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Prenasalization and the IPA

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This paper revisits the topic of prenasals which has been controversial due to the existence of two contrasting views. One view is that the prenasals form a single segment and the second view is that they are sequences of segments. The paper draws examples from Bantu languages and argues that there are actually two types of “prenasals”; one that is a mere sequence of a nasal + and obstruent, and the prenasal proper that functions as a single consonant. Noting that the *Handbook of the International Phonetic Association* does not mention prenasalized consonants, I suggest symbols for incorporation into the IPA.

1.0 Introduction

This paper pursues further the issue of the status of the prenasals, especially in Bantu languages. The term ‘prenasals’ is used in this paper to refer to a consonant cluster which consists of a sequence that begins with a nasal articulation and ends with an oral articulation or even in a nasal articulation in some cases. This definition will be given a more specific target later on in the paper. For a number of years now a debate has been raging as to whether the prenasals are phonemic or not. Evidence has been adduced by linguists to either support the phonemic status or to disclaim it. For example, it has traditionally been assumed that the prenasalized consonants which are not morphologically complex are unitary segments because (1) the two components are homorganic (2) they evidence surface length as ‘simple’ consonants, and (3) they function within a single syllable (Herbert 1975). Equally strong views have been expressed to show that prenasals are not single unit sounds.

In this paper, I present both arguments, spliced with my own views, and I argue that some prenasals in Bantu languages are actually single unit sounds, though there are others which are not. There seems to be a clear distinction between prenasalized stops and nasal + stop sequences. This could be what has caused much controversy; the failure to clearly distinguish between the two types of ‘prenasals’. I then make recommendations on their adoption as unitary sounds by the International Phonetic Association and how they should be included in the IPA chart. It is surprising that the *Handbook of the International Phonetic Association* does not mention them at all.

2.0 Examples from Bantu Languages

Though prenasal consonants are found in many languages in the world, eg Fijian, I choose to draw my examples from Bantu languages because this phenomenon is predominant here. In fact Welmers (1973) notes that such sounds are nearly universal in the Niger-Congo language family. These combinations are restricted in some of these languages to nasal plus voiced stop, and most commonly, homorganic sequences like

interpretation as a series of unit phonemes attractive. This analysis is complicated, however, by the occurrence of other sequences which include morpheme boundaries.

2.3 Kuria

In the Kuria language, the prenasals are also grouped together with single consonants as phonemes of the language. Cammenga (2004) lists the following prenasals in this language, among others.

- (4) mb nd ŋk ŋg nt ns

It is important to note that in Kuria there is no phoneme /b/ per se. The absence of /b/ which could parallel /mb/ makes it possible to interpret /mb/ as a unit phoneme.

2.4 Luganda

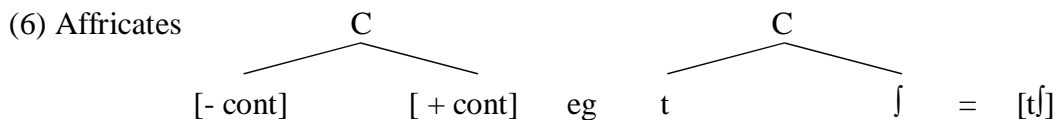
Luganda is a Bantu language of East Africa. It has prenasalized voiced and unvoiced plosives, and also the prenasalized voiced and unvoiced continuants:

- (5) mb nd ɲj ŋg
 mp nt ɲc ŋk
 mv nz
 mf ns

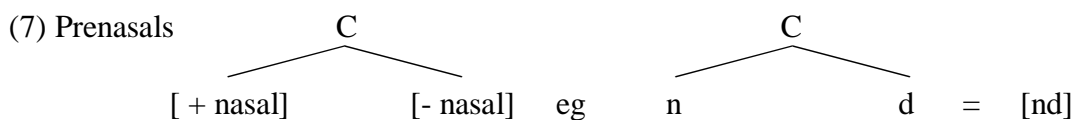
3.0 Evidence for Single Segment

3.1 Affricates

One type of evidence that has been given with respect to the ‘one or two segment’ issue has revolved around the status of the affricates (Ewen 1982); which at least phonetically appear to involve two distinct phases – a closure and some kind of friction phase. Phonetically, all the examples of sound sequences given above are comparable to the combination of sounds found in affricates or dental fricatives [ð, θ]. Many languages have prenasalized consonants which show sequential organization of features at the sub-segmental level. Affricates show the simultaneous association of a single C slot with two segmental distinctive feature matrices. Affricates like [pf] and [tʃ] are described using the feature [+ delayed release] in SPE (Herbert 1975). They can be represented this way:



A similar argument can be used for the prenasals to show that they are also just one sound.



