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## Nasalization in UMBundu

THILO C. SCHADEBERG

### INTRODUCTION

UMBundu (úmbúndù) is a Bantu language, R.11 in Guthrie's referential classification spoken mainly on the central plateau (planalto) of Angola. Its centre lies in the provinces of Huambo and Bié where it is spoken in a relatively uniform way. Greater dialect variation occurs in some border areas, most notably towards the coast in the Benguela province. In terms of number of speakers, UMBundu is the single most important language of Angola.

The most striking feature of UMBundu phonology is provided by nasalized segments, both vowels and consonants. Nasalized consonants are universally infrequent, and within Bantu I know of no other language having such segments. Nasalized vowels occur in a few North-West Bantu languages, where they are the result of lost word-final nasals, at least diachronically and maybe also synchronically. The UMBundu case appears in every respect to be much more complex and interesting.

Nasal sound patterns in the world's languages have been extensively studied in the context of the search for language universals ever since Ferguson's (1963) "Assumptions about nasals" was presented at the Dobbs Ferry conference in 1961. I believe that UMBundu has the makings of becoming a notorious language in this field, on a par with French, Akan, and Guarani. It provides unusual data on all aspects of nasals and nasalization: phonetic, phonological, and diachronic. These facts cannot be gathered from the existing descriptions of UMBundu which contain no more than scattered allusions to some of the nasalized segments. A recent publication which is concerned mainly with spelling suggestions for Angolan languages provides a good start for an inventory of nasalization in UMBundu but the conclusions reached are largely unfounded and even self-contradictory (Instituto Nacional de Línguas 1980).

\*The present study is based on work with several informants from Bié, carried out at Luanda in 1981/82. I wish to thank Ms Adélia Mimosa, Ms Leonor Susso Satanole, and Ms Margarida Inês Mário, all of the Instituto Nacional de Línguas, for patiently providing me with all the data on which this article is based.

Thus I take it as my foremost task to provide a basic phonetic and phonological description of UMBundu nasals and nasalization which can be used by others for theoretical and typological purposes. I wish to point out that all phonetic statements are based on auditory observation of live utterances, and that remarks on frequency refer to a body of a little less than two thousand words.

This article consists of three sections. In sec. 1, I give information about UMBundu phonetics and I introduce some phonological rules concerning nasal (as distinct from nasalized) segments. The main body of my data appears in sec. 2, where I set out the distributional restrictions on nasalized segments. In sec. 3, alternative means of reducing the number of underlying contrasts amongst nasalized segments are presented, followed by the preferred solution, which abandons this goal.

## 1. PHONOLOGICAL SETTING

The systematic phonetic segments of UMBundu are shown in Table 1.

Table 1

p	f	b	v	$\tilde{v}$	m	y	$\tilde{y}$	i	$\tilde{i}$
t	s	d	l	$\tilde{l}$	n			e	$\tilde{e}$
c		j			$\eta$			a	$\tilde{a}$
k		g			$\eta$			o	$\tilde{o}$
	h			$\tilde{h}$		w	$\tilde{w}$	u	$\tilde{u}$

This inventory contains ten nasalized segments: three true consonants, two glides, and five vowels. The nasalized consonants are all voiced continuants: the labiodental [ $\tilde{v}$ ], the lateral [ $\tilde{l}$ ], and the glottal fricative or approximant [ $\tilde{h}$ ]. The symbol [ $\tilde{h}$ ] has been chosen for ease of setting instead of the more exact symbol [ $\tilde{h}^h$ ].

I use the term "nasalized" for nasal continuants, i.e. all segments transcribed with a tilde, and the term "(pure) nasals" for the nasal stops *m*, *n*, *ɲ*, *ŋ*. As for frequency, the relatively rare occurrence of *ɲ* and *ŋ* may be expected on universal as well as on comparative grounds, but the low frequency of *n* is surprising. Of the nasalized consonants,  $\tilde{l}$  and  $\tilde{h}$  are relatively common,  $\tilde{y}$  much less so, and  $\tilde{v}$  is very rare. The status of  $\tilde{w}$  is altogether different from that of the other four nasalized consonants (cf. sec. 3 below)

The voiced stops *b*, *d*, *j*, *g* occur only after homorganic nasals, and the

resulting *mb*, *nd*, *nj* [ɲj], and *ng* [ŋg] are the only consonant clusters in Umbundu. They are always tautosyllabic, and phonetically they might be considered as prenasalized (voiced) stops. Morphology provides the following four alternations:

- (1)  $\begin{matrix} b & d & j & g \\ \nu & l & y & \emptyset \end{matrix} / N\_ \\ \phantom{(1)} \phantom{\nu} \phantom{l} \phantom{y} \phantom{\emptyset} / \text{elsewhere}$

I shall not discuss here the underlying feature specification of these segments. Suffice it to say that the corresponding voiced stops and continuants are in perfect complementary distribution and represent alternants of the same segments (see examples in (4)).

The phonetic glides [y] and [w] occur frequently as non-syllabic variants of the vowels *i* and *u*. This can be seen from the pre-vocalic allomorphs of the nominal prefixes *oku*- (class 15) and *ovi*- (class 4).

- (2)  $\begin{matrix} \acute{o}kw.am\grave{a} & \text{to come close up} \\ \acute{o}vy.am\acute{e} & \text{proffers} \end{matrix}$

Elsewhere, [y] functions as a voiced consonant alternating with [j]. Note also that [y] when underlyingly consonantal may be followed by the underlying vowel and surface glide [w], e.g. *oku.yw\acute{a}* 'to itch'. No such consonantal analysis seems to be called for in the case of [w]. Rather, it looks as if in all cases where [w] is not preceded by a consonant, either *b* or *g* has been deleted. Compare the behaviour of *w*-initial verb stems after homorganic nasals:

- (3)  $\begin{matrix} w\acute{a}l\acute{a} & \text{get dressed!} & mbw\acute{a}l\acute{a} & \text{I wear} \end{matrix}$

Occasionally, both [y] and [w] may have to be analysed as epenthetic. To sum up, I do not recognize an underlying class of glides in Umbundu defined by the major class features [-vocalic; -consonantal].

There are three morphemes in Umbundu that consist of just a homorganic nasal: the first person singular subject concord, the first person singular object concord, and the class 9 nominal prefix. I shall now summarize the rules applying to this nasal and the following segment.

