b t/d, k/g, f/v, [θ]/[ð], s/z, [ʃ]/[ʒ], [tʃ]/[dʒ], m,n, [ŋ], w,l,r, [ʔ], h

5.1.1 Place of Articulation

- Criteria: Where in the vocal tract a constriction is made/where the vocal tract is more narrow.
 1. Bilabial: sounds made by bringing both lips closer together. English sounds: [p] [b] [m] [w] [w] as in *pa, bat, mat, with, (where)*
 2. Labio-dental: made with the lower lip against the upper front teeth. English sounds: [f] and [v] as in *fat and vat*
 3. (inter)dental: made with the tip of the tongue between the front teeth. English sounds: [θ] and [ð] as in *thigh and thy*
 4. alveolar: sounds made with the tongue tip at or near the alveolar ridge. English sounds: [t] [d] [s] [z] [n] [l] [r] as in *tab, dab, sip, zip, noose, loose, red*
 5. (alveo)palatal: sounds made with the tongue near the hard palate (hard part of the roof of the mouth) (these sounds often called past-alveolar or palato-alveolar sounds because they are made in the area between the alveolar ridge and the hard palate). English sounds: [ʃ] [ʒ] [tʃ][dʒ][j] as in *leash, measure, church, judge, yes*
 6. velar: sounds made with the tongue near the velum. English sounds: [k] [g] [ŋ] as in *kill, gill, sing.*

7. glottal: Remember the space between the vocal cords is glottis. English has two glottal sounds [h] and [ʔ] as in *high* and *uh-oh*

5.2 Manner of articulation

- Criteria: How the airstream is modified by the vocal tract to produce the sound:
 1. stop: sounds made by obstructing the airstream completely in the oral cavity. English sounds: [p][b] [t][d] [k] [g], [ʔ]
 2. fricative: sounds made by forming a nearly complete stoppage of the airstream. English sounds: [f] [v], [θ] [ð] [s] [z] [ʃ] [ʒ]
 3. affricate: sound made by briefly stopping the airstream completely and then releasing the articulators slightly so that friction is produced (the combination of stop and fricative). Two sounds in English: [tʃ][dʒ]
 4. nasal: when the velum is lowered, the air stream can escape out through the nasal cavity. Three sounds in English: [m][n][ŋ]
 5. liquid: two sounds
 - [l]: resting the tongue on the alveolar ridge with the airstream escaping around the sides of the tongue
 - [r]: a great variation among speakers but usually voiced and articulated in the alveolar region, involving curling the tip of the tongue behind the alveolar ridge (retroflex)
 6. glide: made with only a slight closure of the articulators close to vowels if the vocal tract were any more open. English sounds: wind/you [w][j]
 7. approximants: glides and liquids. These vowel-like sounds can act as syllable nucleus as in *table*, *hiker*. But these sounds cannot be vowels as can be seen from *a yacht*, *a woman*.
 8. trills, taps/flaps: occur only in some dialects of English. At the beginning of *rabbit* or [t] in *phonetic*. writer/rider

6 Articulation of English Vowels

- vowels: The most sonorant (sounds that permit the relatively unrestricted flow of air) and the most audible sounds produced with the vocal tract being opened.
- Different qualities:
 - (14) a. Tongue Height: raising or lowering the body of the tongue
 - b. Tongue Advancement: advancing or retracting the body of the tongue
 - c. Lip rounding: rounding or not rounding the lips
 - d. Tenseness: making these movements with a tense or a lax gesture
 - e. Diphthongs vs. Monophthongs: single or double vowels

6.1 Tongue Height: high low mid

- (15) a. high vowels: leak/lick, Luke/look
b. low vowels: sat/cat, cot
c. mid vowels: set[e], bait[e], bet, bought, boat[o]

6.2 Tongue Advancement: front, back, central

- (16) a. front: seek/sick[i], sake[e], sec/sack
b. back: ooze/look, road/paw, dot
c. central: luck

6.3 Lip Rounding: rounded, unrounded

- (17) rounded: loop/foot, soap/fall

6.4 Tenseness: lax, tense (meet vs. mitt, late vs. let)

- (18) a. tense (long): produced with an extra degree of muscular effort
b. lax (short): less tense

- (19) beat/bit, bait/bet, boot/put, boat/bore

6.5 Diphthongs vs. Monophthongs

- (20) a. monophthong: one sound (the sound of a vowel remains relatively unchanged)
b. diphthong: two sounds (the sound of a vowel continually changes within a single syllable) Examples: toy, tie, town, might, how,