Prenasalized consonants phonetically involve a change from velic opening to velic closure in the course of the production of the two sounds in what appears to be normal segment length.

3.2 Homorganicity and Timing

In many cases the sequences of prenasals are made up of homorganic sounds. It has often been argued that similar gestural sequences in some languages should be treated as unitary segments, particularly if they occur in syllable-initial position. Herbert, quoted by Ewen (1982), gives the following phonetic definition of a prenasalized consonant:

A prenasalized consonant is formally defined as a necessarily homorganic sequence of nasal and non-nasal consonantal segments which together exhibit the approximate surface duration of ‘simple’ consonants in those language systems within which they function.

What he suggests here is that at the phonetic level, the prenasalized consonants have the same length as other consonantal segments, rather than clusters of two consonants. It is this fact, together with the homorganicity of their components and various other subtle adjustments which occur between the two components which lead Herbert to treat them as units at the phonetic level. The two adjacent segments, which require homorganic articulatory gestures, may be produced by a single combined gesture due to an overlap of the gestures.

According to Ewen (1982), this single segment solution did get support from Chomsky & Halle (1968:317), who treated them as a single segment, and from Ladefoged (1971:35) who suggested that prenasality must be defined in terms of the duration of an event.

Catford (1977) does introduce two concepts which are important in explaining what is happening in prenasals. He introduces the terms, *open transition* and *closed transition*, which show the relationship between the consecutive sounds in a word. In open transition, there is always a momentary, minimal break of articulatory continuity between the successive segments. In close transition there is no such break. The characteristics of the two types of transitions can best be summed up as in Table 1:

Table 1

<i>sequence type</i>	<i>open transition</i>	<i>close transition</i>
homorganic	articulatory non-continuity	articulatory continuity
heterorganic	no overlap	articulatory overlap

Catford (1977)

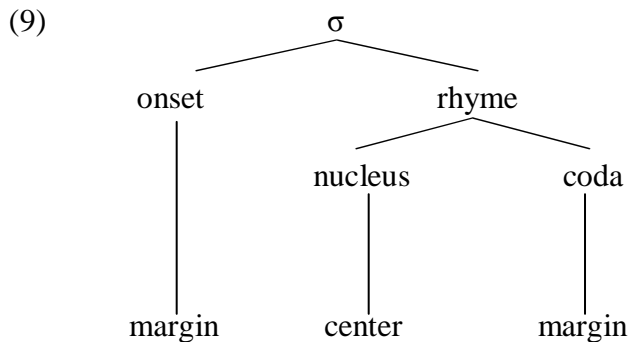
If the argument here is that the prenasals are pronounced in the time of a single segment, then they have a *homorganic close transition* where there is absolute continuity of the articulatory stricture. The articulators retain the identical position throughout, whether there is a change in phonation type or not.

3.3 Syllabicity and Timing

The fact that the units making up the prenasals usually find themselves in one syllable has been taken as proof that the consecutive consonants in a prenasal form a unit segment or one sound. Here are examples of syllabification of words from Swahili.

- (8) shamba /sha.mba/ 'farm'
 kenda /ke.nda/ 'nine'
 ndani /nda.ni/ 'inside'
 kamba /ka.mba/ 'rope'

Also, the internal structure of the syllable generally follows the sonority hierarchy. In the normal syllable the center of the syllable is the most prominent and the margins least prominent.