- (i)  $=C_1 V(N)C_2 V$  where  $C_1$  is [+voice, -nasal] and  $C_2$  is [-nasal]

- (4)  $\begin{matrix} N & + \nu & \rightarrow & mb & v\grave{a}nj\acute{a} & \text{look!} & mb\grave{a}nj\acute{a} & \text{I look} \\ N & + l & \rightarrow & nd & l\grave{a}nd\acute{a} & \text{buy!} & nd\grave{a}nd\acute{a} & \text{I buy} \\ N & + y & \rightarrow & nj & y\acute{e}va & \text{hear!} & nj\acute{e}va & \text{I hear} \\ N & + \emptyset & \rightarrow & ng, nj & \grave{e}nd\acute{a} & \text{go!} & ng\grave{e}nd\acute{a} & \text{I go} \end{matrix}$

Note that  $C_2$  may be preceded by a (homorganic) nasal but it may not itself be a single pure nasal. The choice between *ng* and *nj* depends mainly on the following vowel.

(ii)  $=C_1VC_2V$  where  $C_1$  is [+voice, -nasal] and  $C_2$  is [+nasal]

- (5)
- |   |             |            |                         |
|---|-------------|------------|-------------------------|
| $N + v \rightarrow ?$                                 |             |            |                         |
| $N + l \rightarrow n$                                 | <i>límá</i> | cultivate! | <i>níma</i> I cultivate |
| $N + y \rightarrow ?$                                 |             |            |                         |
| $N + \emptyset \rightarrow \eta, n$ ( <i>ng, nj</i> ) | <i>òlǎ</i>  | snore!     | <i>ḡòlǎ</i> I snore     |

The choice between  $\eta$  and  $n$  again depends mainly on the following vowel ( $n$  before *i* and  $\eta$  elsewhere). Forms with *ng* and *nj* are sometimes optional variants, e.g. *ngòlǎ* 'I snore'.

(iii)  $=C_1V(N)CV$  where  $C_1$  is [-voice, -continuant]

- (6)
- |                             |              |        |                |         |
|-----------------------------|--------------|--------|----------------|---------|
| $N + p \rightarrow m$       | <i>pópya</i> | speak! | <i>mópya</i>   | I speak |
| $N + t \rightarrow n$       | <i>túma</i>  | send!  | <i>núma</i>    | I send  |
| $N + c \rightarrow \eta$    | <i>cíla</i>  | dance! | <i>ḡíla</i>    | I dance |
| $N + k \rightarrow \eta, h$ | <i>kwátá</i> | take!  | <i>ḡwátà</i>   | I take  |
|                             |              |        | <i>ó.hwáte</i> | captive |

The rule  $N + k \rightarrow h$  applies to the nominal prefix only; elsewhere, the nasal nominal prefix produces the same changes as the verbal prefixes.

- (7)
- |                   |              |                 |            |
|-------------------|--------------|-----------------|------------|
| <i>óku.pónda</i>  | to slay      | <i>ó.móndi</i>  | murderer   |
| <i>óku.túnga</i>  | to construct | <i>ó.núngi</i>  | inhabitant |
| <i>óku.citiwà</i> | to be born   | <i>ó.ḡitiwe</i> | native     |
| <i>óku.kémba</i>  | to lie       | <i>ó.hémbi</i>  | liar       |

(iv)  $=C_1V(N)CV$  where  $C_1$  is [-voice, +continuant] or [+nasal]

Before these two classes of consonants the nasal is completely lost. Note that nasal continuants do not occur in stem-initial position.

- (8)
- |              |           |              |            |
|--------------|-----------|--------------|------------|
| <i>fělá</i>  | dig!      | <i>fěla</i>  | I dig      |
| <i>sěvá</i>  | cook!     | <i>sěva</i>  | I cook     |
| <i>hálá</i>  | swim!     | <i>hála</i>  | I swim     |
| <i>móla</i>  | see!      | <i>móla</i>  | I see      |
| <i>néna</i>  | bring!    | <i>néna</i>  | I bring    |
| <i>ḡáva</i>  | sprinkle! | <i>ḡáva</i>  | I sprinkle |
| <i>ḡwálǎ</i> | turn!     | <i>ḡwálǎ</i> | I turn     |

When rules and distributional restrictions relating to nasalization are formulated, UMBundu consonants repeatedly divide into the same groups, which presumably are "natural classes". The symbols and features of these classes are given in Table 2.

Table 2

+consonantal					
-nasal				+nasal	
-voice		+voice			
-cont	+cont	-cont	+cont		-cont
p	f	b	v	ṽ	m
t	s	d	l	ḷ	n
c		j	y	ỹ	ɲ
k	h	g		ḥ	ŋ
C̥		C̣		C̃	N

The voiced non-nasal continuants are a peculiar class of segments. In Chomsky and Halle's (1968) framework they fall into three different classes using any two of the three major class features:

(9)		v	l	y
sonorant	-	+	+	
consonantal	+	+	-	
vocalic	-	+	-	

The position of *h* is highly ambiguous. Phonetically, I am not certain whether it really is altogether voiceless. Phonologically, it may group with voiceless consonants, with voiced continuants, or even with pure nasals.

Nasalization as described in this article does not interact with tone. Nevertheless, all examples are fully marked for tone in accordance with the following conventions:

- (i) The first acute accent represents a high tone.
- (ii) Subsequent acute accents represent downstepped high tones.
- (iii) A grave accent represents a low tone.
- (iv) Unmarked syllables are understood to carry the same tone as the preceding one.

In underlying representations (marked by a small raised circle), each vowel is marked either High or Low.

I distinguish three types of boundaries: word boundary (#), pre-stem boundary (=) or (.) and other boundaries (-). The period is used as an informal and approximate mark of the pre-stem boundary when the word as a whole appears in its systematic phonetic representation and where (as in the case of class 9) one and the same segment may represent the nominal prefix as well as the stem-initial consonant.

## 2. THE DISTRIBUTION OF NASALIZED SEGMENTS

### 2.1. =(C)(G)Ṽ#

Nasalization occurs word-finally in monosyllabic stems. Such stems have the segmental structure Consonant-Glide-Vowel, or Consonant-Vowel, or Glide-Vowel, or just Vowel. My notes contain twelve relevant items: seven simple noun stems, one compound noun stem, one adjective, one verb, and two ideophones.

(10)	<i>óva.lā̃</i>	intestines	<i>ólo.hwĩ̃</i>	firewood
	<i>ó.fĩ̃</i>	indigestion	<i>ná-wā̃</i>	brother/sister-in-law
	<i>é.twĩ̃</i>	ear	<i>=vĩ̃</i>	bad
	<i>óva.sũ̃</i>	urine	<i>=ĩ̃</i>	to know
	<i>ó.swĩ̃</i>	kind of tree	<i>pũ̃</i>	extremely cold
	<i>é.kwĩ̃</i>	ten	<i>fĩ̃</i>	extremely hot

The paradigm of the verb 'to know' provides further examples for this type of word.

