Multiple Articulation and Coarticulation

1. Introduction

The description of speech so far has focused on the position of one part of the vocal tract; for vowels, the location of the highest point of the tongue dorsum; with consonants, the place and manner of the stricture at the point where the constriction is greatest. But in fact it is the configuration of the entire vocal tract that is important.

2. Primary vs. secondary articulations

Multiple articulations involve two (or more) simultaneous strictures. In cases where both strictures are of equal degree, these are referred to as **double articulations**. More commonly, one stricture is more open than the other. In these cases the one with the greater constriction is said to be the primary articulation and the one with the more open constriction is referred to as a **secondary articulation**. Note that "secondary" in degree of stricture does not mean "secondary" in importance or linguistic significance. Secondary articulations are often lexically distinctive, just as much as primary articulations.

3. Double Articulations.

In the IPA, double articulations are shown by connecting two symbols with a tie-bar symbol written over them, e.g. k͡p.

i) Stops: double stops occur as distinctive phonemes primarily in languages of West Africa, though they also occur in the phonetics of more familiar languages, e.g. Katharevousa Greek *ptina*; Russian *ptitsa*, English *outpost* (in fluent speech). Most common of these are labial-velar stops, e.g.:

> Idoma [àg͡bà] "jaw" *vs*. [àbà] "palmnut" *vs*.[àga] "axe"
> Ibibio [èk͡pà] "bag" *vs*. [èkà] "mother"
> Igbo [àk͡pà] "bag" *vs*. [àg͡bà] "fame"

Double nasal stops [ŋ͡m] also exist, but in most cases these occur only as homorganic to the oral stops. Labial-alveolar stops are also said to occur, again in W. Africa (e.g. in Bura, Nzema) and in some of the North West Caucasian languages.

ii) Fricatives: a voiceless alveolar-velar fricative [ʃ͡x] (for which the IPA has a single symbol, [ɧ]) exists in some varieties of Swedish. For example, *sjok* [ɧuk] "chunk". And Shona (spoken in Zimbabwe) has labial-alveolar fricatives [ɸ͡s] or [f͡ʃ], sometimes referred to as "whistling fricatives".

iii) Approximants: two types should be noted in particular, the labial-velar approximant [w] and the labial-palatal approximant [ɥ] which occur in many languages, e.g. French *soin* "care" *vs. suint* "grease on sheep's wool".

4. Secondary articulation

Definition: an articulation with a lesser degree of closure occurring at the same time as another (primary) articulation. The secondary articulation is normally the addition of an approximant or vowel-like articulation to the primary one. In many cases these may be ignored, i.e., if they are not phonologically contrastive (and unless an exhaustive description is required), but in other cases, they may be important for the language in question. Four major types of secondary articulation are generally recognized: **labialization**, **palatalization**, **velarization**, and **pharyngealization**, as well as combinations (e.g. labiovelarization) and other minor types (e.g. rhotacization, faucalization).

4.1. Labialization (labialized): the addition of lip rounding to an articulation: e.g. in English, "sh" = [ʃʷ], as in "she", and "r" [ɹ] too are often labialized, even before unrounded vowels e.g. in "sheet" or "reek". In some languages, labialization is contrastive: Twi (W. Africa) [àkwá] "round about way" vs. [àkà] "has bitten"; Tashlhit Berber (S. Morocco) [ikʷti] "to recall" vs. [ikti] "hot".

4.2. Palatalization: raising of the front of the tongue (addition of an [i]-like tongue posture). This, too, may be distinctive or non-distinctive in different languages. In English, /l/ in initial position may be slightly palatalized (e.g. leaf [lʲif], and in some accents/dialects may be so in all positions (e.g. Irish English). In Russian, palatalization is distinctive: [brat] "brother" vs. [bratʲ] "to take"; [stal] "he has become" vs. [stalʲ] "steel".