Looking at any of the prenasals, one notices that the sonority hierarchy theory of syllable structure predicts that a syllable-initial prenasalized stop is unexpected (Ewen 1982). In a syllable like /mbV/ the sonority of the initial nasal is greater than that of the following stop. This fact, that order of components in a prenasalized consonant is contrary to the sonority hierarchy, is an important piece of evidence traditionally cited as pointing to the unitary status of prenasalized consonants. There would therefore be no syllable which begins with a prenasalized stop as this violates the general principles of syllable structure. Furthermore, the canonical Bantu syllable is of a CV form and therefore the prenasalized consonants are analyzed as simple consonant units.

The sequences /mp, mb/ in English do not necessarily have any longer acoustic or articulatory durations than the single segments /p, b, m/ (Ladefoged & Maddieson 1996). It is also shown that the timing of these English bilabials is very similar to that which is found in word initial *p*, *m*, and *mb* in the KiVunjo dialect of KiChgga, where /mb/ is usually analyzed as a prenasalized stop. KiChagga is a Bantu language. Ladefoged & Maddieson also report that in Fijian the acoustic duration of prenasalized stops is very comparable to that of other consonants in a medial position. These examples suggest that the Bantu prenasals we are dealing with here are single units.

These are some of the reasons that have led people to argue strongly that some of the prenasals are actually phonemic. Nchimbi (1992) seems to treat the issue of the phonemic

value of the prenasals as a forgone conclusion as he uses symbols which he has proposed elsewhere for the prenasals. These are:

- (10) nj = ɲ
 nd = ŋ
 mb = ɓ
 ng = ŋ̃

These symbols can be grouped in the non-pulmonic section of the consonants; but most non-pulmonic voiced implosive consonants have their hooks facing the right except for the palatal implosive. A question arises: Does the pattern of the hooks (direction facing) have any meaning? If yes, then, Nchimbi's phonetic symbols should be disregarded and new symbols sought.

4.0 Evidence for Cluster Analysis

Though in the previous section we argued that the prenasal is a single unit, there is evidence to the contrary. We now go through that evidence with the assistance of examples.

4.1 Syllables and Timing

Phonetically, a syllable is a unit of timing in a language. While in the previous section, examples of words in which the prenasals occupied a syllable were shown, the contrary happens here. The problem here is that the nasal component of the prenasalized consonants in Bantu languages can be syllabic in initial position so that they comprise a separate syllable. Ewen (1982) quotes an example from Herbert (1977) about the existence of the Nyanga minimal pair, which at the phonetic level, contrasts a syllabic nasal followed by a voiced stop with a syllable-initial prenasalized voiced stop in §11.

- (11) a. /m + bale/ [mbale] (trisyllabic) 'brother'
 b. /n + bale/ [mbale] (disyllabic) 'plate'

In §11a, the nasal in the prenasalized syllable is syllabic. In this case the internal structure of the syllable has been used to show that it is not possible to have /m/ as an onset followed by /b/ then the nucleus. This violates the sonority hierarchy. The only way to make it sensible is to have the nasal as the nucleus of a syllable with no consonants in the margins.

The Swahili examples given earlier as §1 are used here as §12 to show that the word initial nasal can be syllabic.

- (12) Class 1: *mtu m-baya* 'a bad person' } In these examples, the *m-* in *mbaya* is
 3: *mti m-baya* 'a bad tree' } syllabic.
- 9: *nyumba mba-ya* 'a bad house' } In these examples, *m-* in *mbaya* is not
 10: *nyumba mba-ya* 'bad houses' } syllabic.

This means that there is no *homorganic open transition* between *m* and *b* in §12a above such that the transition is marked by a momentary relaxation of the articulatory stricture (though the successive segments are produced at the same time) followed by a renewed tensing into the former position.

The notion of timing has been used to show that prenasals behave like complex segments. Ewen (1982) quotes Anderson (1974, 1976) who claims that the prenasalized stops differ from ordinary nasals in relative timing. He argues that one cannot say that the prenasals have the same timing as regular consonants since the prenasals are sequences of nasal + consonant.