(11)	<i>ónjĩ̃/ókwĩ/ótwĩ/ówĩ̃</i>	he knows me/you/us/him		
	<i>ndũwĩ̃</i> (cl. 1,3)	<i>ndĩlĩ̃</i> (cl. 5)	<i>ndĩvā̃</i> (cl. 2)	
	<i>ndũlwĩ̃</i> (cl. 11)	<i>ndĩcĩ̃</i> (cl. 7)	<i>ndĩyā̃</i> (cl. 6)	
	<i>ndũtwĩ̃</i> (cl. 13)	<i>ndĩvĩ̃</i> (cl. 4, 10)	<i>ndĩkā̃</i> (cl. 12)	
	<i>ndũkwĩ̃</i> (cl. 15)			

I know him/it/them (various classes)

I have marked nasality only over the final vowel; however, nasality extends

over the whole word-final sequence C(w)V whenever phonetically possible.

- (12) *óva.lā́ é.twĩ́ ólo.hwĩ́*  
*cí.vĩ́ ná-wā́ óva.sṹ*

There appear to be restrictions on vowels, glides, and consonants occurring in this type of word. As for vowels, the mid vowels *ē* and *ō* seem to be excluded. There is one possible exception, i.e. the class 1 possessive stem as in [yāñhé] 'his/her (cl. 9)'. This stem might be analysed as °=*hḗ*, but the alternative analysis °=*āñhé́* is also possible. Of the two glides, *w* [*ĩ*] occurs frequently but *y* [*ĩ*] only occurs in postvocalic position in the single verb form 'I know them/it (cl. 6)', where it is epenthetic:

- (13) °*ndi-ā=ĩ́* → *ndiyā́*

As for consonants, pure nasals are notably absent, and so are nasal-plus-obstruent clusters with the exception of the verb form *ónjĩ́*. (No strategy seems to be available to avoid this form without creating an even less acceptable one.) No contrast exists, of course, between nasalized and non-nasalized voiced continuants followed by *ĩ́* (see above). In spite of all these restrictions, nasalization must be considered contrastive in monosyllabic stems. Compare the following non-nasalized items:

- (14) *ú.lá*      bed                      *ú.pí*      handle  
*ó.sí*      ground                      =*wá*      good  
*é.ywí*      crazy person              *wí*      pitch-black

The restriction of nasalization in monosyllabic stems to word-final position is not a vacuous one. There are certain clitics that can follow the stem and take word-final position, e.g. the negative enclitic *-kó* may follow a noun and the locative substitutes *-pó* (cl. 16), *-kó* (cl. 17), and *-mó* (cl. 18) may follow a verb. When this happens, monosyllabic stems lose their nasality.

- (15) *ó.fĩ́:*      *hófĩ-kó*                      it is not indigestion  
*cí.vĩ́:*      *hácivĩ-kó*                      it is not bad  
*=ĩ́:*      *ndĩ-pó/ndĩ-kó/ndĩ-mó*      I know it there

## 2.2. *ĩ́Cĩ́ĩ́*

Most commonly, nasalization occurs in *ĩ́Cĩ́ĩ́* sequences. Occasionally, nasalization affects a longer stretch, thus the formula should more properly



ly be given as  $\tilde{V}(\tilde{C}\tilde{V})_1^n$ . Such sequences occur typically in word-final position and do not cross the pre-stem boundary. In my transcription of actual examples I only mark the consonant(s) for nasality, unless the domain of nasality is under particular discussion.

- (16) *óku.té̃la* to forge  
*óku.kú̃lĩhà* to know  
*óku.tá̃laḥàlā* to hit a sore

When all instances of  $\tilde{V}\tilde{C}\tilde{V}$  are taken together there appear to be no significant restrictions on vowels or vowel combinations (see Table 3). The fact that there is no example for the  $\tilde{o}\tilde{C}\tilde{u}$  sequence has nothing to do with nasality but reflects a general constraint excluding all stem-internal *oCu* sequences.

Table 3

é.pĩĩ	vá.cĩlè	ú.cĩlā	é.ŋĩlĩlò	ó.mĩlú
left	let them dance	tail	entry	bargain
vé.meḥĩ	é.pé̃lè	óku.fẽlā	ó.né̃lèhò	óci.ké̃lú
below	nudity	to dig	flower	scolding
ú.ká̃yi	ó.há̃lè	kú.pãlā	tá̃lò	é.ká̃lú
woman	crab	far	five	car
ó.só̃yì	ú.põlè	ó.ŋó̃hā	ólu.sõlò	-
shame	tree sp.	snake	bullet	
ó.hũvĩ	vá.kũlè	é.kũlā	ó.nũlò	ú.kũlú
bird sp.	let them sow	ditch	bait	old person

At this point I should note my uncertainty as to some phonetic facts. Whenever we have a  $\tilde{V}\tilde{C}\tilde{V}$  sequence preceded by a glide and/or a consonant capable of nasalization, i.e. *v, l, y, h, w*, it is difficult to decide whether these segments do or do not fall under the domain of nasalization.

- (17) *óku.lé̃ḥā* or *óku.lé̃ḥā* to smell  
*óku.hā̃lā* or *óku.hā̃lā* to be highly active

My informants felt that in examples such as these only the last three segments were nasalized. My own impression is that the preceding consonant is also nasalized, though possibly somewhat less than the consonants within a  $\tilde{V}\tilde{C}\tilde{V}$  sequence. In rapid speech, nasalization may even slightly affect a vowel preceding such a  $\tilde{C}\tilde{V}\tilde{C}\tilde{V}$  sequence, but the difference in degree of nasalization remains clearly audible when words such as the follow-

ing are compared. (Weak nasalization is indicated by a tilde under the segment.)

- (18) *á.kǎĩlā* charcoal  
*óva.ĩlā* or *óva.ĩlā* intestines

There is another environment in which weak nasality occurs. But whereas the cases described above are instances of incipient, optional spreading of nasality, we now present instances of reduced or attenuated nasalization. We have stated that  $\tilde{V}\tilde{C}\tilde{V}$  sequences occur "typically" in word-final position. When such sequences in the course of Bantu agglutinative morphology appear word-internally, nasality is somewhat reduced but not altogether obliterated.

- (19) *óku.felísà* to make dig  
           from: *óku.felā* to dig  
*óku.fetaĩhapà* to pay back (in revenge)  
           from: *óku.fetā* to pay  
*ó.mĩlukò* dance  
           from: *óku.pilukà* to dance  
*é.máĩlaga* kind of antelope

In all four examples, attenuated nasality occurs on the nasalized consonant and on the two adjacent vowels. The condition for this attenuation clearly is the non-final position of the  $\tilde{V}\tilde{C}\tilde{V}$  sequence. Or, to phrase it differently,  $\tilde{V}\tilde{C}\tilde{V}$  is followed by one of the consonants not capable of nasalization, which includes the class of pure nasals! The same attenuation of nasality occurs before the negative enclitic, and the difference with the behaviour of monosyllabic stems should be noted.

- (20) *kú.palā:* *hákupaĩā-kó* it is not far  
       compare *cí.vĩ:* *hácivĩ-kó* it is not bad

I shall now present the nasalized continuants one by one because each has its own special characteristics.