4.3. Velarization: raising of the back of the tongue (addition of [ɯ]- or [ɣ]-like articulation, without labialization). In English, again, it is non distinctive, but a common addition to /l/ in final position in many accents (e.g. feel [filˠ] and for many Scots speakers it is the only variety. In Russian velarized stops contrast with palatalized ones, and velarization is also contrastive in [Irish](#).

4.4. Pharyngealization: (adding an [ɑ]-like articulation - symbol: [ˤ]) is less common in languages, but it does occur in Afroasiatic languages, with what Arabic scholars refer to as the emphatic consonants. E.g. Tashlhit Berber [ɑgdˤidˤ] "[bird](#)" *vs.* [ɑgdur] "[jar](#)". Arabic [sˤɑrf] "[exchange](#)" *vs.* [saara] "[walked](#)". No language has yet been found that uses both velarization *and* pharyngealization contrastively. Impressionistically, consonants having these latter two secondary articulations are called "dark" while palatalized consonants are called "clear".

4.5. Terminology

i) The terms "palatalized", and to a lesser extent "labialized", have been us have been used to refer to different things. Often they refer to a (putative) *process*, e.g.

  (1) /k/ in /kip/ is (i.e. "becomes") fronted relative to /k/ in /kul/, and is sometimes referred to as "palatalized".
  (2) /z/ in the phrase /ɪzʃi/ "is she" is retracted towards the palate.

Diachronically, a process of palatalization is also common: e.g., Latin "caballus" > French "cheval" (cf. Spanish "caballo"). When talking about secondary articulations, however, the term refers to a state.

ii) Regardless of relative degrees of stricture, nasalization is always considered secondary, by convention.

5. Coarticulation

5.1. Secondary articulations are an instance of **coarticulation**. Coarticulation may be generally defined as "the overlapping of adjacent articulations" (Ladefoged 1993: 55) or as two articulators "moving at the same time for different phonemes" (Borden and Harris 1984:130). Common examples from English are: eight [eɪt] vs. eighth [eɪt̪θ], keep [k̟ʲip] vs. cool [kʷul], where the /t/ in "eighth" is dental (here transcribed [t̪]) when followed by the dental fricative [θ], and the /k/ of "keep" has a front-of-velar (transcribed [k̟]), palatalized articulation when followed by the high front vowel [i]. The /k/ of "cool" is not so advanced, and is labialized.

5.2. All languages exhibit coarticulatory phenomena, though in varying ways. One of the ways in which they differ is in **directionality**. Compare English /k/ in: "peak" /pik/ and "keep" /kip/, "caw" /kɔ/ and "hawk" /hɔk/, then in "peak" and "hawk". You should find that /k/ undergoes greater influence (alteration of place of articulation) from the following vowel than from a preceding vowel. This direction of influence is called **anticipatory** or **regressive** coarticulation. In other languages, such as French and Italian, a preceding vowel will exert greater influence — **perseverative** or **progressive** coarticulation.

5.3. Coarticulation occurs because the different speech production processes, and the different articulators involved, combine with one another with different timing patterns. For example, vowels become nasalized when followed (or preceded) by a nasal consonant (compare English "pit" and "pin") because the timing of the lowering of the velum is not perfectly synchronized with the tongue movement for the alveolar consonant.

5.4. Coarticulation and secondary articulation are not synonymous: though consonant-vowel coarticulation is manifest as secondary articulation differences on the consonant, consonant-consonant coarticulation may involve adjustments of the primary place of articulation. The [sʷ] in English /sun/ "soon" has a secondary articulation of labialization, but it is also a case of coarticulation, with anticipation of the lip rounding for the following vowel. Labialization of English /ʃ/ or /ɹ/ is not coarticulatory, however, as in "sheet" or "reek", the initial consonant is labialized despite the fact that the following vowel is **un**rounded, and the final consonant is not labial either. In this case, the secondary articulation cannot be attributed to coarticulation. Note the continuous rounding of the lips in the phrase "Who'd choose prune juice?" [hʷudʷtʃʷuzʷpʷɹʷunʷdʒʷusʷ]!