

ON INGRESSIVE GLOTTALIC AND VELARIC ARTICULATIONS IN XHOSA

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ABSTRACT

The aim of this paper is to present some data on the bilabial implosive and on click articulations in Xhosa, a language belonging to the Bantu group of languages. Variations in implosive production will be enunciated paying specific attention to the inadequacy of phonological features to account for phonetic differences among languages. Distributional characteristics of certain click types in Xhosa will then be considered. An articulatory phonetic motivation for the occurrence of these specific forms will be proposed.

1. IMPLOSIVE BILABIAL

Xhosa exhibits one bilabial implosive [ɓ], orthographically presented as *b*, when not present in a nasal combination, eg. *abantu* [abant'u]. Impressionistic phonetic descriptions furthermore refer to two other bilabial plosives occurring in this language, viz. a bilabial plosive with full breathy voice in nasal compounds, eg. *imbuzi* [imbuzi], and a bilabial plosive with delayed breathy voice occurring in non-nasal environments, eg. *-bhala* [hala] [1]. A computer assisted phonotactic analysis [3] of the sound system of Xhosa based on grapheme to phoneme conversions following the above mentioned conventions indeed indicated a high occurrence of the implosive vis-a-vis the other two plosives types. An analysis of

294 965 /CV/-syllables yielded 8,2% implosives in the /C/-position, with 1,2% breathy voiced plosives and 0,42% delayed breathy voiced plosives in the same position. In real life, however, the phonetic qualities of the implosive in Xhosa seem to change quite extensively, inter alia, as a function of tempo. Figure 1 represents the articulation of an intervocalic bilabial implosive, produced at a relatively slow (deliberate) speaking rate. This articulation may be regarded as a "classical" implosive sound. Total closure of the vocal folds followed by some amount of pre-voicing prior to the bilabial release may clearly be noted. This observation renders some support for the traditional view [1] that the vocal cords may start to vibrate due to a downward movement of the larynx through the column of subglottal air. However, it is also clear that distinctive timing sequences prevail: the voicing follows a glottal closure which in itself may be necessary to induce rarefaction. Figure 2 presents the same intervocalic sequence, this time embedded in the word *abafana* "boys", produced at a relatively faster speaking rate. Although the articulation is also clearly implosive in nature, both auditorily and articulatorily, there is a marked difference in the acoustic spectrum during the closure phase of the implosive. Voicing continues throughout the closure phase suggesting no specific timing with respect to glottal closure. The extent of this phonetic variation is difficult to determine. Free variation may

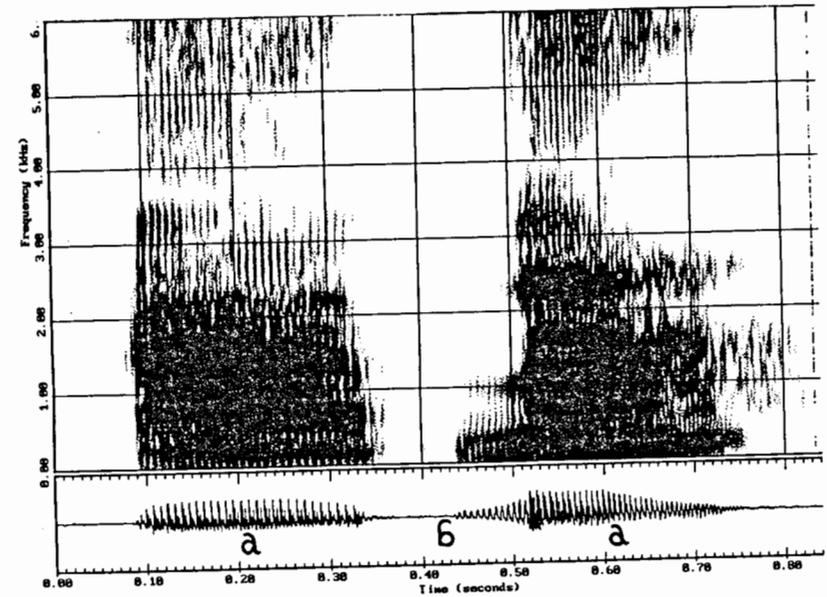


Figure 1 Implosive bilabial in /aba/

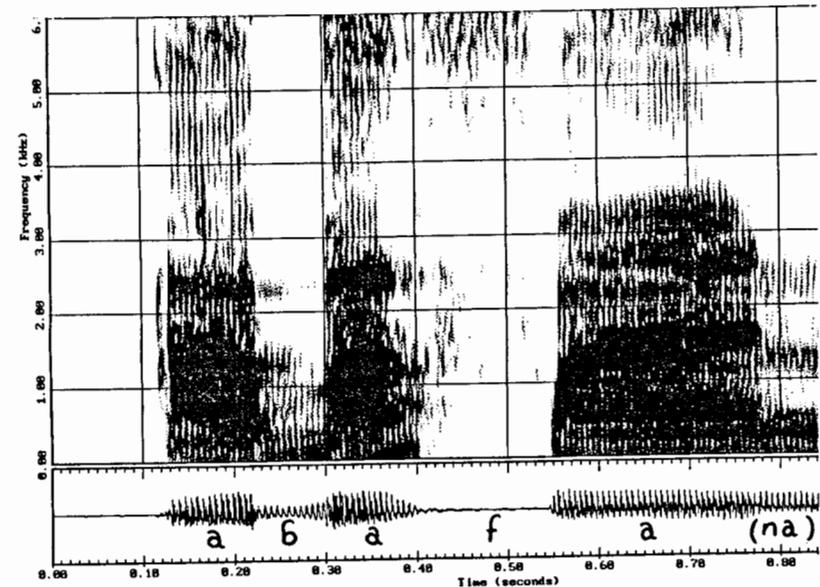


Figure 2 Implosive bilabial in /abafana/

take place within individuals irrespective an increase in tempo, whilst in other cases the variation seems to be tempo related. Instances were also recorded [3] where implosives totally lost their ingressive qualities in fast speech to be articulated as voiced bilabial plosives as are usually found in nasal combinations. This phenomenon, however, may possibly be explained in terms of unattained articulatory targets.