### 2.2.1. $\tilde{V}\tilde{y}\tilde{V}$

The voiced labial continuant is the rarest of all nasalized consonants. My notes include just four examples.

- (21) *ó.huĩi* kind of bird (vulture?)  
*óku.tékaĩā* to be/become black or dark  
*ólu.néĩā* ([ $\tilde{v}$ ] ~ [ $v$ ]) reed  
*óku.tyáĩā* to cut firewood

The last of these items probably belongs to the dialect of Huambo; my informants from Bié accepted it but preferred the form *óku.tyáŋà*. With so few examples, distributional restrictions and oppositions are difficult to establish. The non-nasalized voiced labial is very common in stem-initial position ( $C_1$ ), and less common as  $C_2$ . Its occurrence as  $C_2$  after a pure nasal  $C_1$  is attested four times including the item cited above where it varies with  $\tilde{v}$ . I did not check whether nasalization is an optional possibility in the other three examples.

- |      |                                |                     |
|------|--------------------------------|---------------------|
| (22) | <i>ó.névò</i>                  | adze                |
|      | (related to <i>óku.tyáŋà</i> ) | to cut firewood)    |
|      | <i>ó.nuvikò</i>                | lid                 |
|      | (from <i>óku.tuvikà</i> )      | to cover)           |
|      | <i>óku.navà</i>                | to sprinkle (water) |

There are no identifiable verbal extensions of the shape  $-V\tilde{v}-$ , so it is impossible to look for nasalized allomorphs. In general terms, no consonant sharing nasality and/or labiality with  $\tilde{v}$ , i.e.  $v$ ,  $m$ ,  $mb$ , is suspiciously absent from any position in which  $\tilde{v}$  occurs. The same is true for  $\eta$  with which a relation is suggested by the dialect variation reported above. Thus,  $\tilde{v}$  has to be accepted as a rare but valid member of the phonological inventory of Umbundu.

### 2.2.2. $\tilde{V}\tilde{I}\tilde{V}$

The alveolar (lateral) voiced continuant is by far the most common nasalized consonant in Umbundu. After voiceless obstruents, i.e.  $/C^0V\_\_$ ,  $\tilde{l}$  clearly contrasts with  $l$ ,  $n$ , and  $nd$ . Compare:

- |      |                  |                  |
|------|------------------|------------------|
| (23) | <i>óku.taḷà</i>  | to scratch lines |
|      | <i>óku.tála</i>  | to look          |
|      | <i>óku.tanà</i>  | to crow          |
|      | <i>óci.tandà</i> | market           |

After voiced obstruents, including prenasalized (voiced) consonants, as well as after vowel and  $w$ -initial stems, the same contrasts appear, but both  $n$  and  $\tilde{l}$  are suspiciously rare. Here are all my relevant examples, excluding some obvious loanwords from Portuguese.

- |      |   |  |                              |
|------|---|--|------------------------------|
| (24) | (N) (Ç) (w) $\tilde{V}\tilde{I}\tilde{V}$ : | <i>óci.veḷà</i> ([ $\tilde{l}$ ] $\sim$ [1]) | iron                         |
|      |   | <i>ci.mbúmbuḷu</i>                           | short                        |
|      |   | <i>óc.eḷú</i>                                | kind of groundnut            |
|      |   | <i>ókw.oḷà</i>                               | to snore                     |
|      |   | <i>ókw.oḷoḷà</i>                             | to stretch and make straight |

	<i>é.ngũlĩ</i>	throat
	<i>ó.ngũlĩ</i>	hyena
(N) (Ç) (w) VnV:	<i>óci.lenà</i>	bladder
	<i>Lw.éná</i>	Lwena (name of river)
	<i>ókw.inà</i>	to swallow
	<i>inà</i> (archaic)	his/her mother

Both *l* and *nd* are frequent in the same environment.

(25)	<i>óku.vélà</i>	to be sick	<i>óku.vénda</i>	to flatten grass
	<i>ó.mbéla</i>	rain	<i>ó.ndóndo</i>	mouse
	<i>ów.elé</i>	white hair	<i>ókw.endà</i>	to go

After pure nasals, *l* is excluded but *n*, *ĩ*, and *nd* occur.

(26)	<i>óku.manà</i>	to plaster wattle
	<i>óku.malà</i>	to finish
	<i>óci.mánda</i>	wooden dish

There are several verbal extensions in which *-Vl-* varies with *-Vĩ-*. Two of these are semantically transparent, and for these the distribution of the allomorphs is predictable:

(27)	<i>-Vĩ-</i>	/ { N, Ć } ___
	<i>-Vl-</i>	/ elsewhere

The same distribution applies to the allomorphs *-ile/-ele/-ĩle/-eĩle* of the “final” suffix marking certain past tenses. The two extensions are the Applicative *-il/-el/-ĩl/-eĩl-* and the Separative *-ul/-ol/-uĩl/-oĩl-*. Below I give relevant examples containing the Separative extension, which I would consider as frequent but not really productive.

(28)	N___:	<i>óku.pémulà</i>	to cut hair
	Ć___:	<i>óku.sólolà</i>	to take out seam
	Ç___:	<i>óku.tuvulà</i>	to uncover
	NÇ___:	<i>óku.songolà</i>	to precede
	Ø___:	<i>óku.tyulà</i>	to turn
	Ç___:	<i>óku.sókolà</i>	to pull out

There are also less frequent, unproductive, and semantically opaque verbal extensions in which *-Vl-* varies with *-Vĩ-*. For these, the distribution is only partially predictable because either *-Vl-* or *-Vĩ-* may occur after a voiceless consonant or no consonant.

- (29) N\_\_ : *óku.tímalà* to sit  
       Ā\_\_ : *óku.pālālā* to fly  
       C\_\_ : *óku.levalā* to borrow  
       NĀ\_\_ : *óku.sángalā* to be very content  
       Ø\_\_ : *óku.syalā* to remain;  
            *óku.pyālā* to be too much  
       C\_\_ : *óku.pósilā* to twist (rope);  
            *óku.tákilā* to chew

### 2.2.3. $\bar{V}\bar{y}\bar{V}$

My notes include about a dozen examples for this sequence. Barring one "exception",  $V_1$  is always non-high, i.e.  $\bar{e}$ ,  $\bar{a}$ , or  $\bar{o}$ , and  $V_2$  is always  $\bar{i}$ . None of the examples has a voiced continuant  $C_1$ , and one example only has a (voiced) NC preceding this sequence.

