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Intro 2 Lx
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Articulatory Phonetics

Speech sounds are commonly divided into two groups: vowels and consonants. Vowels are produced with a relatively open vocal tract; no significant constriction of the oral (and pharyngeal) cavities exists. The airstream from the vocal folds to the lips is relatively unobstructed. Therefore, vowels are considered to be unrestricted sound. That's why, while articulating vowels, they can be maintained for a longer time than consonants. In contrast, consonants are produced with a significant constriction in the vocal tract during their production. For consonants, the airstream, along its way from the vocal folds to the oral and nasal cavities, encounters some type of articulatory modification (obstruction). Therefore, consonants are considered to be constricted sounds.

Consonants

Producing a consonant involves making the vocal tract narrower at some location than it usually is. We call this narrowing a **constriction**. Consonants can be described in terms of the location of the constriction, the manner of the constriction, and the type of phonation it supports (see Clark and Yallop 1992: 76). In short, consonants are classified by place, manner, and voicing as detailed below.

All consonants can be classified according to where in the vocal tract the modification of the airstream takes place (the so-called place of articulation) and how exactly this modification is carried out (the manner of articulation). As a third term in the description of speech sounds, we can specify how active the vocal cords are: whether they vibrate (in voiced sounds) or not (in voiceless sounds.) We classify consonants along three major dimensions:

- place of articulation
- manner of articulation
- voicing

Places of articulation

Place of articulation or the Place of Obstruction tells where the primary modification of the airstream happens in the vocal track.In the classification system for consonants, "place" denotes the location or place of obstruction and the active organ of speech involved in the articulation stage of the production of the consonants Clark and Yallop (1992: 79).

Bilabial: In a bilabial consonant, the lower and upper lips approach or touch each other. English [p], [b], and [m] are bilabial stops.The sound [w] involves two constrictions of the vocal tract made simultaneously. One of them is lip rounding, which you can think of as a bilabial approximant.

Labio-dental: In a labiodental consonant, the lower lip approaches or touches the upper teeth, like RP [f] and [v]

Interdental (or apico-dentals) are generated with the tip of the tongue protruded between the lower and the upper teeth.-- still leaving enough space for a turbulent airstream to escape. This kind of [θ] and [ð] is often called **interdental**.

Alveolar (or apico-alveolar sounds) are made by advancing the tip of the tongue toward the alveolar ridge:, such as [t], [d], [n], [l], [s], [z].

In **post-alveolar/ palato--alveolar** consonants, the constriction is made immediately behind the alveolar ridge. The constriction is be made with the blade of the tongue. The English fricatives [ʃ] and [ʒ] are made at this place of articulation, as are the corresponding affricates [tʃ] and [dʒ]. **[ɹ]** is another post-alveolar sound. It is *always* pronounced when it comes *before a vowel (***R***eady, Real).*

In a **palatal**, the blade of the tongue approaches or touches the hard palate. English [j] is a palatal approximant -- the tongue body approaches the hard palate, but closely enough to create turbulence in the airstream.

In a **velar** consonant, the body of the tongue approaches or touches the soft palate, or velum. English [k], [g], and [ŋ] are stops made at this place of articulation. The [x] sound made at the end of the German name *Bach* or the Scottish word *loch* is the voiceless fricative made at the velar place of articulation.

A g**lottal** sound like [h], is produced by narrowing the glottis - the opening between the

Manners of articulation

The manner of articulation (manner of air obstruction) is the second facet used in the description of consonants. It describes the degree of freedom of the airflow; the type of modification of the airstream; or the manner in which the flow of air is altered. It is concerned with the degree or extent of the obstruction (Clark and Yallop 1992: 81). The modification ranges from total obstruction of the airstream in the vocal tract to nearly open tract.

Sonorant consonants are produced with a relatively *open expiratory passageway*. Sonorant sounds are sounds where the air stream passes unobstructed through the vocal tract. The sonorant consonants include nasals, liquids, and glides. The sonorants are distinguished from the **obstruents** which are characterized by a complete or narrow constriction between the articulators hindering the expiratory airstream. The group of obstruent consonants includes stops, the fricatives, and the affricates.

Table 1.

The 7 RP sonorant consonants with examples

Sonorant	**Example**
[m]	Map
[n]	Night
[ŋ]	Thing
[l]	Light
[ɹ]	Red
[j]	Yet
[w]	Wet

Plosives/stops: complete obstruction with sudden (explosive) release. The airstream is totally blocked and then released with a small burst of noise. They are also defined as stops because they cannot be prolonged. Stop or plosive are used to characterize the same sounds, yet they refer to two distinct sub-processes in their production. During the production of stops/ plosives, complete occlusion of the expiratory air pressure (stop) is secured at specific point in the vocal tract, and this obstruction is then suddenly released (plosive).