4.2 Meinhof's Law

Some evidence in support of the cluster analysis comes from a phonological rule in Luganda called Meinhof's Law. The rule states that a voiced obstruent is nasalized when it appears between a nasal and a vowel followed by another nasal. Its rule can be written as:

$$(13) \left[\begin{array}{c} C \\ + \text{voice} \\ - \text{cont} \end{array} \right] \rightarrow [+ \text{nasal}] / N - V (V) N$$

Here are examples from Herbert (1975)

- (14) a. / n – bumba / **mm**umba "I mould clay" (cf. òbûmbá "you mould clay")
 / n – linda / riníndá "I wait" (cf. òlíná "you wait")
 / n – gendo / **ŋŋ**éndó "Journeys" (cf. lùgéndó "journey")
- b. / n – bala / **mb**álá "I count"
 / n – leeta / rídéètá "I bring"
 / n – gula / **ŋg**úlá "I buy"

Although the affected segments (highlighted above) might be termed as prenasalized consonants, the output of the rule is clearly a long (geminate) nasal consonant or nasal plus obstruent which are derived. Thus, we are dealing with two distinct segments.

5.0 Conclusion

So far, the evidence presented in this paper sways both ways: prenasals are single unit sounds; and they are made up of separate sounds. To support the argument that the prenasals in Bantu are single segments I used the following evidence (a) They resemble affricates in internal structure (b) they are homorganic (c) they function within a single

syllable. Evidence used to show that the prenasals are made up of different sounds is (a) they fall into different syllables (b) Meinhof's Law.

While it would be premature, on the basis of the selective sampling that I have done and on the strength of the fact that there are other languages in other areas¹ which are not included in this paper, it does appear that the available evidence points to the existence of prenasals that are a single unit. The issue has been the non-separation of the two types of 'prenasals'. As Catford (1977) suggests, the term *prenasalized stop* is a specific term used only where the sequence 'nasal' plus 'homorganic stop' occurs within one and the same syllable, and is regarded as forming a single unit phoneme in the language in question. I concur with this observation and add that if it is not in the same syllable then it should not be called a prenasal. I therefore suggest that the combination that meets this condition of a prenasal be recognized by the International Phonetics Association as a sound in Bantu languages and maybe also in other languages which I have not looked at; but that is after ample studies are done in those languages.

The closest existing IPA resources to represent the prenasalized consonants would be \widehat{nd} , \widehat{mb} , \widehat{ng} , \widehat{nj} etc. This is because, as I have argued in section 3.1, prenasals are like affricates, and affricates are transcribed with a top ligature. This diacritic has however been used for complex sounds like \widehat{kp} and \widehat{gb} . These are two stop articulations that are made simultaneously, creating a double stop. The prenasalized consonants that we have discussed in this paper do not have a double articulation. This makes us look for a different symbol.

The symbols in §15 have been used in literature to represent the sounds described but have not been officially recognized by the IPA.

(15) nd	=	ⁿ d
mb	=	^m b
ng	=	ⁿ g
nj	=	ⁿ j

It should be realized that these are different from the 'post-stopped nasals' like $[m^b, n^d]$. In this later case, the nasals are given more prominence but in the former case it is the

¹ 1. Anderson (1976) notes that in a variety of languages in Africa, South America, South Asia, New Guinea, and various areas of the Pacific, elements transcribed as $[\widehat{mb}]$, $[\widehat{nd}]$, $[\widehat{ng}]$ etc clearly behave as single units. They have the distribution typical of single segments (ie they can occur in positions where clusters are impossible), and they may contrast with clusters eg Fula has a contrast between $[\widehat{mb}]$ and $[\widehat{mmb}]$ etc in intervocalic positions. He adds that these consonants involve nasality, but they cannot simply be treated as [+ nasal] stops since they would then be indistinguishable from primary nasal consonants. This position is quite untenable, since the two classes of sounds are quite distinct, both phonetically and phonologically.

stops that are given prominence. The prenasals are also different from the nasal release like [dⁿ] which already feature in the IPA chart. My suggestion is that the symbols in §15 should be officially recognized by the International Phonetic Association and included in the phonetic charts. This will not be far fetched since already precedence has been set by including the nasal release symbols in the phonetic chart.

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