- (30) *pwāyī* but  
       *=tāyī* to be (somewhere)  
       *māyī* mother, mother's sister  
       *ó.néyineyī* firefly  
           cf. *néyī-néyī* on-off-on-off (of light)  
       *ó.njoyī* dream  
       *óci.tēyī* shoulder  
       *ú.toyī* courage  
           cf. *ó.noīyī* hero  
       *ó.sāyī* moon  
       *ó.sōyī* shame  
       *ú.sayī* laziness  
       *ú.kāyī* woman  
           cf. *pá-hayī, só-hayī* father's sister  
       *ó.hwiŷù* kind of rat

It is difficult to demonstrate the opposition between  $\bar{y}$  on the one hand and  $y$  or  $\bar{n}$  on the other. As regards the final example above, there is no example for word-final *yu* and final *ŷu* is only attested twice.

- (31) *ón.īnu* (from Port. vinho) wine  
       *é.kwani* craving for tobacco

As for final *i*, nouns and verbs should be considered separately. In nouns, final *ni* does not occur at all, and final  $V_1yi$  where  $V_1$  is [-high] occurs only after a voiced consonant:

- |      |                |                    |
|------|----------------|--------------------|
| (32) | <i>ó.mbéyi</i> | sick person        |
|      | <i>é.véyi</i>  | moonlight          |
|      | <i>ú.lóyi</i>  | someone who shoots |

Verb forms, however, may have a final morpheme *-i* Plural or *-i* Negative, and thus the relevant forms contrasting with *yi* can be produced freely from verbs with stem-final *y* and *n*.

- |      |                 |                             |
|------|-----------------|-----------------------------|
| (33) | <i>téyi</i>     | chop! (plural)              |
|      | <i>hóyi</i>     | make noise! (plural)        |
|      | <i>kàyi</i>     | ask for something! (plural) |
|      | <i>kàváfeyi</i> | they don't snuff tobacco    |

#### 2.2.4. *VhV*

This sequence does not contrast with non-nasalized *VhV*. Non-nasal *h* only occurs morpheme initially (see sec. 2.3 below). As  $C_2$ ,  $\tilde{h}$  is rare. Below, I give a complete list of my examples, arranged in three groups.

- |      |       |                                 |                       |
|------|-------|---------------------------------|-----------------------|
| (34) | (i)   | <i>ólu.maḥí</i> , <i>ó.maḥí</i> | foot                  |
|      |       | <i>vé.meḥí</i>                  | below                 |
|      |       | <i>é.náḥa</i>                   | crossway              |
|      |       | <i>ólu.níḥi</i>                 | bee                   |
|      |       | <i>ó.nóḥa</i>                   | snake                 |
|      |       | <i>nóḥò</i> (archaic)           | your mother           |
|      | (ii)  | <i>óku.maḥà</i>                 | to taste              |
|      |       | <i>óku.táḥa</i>                 | to divine             |
|      |       | <i>óku.téḥa</i>                 | to jump               |
|      | (iii) | <i>óku.miḥà</i>                 | to light              |
|      |       | <i>óku.néḥà</i>                 | to take away by force |
|      |       | <i>óku.léḥà</i> [1] ~ [n]       | to smell              |
|      |       | <i>óku.viḥà</i>                 | to be ugly or bad     |
|      |       | <i>ókw.iḥà</i>                  | to give (someone)     |
|      |       | <i>ókw.úḥà</i>                  | to be quiet           |
|      |       | <i>óku.syúḥà</i>                | to be straight        |

The first group of examples contains nouns the stem of which starts with a pure nasal. The second group comprises three verbs; note the absence of initial voiced obstruents. In these two groups it is in principle possible to contrast  $\tilde{h}$  with both *ŋ* and *k*, but examples are rare.

- |      |               |              |
|------|---------------|--------------|
| (35) | <i>ó.máko</i> | kind of tree |
|      | <i>ó.nukù</i> | fist         |
|      | <i>ó.naṇé</i> | cattle-egret |

<i>óku.teketelà</i>	to let burn (food)
<i>kù.takelò</i>	west
<i>óku.péka</i>	to plant (trees or manioc)

The third group of examples in (34) contains verbs that all belong to an infrequent and highly marked tone class. For reasons of tonal analysis all of these verbs have to be analysed as containing a double vowel, or – in morphological terms – an extension *-Vh̃-*. Phonologically, contrast with *ŋ* and *k* is possible:

(36) <i>ókw.ikà</i>	to fix in the ground
<i>óku.tékà</i>	to break (intr.)
<i>óku.tyéŋà</i>	to twist

The verbal extensions *-ik-/ek-/ih̃-/eh̃-* (Neuter or Impositive) and *-uk-/ok-/uh̃-/oh̃-* (Separative-intransitive) provide the majority of examples for the *Vh̃V* sequence. The forms with *h̃* occur after nasals or nasalized consonants, the forms with *k* appear elsewhere.

(37) N__:	<i>óku.sónehà</i>	to write
Č__:	<i>óku.nálehà</i>	to spread out for drying
Ç__:	<i>óku.lálekà</i>	to invite
NÇ__:	<i>óku.sindikà</i>	to push
Ø__:	<i>óku.twikà</i>	to help putting load on head
C__:	<i>óku.kétikà</i>	to bend

However, the rare and complex verbal extensions *-ah̃al̃-* and *-ah̃añ-* both appear after voiceless obstruents without any obvious conditioning for the nasalization.

(38) <i>óku.pitaḥalà</i>	to overtake
from: <i>óku.pita</i>	to pass
<i>óku.fetaḥanà</i>	to pay back (in revenge)
from: <i>óku.fetà</i>	to pay
<i>óku-li.syetaḥalà</i>	to compare oneself (to someone)
from: <i>óku.syetà</i>	to approach
<i>óku.kéloḥalà</i>	to scold (someone)
from: <i>óci.kélu</i>	scolding
cf. <i>óku.syakalà</i>	to light

#### 2.2.5. *VwV*

This sequence occurs properly only in some loanwords from Portuguese where the donor language has final orthographic *-ão* [ɐw̃].





contrast with non-nasal  $hV$  is easy to establish as there are a number of  $=hVC$  stems for which nasalization is not acceptable.

- (44) *ó.háta* ring-shaped head-pad  
*ólu.hiso* kind of parasitic insect (bedbug?)  
*ó.hukù* kind of tree  
*ó.hwáte* captive  
*óku.húpa* to ask for fire

It is not possible to contrast stem-initial  $\tilde{h}$  with  $\eta$  because there are no stems of the shape  $=\eta VC$ , at least not in my data. Stem-initial  $k$  does not occur with nouns of class 9 (the nasal prefix class), which provides the majority of examples for stem-initial  $\tilde{h}\tilde{V}$  and  $hV$ . In terms of surface phonology, however, nothing seems to be wrong with the opposition  $\tilde{h}/h:k$ .

- (45) *é.kasà* paw *é.kupà* load

The stem-initial sequence  $\tilde{h}\tilde{V}$  (with optional nasalization) does not occur when  $C_2$  is either a pure nasal or a prenasalized consonant.