In sum, a stop consonant completely cuts off the airflow through the mouth. In the consonants [t], [d], and [n], the tongue tip touches the alveolar ridge and cuts off the airflow at that point. In [t] and [d], this means that there is no airflow at all for the duration of the stop. In [n], there is no airflow through the mouth, but there is still airflow through the nose. We distinguish between

- **Nasal stops**, like [n], are often simply called **nasals**; they involve airflow through the nose.
- **Oral stops**, like [t] and [d], do not involve a total obstruction of the airflow.

Nasal vs. oral: Nasal consonants have a stoppage at some point in the oral cavity, and the velum is lowered for the air to escape through the nasal cavity. However, there is complete occlusion within the oral cavity between organ and place of articulation. These sounds have been called nasal stops due to the closure in the oral cavity and the ensuing free air passage through the nasal cavity (Ball and Rahilly, 1999). [m], [n], and [ŋ] are the nasal speech sounds of RP English. Besides, oral stops can be either voiced or voiceless. Nasal stops are always voiced.

In the production of **fricatives**, the articulators come close together, the escaping expiratory airstream causes an audible friction or turbulent airflow. The turbulence results in a sound with a hissing or sibilant quality. Moreover, fricatives are all continuant consonants: they can be continued for a long time. Two examples of fricatives are [ð] and [v]. In a fricative consonant, the articulators involved in the constriction approach get close enough to each other to create a turbluent airstream. The fricatives of RP are [f], [v], [θ], [ð], [s], [z], [ʃ], and [ʒ].

Affricates, like the RP [tʃ] and [dʒ], are the two sounds that are produced via an initial complete closure of the airstream (in the plosive sounds [t] and [d]), which is released through a partial constriction producing the fricative sounds [ʃ] and [ʒ].

Approximants are sounds in which there is no complete, direct contact between organs of speech. The approximants of English ([j], [w], [**ɹ**]) have spectra similar to vowels, but acoustically weaker. RP approximants are subdivided into **lateral** [l]in which the airflow manages to escape via the sides of the tongue and medial [w], [j], [ɹ] where the airflow escapes through the middle of the tongue. (Collins and Mees 2003)

Voicing

At the phonation stage, the vocal folds may be in tight contact or held against each other at just the right tension so that the air flowing past them from the lungs will cause them to vibrate against each other. We call this process **voicing**. Sounds which are made with vocal fold vibration are said to be **voiced**. Sounds made without vocal fold vibration are said to be **voiceless**.

All English vowels and sonorant consonants are voiced. Besides, voicing constitutes the main linguistically relevant differences that separate the consonant cognates such as [s] from [z] or [f] from [v]. There are several pairs of sounds in English which differ only in voicing and these are:

voiceless	voiced
[p]	[b]
[t]	[d]
[k]	[ɡ]
[f]	[v]
[θ]	[ð]
[s]	[z]
[ʃ]	[ʒ]
[tʃ]	[dʒ]

Vowels

The characterisation and classification of vowels is challenging. , unlike consonants, vowels are produced without any specific point of blockage, and are commonly described according to different parameters (see Crystal, 1987, for more). Clark and Yallop state that the quality of vowels depends on the size and shape of the vocal tract. The major challenge is to define the position of the tongue as it moves without forming any significant obstruction in the oral cavity. As a result, vowels are defined following tongue fronting o advancement, tongue height, tenseness and lip rounding.

1. **Tongue fronting or advancement** or the portion of the tongue that is involved in the articulation. This dimension refers the horizontal movement of the tongue, which could be front, back, or central.
2. **Tongue height** or the tongue's position relative to the roof of the mouth. Tongue height refers to the vertical movement of the tongue. It depicts the height of the body of the tongue / how high or low the tongue is positioned in the mouth
3. **The Shape of the Lips** or the degree of lip rounding or unrounding.
4. **Tenseness and Length:** tense and lax refer to the degree of muscular activity involved in the articulation and to the length of the vowels in question (Shriberg and Kent, 2003). Tense vowels are considered to have relatively more muscle activity and are longer in duration than lax vowels. Tense vowels are relatively higher and more marginal, while lax are shorter, lower, and slightly more centralised.