The variation in the phonetic qualities of implosives in Xhosa brings to mind similar types of differences described by Ladefoged [2] for implosives in Hausa and Kalabari, two languages spoken in Nigeria. In Hausa, implosives display laryngealized voicing throughout the closure, whilst implosives are fully voiced during the closure with no tendency toward creaky voice or laryngealization in Kalabari. Apart from sharing the voiced version with Kalabari, Xhosa augments the possible implosive articulatory repertoire with a distinct closure of the glottis followed by an amount of prevoicing prior to the release. These observations clearly have, as Ladefoged [2] has pointed out, serious implications for a theory of (universal) distinctive features as it becomes virtually impossible to account for linguistically significant differences between languages. It therefore remains an open question on what the exact phonetic content of a distinctive feature such as, for example, [implosive] should be. This, in principle lends support to Ladefoged's well known view that "...phonological features are certainly not sufficient for specifying the actual sounds of a language; nor are they in a one-to-one relationship with the minimal sets of parameters that are necessary and sufficient for this purpose." [2].

2. CLICKS

Xhosa exhibits three basic click types, all of which are produced with ingressive air mechanisms. These basic click types (dental [!] orthographic c, alveo-lateral [!])

orthographic x, and alveo-palatal [!] orthographic q) may furthermore be accompanied by various secondary features such as aspiration, voicing, nasalization, and breathy voicing. It is important for the following discussion to be aware that clicks are produced with two occlusions, i.e. at a point in the front region of the oral cavity, as well as a closure at the velum. Subsequent backward movement of the tongue across the velar area is necessary to induce rarefaction [4]. The computer-assisted phonotactic analysis mentioned above [3] revealed interesting phonotactic patterns, some of which suggest phonetic conditioning. It should, however, be pointed out that /CV/-syllable combinations containing any one of fifteen possible clicks (phonetic varieties included) as initial segments are relatively rare, representing only 2,78% of the total corpus of 294 965 combinations. Hence, typification of the Nguni languages (Xhosa and Zulu) as unique in this respect, is obviously not based on quantitative values. Of these clicks, the plain version (1,45%) and the nasalized versions (0,62%) constitute the bulk of these occurrences. With Xhosa entertaining a five vowel system, the following most frequent combinations occur in decreasing (vertical) order for each type (e and o represent mid-low vowels):

DENTAL ALV-LAT ALV-PAL

PLAIN

a	e	!a
e	a	!o
i	o	!u

NASALIZED

̄ i	̄ a	̄!a
̄ e	̄ e	̄!u
̄ a	̄ i	̄!i

(The "missing" two vowels in each case have been omitted, due to their extremely low occurrence rate, i.e. a rate of less than 0,003%. In some instances these vowels do not even occur whatsoever [3].)

In all cases above /a/ seems to have default status occurring irrespective of any other vowel category. Dentals, both plain and nasalized, show a clear preference for front vowels, which implies that styloglossus (and possibly palatoglossus) activity which is responsible for tongue-velar closure (to induce rarefaction), is overridden by activity of the genioglossus muscle maintaining the position of the tongue in the anterior region of the oral cavity.

Plain alveo-lateral articulations seem to favour mid-low vowels. If it is taken into account that the alveolar closure is maintained during lateral release where the side of the tongue is lowered to a position towards the middle of the oral cavity, then it may be expected that mid vowels will tend to follow.

In plain alveo-palatal articulations the preference seems to be for back vowels to follow these clicks. In these articulations the tip of the tongue is very active performing a partly retroflex movement in which the inferior longitudinal muscle as well as the genioglossus are most probably involved. Considering the back and downward movement of the dorsal part of the tongue (to induce rarefaction) as well as the retroflex movement of the tip of the tongue, it seems quite plausible that the following articulation could also be in the posterior area of the oral cavity, hence the preference for back vowels.

In nasalized alveo-lateral articulations the preference for mid vowels seems to give way to front vowels. This preference is also shared by nasalized dentals. It is probably safe to assume that in both cases the pull of the tongue towards the dental and alveolar regions for the primary occlusions overrides any pull or lift towards the posterior area. Activity of the palatoglossus

muscle which lowers the soft palate as well as a lack of levator palatini activity may concomitantly contribute to a lack of activity in the back of the oral cavity, giving rise to a preference for front vowels.

Finally, nasalized alveo-palatal clicks frequently combine with high front and back vowels. It should be borne in mind that the articulation of the alveo-palatal click requires a high raising, and even bunching of the body of the tongue in the palatal and velar regions. These two occlusions are relatively close to one another, compared to dental clicks where the points of occlusion are relatively far apart. Add to this the active lowering of the velum, hence a narrowing of the area between the roof of the oral cavity and the body of the tongue, then it comes as no surprise that high vowels are preferred in a position following a nasalized click.

The patterns described above generally seem to hold true for voiced as well as for nasalized breathy click articulations, albeit the incidence of occurrence is extremely limited. The only counterexamples are found with aspirated clicks where dentals and alveo-palatals seem to interchange. Aspirated dentals seem to prefer a following back vowel, whilst aspirated alveo-palatals tend to have a preference for front vowels in the following position. No obvious phonetic explanation seems to be at hand for this phenomenon.

4. REFERENCES

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