- (46) *ólu.hamwè* mosquito *ó.hánga* guinea-fowl

When  $C_2$  is a voiced (not prenasalized) obstruent, the nasalized sequence  $=hV\tilde{C}V$  is more common than non-nasalized  $=hV\check{C}V$  but both do occur. Compare:

- (47) *hélá* yesterday, tomorrow *hélyé* who?  
*óku.hála* to be highly active *óku.halà* to swim, to bathe  
*ó.háìe* crab *ó.hála* kind of wild cat

Before  $V\check{C}$ ,  $h$  does contrast with  $\eta$ :

- (48) *ó.ηáìla* Sir

Remember that  $h$  may be slightly (?) nasalized when followed by a  $V\check{C}V$  sequence:

- (49) *ó.háìẽ* or *ó.ḥáìẽ*

#### 2.4. Optional Nasalization

Nasalization is optional in a limited number of items. "Optional" here

means that my informants accepted both pronunciations, though in general each of them preferred for any one item either the nasalized or the non-nasalized form. One type of optional nasalization has already been described (cf. sec. 2.3). In the following six items,  $\check{V}\check{I}\check{V}$  varies with non-nasal *VIV*.

- |      |                   |  |                 |          |
|------|-------------------|--|-----------------|----------|
| (50) | <i>ó.mésele</i>   | craftsman                                  | <i>óci.pála</i> | face     |
|      | <i>óci.veḷā</i>   | iron                                       | <i>ú.poḷò</i>   | forehead |
|      | <i>ó.sé-kuḷu</i>  | old man (respectful term)                  |                 |          |
|      | cf. <i>ú.kuḷu</i> | old person                                 |                 |          |
|      | <i>ina-kulu</i>   | old woman (respectful); chief's first wife |                 |          |
|      | <i>ó.heḷè</i>     | fear, respect                              |                 |          |

In two other items, the domain of nasalization is variable.

- |      |  |             |
|------|--|-------------|
| (51) | <i>ó.mbaláwù</i> or <i>ó.mbaláwü</i>               | aeroplane   |
|      | <i>ó.húkwĩ</i> or <i>ó.húkwi</i> or <i>ó.húkwi</i> | poor person |

Finally, there are five items in which a voiced obstruent, either oral or nasalized, varies with a pure nasal.

- |      |                   |    |                   |    |                 |                   |
|------|-------------------|----|-------------------|----|-----------------|-------------------|
| (52) | <i>ó.mésele</i>   | or | <i>ó.mésele</i>   | or | <i>ó.mésené</i> | craftsman         |
|      | <i>óku.leḥā</i>   | or | <i>óku.néḥā</i>   |    |                 | to smell          |
|      | <i>óku.tyáṽā</i>  | or | <i>óku.tyāṅā</i>  |    |                 | to cut firewood   |
|      | <i>óku.vávokā</i> | or | <i>óku.mámoḥā</i> |    |                 | to speak nonsense |
|      | <i>óku.vókiyā</i> | or | <i>óku.vókiyā</i> |    |                 | to increase       |

### 3. ATTEMPTING AN ANALYSIS

#### 3.1. Distributional Generalizations

Nasalized vowels and consonants are to a considerable degree interdependent, as evidenced by the frequent occurrence of  $\check{V}\check{C}\check{V}$  sequences. Still, nasalized vowels have been shown to occur word-finally in monosyllabic stems after oral consonants, and there are instances of stem-initial  $\check{h}\check{V}$  preceded by an oral vowel. A reduced three-vowel system  $\check{i}\check{a}\check{u}$  is found in these environments as opposed to the general five-vowel systems  $i-e-a-o-u$  and  $\check{i}\check{e}\check{a}\check{o}\check{u}/\check{C}$ .

There are other remarkable distributional properties of nasalization. One of them is its predominantly word-final occurrence. UMBundu not being one of the languages in which nasalization derives from lost word-final nasals, it is not clear why this should be so. Even the exceptions

support rather than refute this distributional tendency: Nasalization is optional, maybe disappearing, in non-final (stem-initial)  $\tilde{h}\tilde{V}$  sequences, and it is attenuated when morphology tags something onto an originally word-final  $\tilde{V}\tilde{C}\tilde{V}$  sequence. It would be tempting to describe nasalization in monosyllabic stems as a subtype of the more common word-final  $\tilde{V}\tilde{C}\tilde{V}$ . However, the formula  $\tilde{V}(\tilde{C}\tilde{V})_n^\#$  would miss the point that there are no  $=CVC\tilde{V}$  # stems, and  $=C\tilde{V}(\tilde{C}\tilde{V})_n^\#$  would wrongly exclude such stems as  $^\circ=t\acute{a}k\acute{i}\tilde{l}\tilde{a}$  'to chew'. The (negative) correlation between pure nasals and nasalization is also interesting. Surprisingly, perhaps, vowels are not nasalized when occurring next to pure nasals. Yet, there is a strong tendency for nasalization to occur on  $V\tilde{C}V$  sequences following a nasal consonant. There are productive rules nasalizing verbal suffixes of the shape  $-V\tilde{l}$ -,  $-V\tilde{k}$ -, and  $-i\tilde{l}$  after all [+nasal] consonants. An analysis should account for this ambiguous behaviour of pure nasals.

It might also be relevant to note that nasalization is a phenomenon restricted to stems. In a highly agglutinative Bantu language such as UMBundu, there are many formatives that may be joined to nominal or verbal stems. None of these formatives is subject to or provokes nasalization. In fact, there is but one regular affix containing a nasal consonant, i.e. the class 18 (locative) concord  $m\acute{u}$ -. Normally no nasalizing effect spreads from this prefix.

- |      |                 |                    |
|------|-----------------|--------------------|
| (53) | <i>mwa.liŋá</i> | it is dirty inside |
|      | <i>mwa.yulá</i> | it is wet inside   |

The only cases in which  $m\acute{u}$ - provokes nasalization occur in connection with two monosyllabic items: the defective verb  $=\acute{l}i$  'to be' and the near-speaker demonstrative  $=\acute{l}o$ .

- |      |                   |                       |
|------|-------------------|-----------------------|
| (54) | <i>múli óváva</i> | there is water inside |
|      | <i>múlo</i>       | in here               |

Compare the corresponding forms *kúli* and *kúlo* with the locative class 17 concord  $k\acute{u}$ -.

Finally, it should be recalled that in spite of many distributional restrictions none of the nasalized segments (except maybe  $\tilde{e}$  and  $\tilde{o}$ ) can easily be analysed as a phonologically and/or morphologically conditioned variant of one or other segment(s).