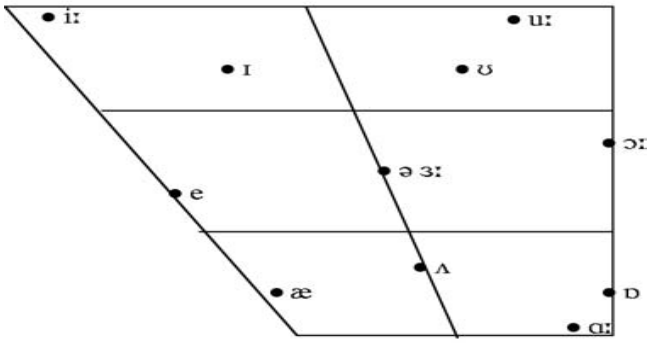

Figure 1. RP pure vowels

Tongue height (High /Low)

- The highest vowels are [ɪ], [iː], [ʊ], [uː].
- **Mid vowels** -[e], [ɔː], [ɜː], [ə]- with the tongue lowered to the mid position in the oral cavity.
- [æ], [ɒ], [ʌ], [ɑː] are low or open vowels produced with the tongue positioned as **low** as possible in order to leave a lot of space for the airflow.

Tongue fronting or advancement (Front/Back):

- **Front** vowels articulated with the tongue far forward in the oral cavity toward the hard palate: [iː], [ɪ], [e], [æ].
- **Central** vowels produced with the tongue retracted to the middle position in the oral cavity: [ʌ], [ɜː], [ə].
- **Back** vowels produced with the tongue retracted as far as possible to shape the space in the front part of the oral cavity: [ɒ], [ɔː], [ʊ], [uː], [ɑː].

The Shape of the Lips (**Lip rounding)**

- **Rounded** vowels, as the lips shape into a circle or a tube: [ʊ], [uː], [ɒ], [ɔː].
- **Unrounded** vowels are produced with no lip rounding. They can be s**pread** vowels, as the corners of the lips are moved away from each other: [ɜː], [e], [iː], [ɪ], [æ] or **neutral** vowels, the position of the lips is neither rounded nor spread as in [ʌ] & [ə].

Tenseness and Length

- Five vowels are long in duration and **tense**: [ɑː], [ɔː], [iː], [uː], [ɜː],
- Seven vowels are short in duration and **lax**: [ʌ], [ɔ], [ɪ], [ʊ], [e], [æ], [ə].

Diphthongs

Diphthongs are vowels in which two vowel qualities can be perceived, and the articulators move from the position of one vowel to the other. The first part of the diphthong is longer and stronger than the second and is often referred to as the nucleus of the diphthong. The second part is just a glide whose full formation is generally not accomplished. In the course of the production of diphthongs, the organs of speech only move toward the articulation of the glide, but they do not pronounce it fully. There are eight diphthongs in the RP accent:[eɪ], [aɪ], [ɔɪ], [ɪə], [eə], [ʊə], [əʊ], [aʊ].

Diphthongs are usually grouped into the following two categories, depending on the height and advancement of the tongue:

- A **centering** diphtong ([ɪə], [eə], [ʊə) .involves the tongue's movement from any positing to the central vowel [ə]. (figure 2)
- Diphthongs that glide toward a higher position in the mouth to reach the close sound [ɪ] or [ʊ] are known as **closing** diphthongs ([eɪ], [aɪ], [ɔɪ] ; [əʊ], [aʊ]). (Figure 3)

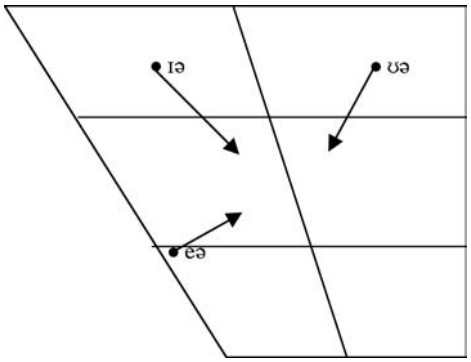

Figure 2. RP centring diphthongs

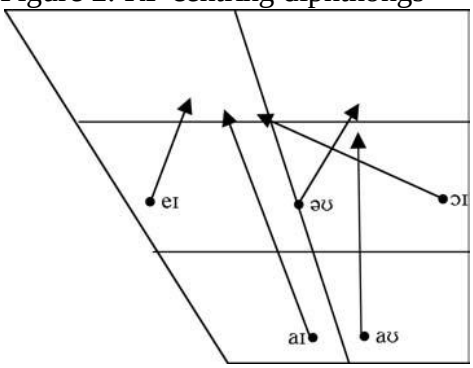

Figure 3. RP closing diphthongs

Triphthongs

The most complex type of vowels in RP is called triphthongs. These are sounds in which three vowel qualities can be perceived as they glide from one vowel to another and then to a third. Roach (2009: 19) describes triphthongs as "composed of the five closing diphthongs ([eɪ], [aɪ], [ɔɪ] ; [əʊ], [aʊ]) with a schwa added on the end".

- [eɪə] as in player
- [aɪə] as in higher
- [ɔɪə] as in employer
- [əʊə] as in lower
- [aʊə] as in shower