### 3.2. Eliminating Nasalized Vowels From Underlying Representation

The close interdependence between nasalized vowels and consonants invites a phonological analysis in which nasalization of one of these

classes derives from the underlying nasality of the other. Regarding  $\tilde{V}\tilde{C}\tilde{V}$  sequences, the analysis  ${}^{\circ}\tilde{V}\tilde{C}\tilde{V}$  plus a vowel nasalization rule  $V \rightarrow \tilde{V}/\tilde{C}$  appears to be highly natural and intuitively correct.

The fact that vowels nasalize in the environment of nasalized continuants but not next to pure nasals may not be as strange as it seems. Nasalized continuants are highly marked consonants. Anderson (1975:22) explains why this is so: "Escape of air through the nose drastically decreases rate of airflow past the primary spirant constriction, rendering such sounds much less distinct than ordinary spirants by virtue of the resultant decrease in acoustic energy." Ohala (1975:300) is even sceptical about the very existence of such sounds: "It is extremely doubtful that voiced fricatives could be produced with a detectable amount of nasalization. Sound[s] symbolized  $[\tilde{v}]$ ,  $[\tilde{\delta}]$  are claimed to exist (Anderson 1975), but it is unlikely these are fricatives (and thus obstruents) in the same sense as  $[v]$ ,  $[\delta]$  are. They might best be considered nasalized frictionless continuants similar to  $[\tilde{w}]$  and  $[\tilde{j}]$ ." While such scepticism and Ohala's resulting proposal may be correct in the cases of certain South American Indian and Celtic languages on which they are based, they do not hold for UMBundu where  $[\tilde{v}]$  is both different from and distinct from  $[\tilde{w}]$ . Nevertheless, we may assume that considerable articulatory effort is needed to produce voiced nasalized continuants, much more than for the production of pure nasals. The nasalizing of adjacent vowels seems a natural consequence of this special effort, and it certainly helps the hearer to perceive the nasal quality of the obstruents.

This view of nasalization still leaves without explanation the cases where nasality apparently spreads over both vowels and consonants from any  $[+nasal]$  consonant, either  $\tilde{C}$  or N, cf. (27), (28), (29), and (37) above. The rule has been described somewhat like this:

$$(55) \quad \begin{bmatrix} -Vl- \\ -Vk- \end{bmatrix} \rightarrow \begin{bmatrix} -\tilde{V}\tilde{l}- \\ -\tilde{V}\tilde{h}- \end{bmatrix} / \begin{bmatrix} C \\ +nasal \end{bmatrix} \_\_$$

As it stands, the rule may not catch the essence of the process. As far as the voiced coronal consonant is concerned, a similar rule called Nasal Harmony is extremely wide-spread in western Bantu (cf. Greenberg 1951). In all of these languages, as far as I am aware, the rule is  $-Vl- \rightarrow -Vn-/N\_\_$  without any concomitant vowel nasalization. I propose that UMBundu, too, has a Nasal Harmony rule, and that vowel nasalization is independent of it.

## (56) Nasal Harmony in UMBundu:

$$\begin{bmatrix} -Vl- \\ -V\tilde{k}- \end{bmatrix} \rightarrow \begin{bmatrix} -V\tilde{l}- \\ -V\tilde{h}- \end{bmatrix} / \begin{bmatrix} C \\ +nasal \end{bmatrix} \_\_\_$$

The analysis that derives nasality of vowels from adjacent nasalized consonants copes well with all  $\tilde{V}\tilde{C}\tilde{V}$  sequences. It becomes less attractive, however, when the two minor types of environments are considered. If stem-initial  $\tilde{h}\tilde{V}$  sequences were analysed as  $^{\circ}\tilde{h}V$  the vowel nasalization rule would have to be blocked by the presence of the pre-stem boundary in order to prevent nasalization of the preceding vowel. Another problem concerns the underlying representation of  $\tilde{h}$  itself. Most instances of stem-initial  $h$  and  $\tilde{h}$  are nouns of class 9. As we have seen above (sec. 1), the normal prefix of nouns in this class is a homorganic nasal. But, when this prefix is added to a stem with initial  $k$  the resulting consonant is  $h$ , and no noun of class 9 has a stem-initial  $k$  in its surface form. Compare:

- (57) *ó.ndukò* name                      from: *óku.lukà* to give a name  
       *ó.hwáte* 'captive'                from: *óku.kwátà* to take

Presumably, the underlying form of 'captive' should be  $^{\circ}\acute{o}-\tilde{n}=k\acute{u}át-\acute{e}$ . But if there is no  $h$  in the underlying representation of such nouns there also is no consonantal segment that could carry the feature [nasal] in, for instance, *ó.hāsà* 'albino'. It is possible that the language itself is about to sort out this problem: Nasality is (already?) optional in all my examples of stem-initial  $\tilde{h}\tilde{V}$  sequences.

Nasalized monosyllabic stems present even bigger obstacles to an analysis without nasalized vowels in underlying representation. The reason is that the environment does not always contain an obvious nasalized consonant from which vowel nasalization could be derived. If we want to save the analysis  $\tilde{V} \leftarrow V/\tilde{C}$  we have to accept several costly, unnatural consequences.

- (i) The stem-initial consonant would be considered nasalized whenever phonetically possible, and vowel nasalization should not apply across the pre-stem boundary (as above for  $^{\circ}\tilde{h}VCV$  stems).  
 Examples: *óva.là; ólo.hwi; =vì*
- (ii) An underlying segment  $\tilde{w}$  would have to be recognized for nasalized  $=C(w)V$  stems. This would completely destroy our present analysis of surface glides, arrived at independently, and the absence of (native)  $\tilde{V}\tilde{w}\tilde{V}$  sequences would become inexplicable.  
 Examples: *é.twì; ó.swì; é.kwì; ólo.hwì; nā-wa*
- (iii) Nasalized monosyllabic stems without a glide and having a voiceless

consonant that cannot be nasalized would demand an even costlier re-analysis. The vowel in all our examples being (nasalized) *i* or *u*, we might posit an underlying  $C\tilde{y}$  or  $C\tilde{u}$  structure, then have the vowel become nasalized, and finally delete the glide from the inadmissible sequences.

Examples:  $^{\circ}\acute{o}-\grave{n}=f\tilde{y}i \rightarrow \acute{o}f\acute{i}; ^{\circ}f\tilde{y}i \rightarrow f\acute{i}; ^{\circ}\acute{o}-v\grave{a}=s\tilde{w}u \rightarrow \acute{o}vas\grave{u};$   
 $^{\circ}p\tilde{w}u \rightarrow p\acute{u}$

- (iv) The verb stem =  $\acute{i}$  would remain irregular as it could not be derived from  $^{\circ}=y\tilde{i}$  because the initial consonant (or glide) would prevent vowel coalescence.

Example:  $?^{\circ}nd\grave{i}-k\acute{a}=y\tilde{i} \rightarrow ndik\acute{a}$  I know it (class 12)

Finally, a major objection could be raised against positing underlying nasalized consonants such as  $\tilde{v}$ ,  $\tilde{l}$ ,  $\tilde{y}$ , and  $\tilde{h}$  on general typological grounds. Since such consonants seem to occur in the world's languages only next to nasalized vowels (cf. Ladefoged 1971:33) – and UMBundu is no exception in this respect – then the implication is that such segments have no independent status in underlying phonological representation.

### 3.3. Eliminating Nasalized Consonants From Underlying Representation

Obviously, nasalization in monosyllabic stems is a powerful argument in favour of recognition of underlying nasalized vowels. Let us try to push this analysis to the point where all nasalized continuants are conditioned variants of their non-nasalized counterparts. Such an analysis is without problems in the case of stem-initial  $\tilde{h}\tilde{V}$  sequences. The rule by which a properly sensitive consonant is nasalized before a nasalized vowel is needed anyway:

- (58)  $\acute{o}va.l\grave{a} \rightarrow \acute{o}va.\tilde{l}\grave{a}$  intestines  
 $\acute{o}.h\grave{a}s\grave{a} \rightarrow \acute{o}.\tilde{h}\grave{a}s\grave{a}$  albino

In  $\tilde{V}\tilde{C}\tilde{V}$  sequences, the question arises as to which vowel is the one that is to be marked as nasal in the underlying representation. The predominantly word-final occurrence of nasalization suggests that it might be the last vowel in such a sequence. There are three reasons why this is unlikely.

First, consider infinitives. They consist of a nominal prefix (with augment)  $^{\circ}\acute{o}-k\acute{u}-$ , a verbal base ideally of the shape  $=CVC(VC)^n-$ , and a final morpheme  $^{\circ}-\acute{a}$ . Now compare the two forms:

- (59)  $\acute{o}kuf\acute{e}la$  to blow       $\acute{o}kuf\tilde{e}\tilde{l}\grave{a}$  to dig

Clearly, nasality is a property of some segment of the verbal base, and the final vowel assimilates to it. There is no reason suppose that the final

vowel is underlyingly  $^{\circ}\text{-}\dot{a}$  in some cases and  $^{\circ}\text{-}\dot{a}$  in others.

Second, the obligatory nasalization of  $-Vl-$  and  $-Vk-$  verbal extensions after  $[+\text{nasal}]$  consonants undoubtedly is a left-to-right assimilation. Note that no separate Nasal Harmony rule as in (56) can be formulated in an approach where nasalized vowels are basic and nasalized continuants are derived.

Third, a right-to-left nasalization rule would have to be blocked by the presence of a pre-stem boundary:

$$(60) \quad ^{\circ}\text{ólo}.\text{hólô} \rightarrow \text{ólo}.\text{h}^{\circ}\text{ólô} \quad (\text{not: } \dot{\text{ó}}\text{ló}.\text{h}^{\circ}\text{ólô}) \quad \text{strength}$$

Since I adhere to the principle that rules referring to specific morphological information such as "pre-stem boundary" are intrinsically classified as "deep" or "early", I prefer left-to-right spreading of nasality plus a low-level (optional?) rule of the shape  $\text{Ç} \rightarrow \text{Ç}/\_\text{V}$ ; e.g.

$$(61) \quad ^{\circ}\text{ólo}.\text{h}^{\circ}\text{ólô} \rightarrow \text{ólo}.\text{h}^{\circ}\text{ól}^{\circ}\text{ô} (\rightarrow \text{ólo}.\text{h}^{\circ}\text{ól}^{\circ}\text{ô})$$

It thus appears that if nasal vowels are to be recognized in underlying representation it should be the first vowel that appears in a surface nasalized sequence rather than the last one. But this analysis, too, is not altogether satisfactory. One objection concerns the Nasal Harmony rule. This would have to be replaced by something like the following assimilation rule:

$$(62) \quad \begin{bmatrix} -Vl- \\ -Vk- \end{bmatrix} \rightarrow \begin{bmatrix} -\dot{V}l- \\ -\dot{V}k- \end{bmatrix} / \left[ \begin{array}{c} \text{C} \\ +\text{nasal} \end{array} \right] \_\_$$

(All stem-internal instances of  $\dot{h}$  are in this approach reduceable to  $^{\circ}k$  preceded by a nasal vowel.) This appears to be all wrong, on internal as well as on comparative grounds. Why should exactly those vowels become nasalized that can be subsequently spread their nasality? Compare also the case of another (unproductive) verbal extension subject to Nasal Harmony:

$$(63) \quad \text{óku}.\text{pipiyà} \quad \text{to disguise;} \quad \text{óku}.\text{pánjìà} \quad \text{to call}$$

Here we do have Nasal Harmony proper, i.e.  $-Vy- \rightarrow -Vn-/N\_\_$ , which clearly affects the following consonant directly without first nasalizing the intervening vowel.

### 3.4. *Proposed Solution*

It has been shown that both "radical" solutions proposed above in sections 3.2 and 3.3 are problematic. In particular, nasalized monosyllabic stems demand acceptance of underlying nasalized vowels, yet analysing  $\check{V}\check{C}\check{V}$  sequences as  $^{\circ}\check{V}CV$  (or  $^{\circ}VC\check{V}$ ) precludes a sensible description of Nasal Harmony. In addition, both approaches miss important distributional generalizations.

The solution I propose is to analyse UMBundu as having underlyingly nasalized consonants, i.e.  $\check{v}$ ,  $\check{l}$ ,  $\check{y}$ ,  $\check{h}$ , as well as the three nasalized vowels  $\check{i}$ ,  $\check{a}$ ,  $\check{u}$ . Both classes of segments are more restricted in their occurrence, in terms of both frequency and distribution, than corresponding oral segments. Nasalized consonants do not occur stem (or morpheme) initially; nasalized vowels are restricted to monosyllabic stems (word-finally), and they optionally occur after stem-initial  $h$  in what appears to be a small and residual group of items.

This proposal may lack the pattern beauty of the two solutions attempted above. It does, however, best reflect the distributional properties of nasalization in UMBundu. In  $\check{V}\check{C}\check{V}$  sequences, [+nasal] is inherent in the consonant, and any adjoining vowel assimilates to it. This seems a more adequate description than one in which the occurrence of an inherently nasal vowel depends on the nasalizability of the following consonant. In nasalized monosyllabic stems, the feature [+nasal] is inherent in the vowel, which is its only logical place, particularly in items with no other nasalized segment.

An important advantage of this analysis is that it reveals an underlying system of three nasal versus five oral vowels as against a surface system of five nasal versus five oral vowels:

(64)	underlying:	surface:
	$i - e - a - o - u$	$i - e - a - o - u$
	$\check{i} - \check{a} - \check{u}$	$\check{i} - \check{e} - \check{a} - \check{o} - \check{u}$

This had been obscured in both earlier proposals. It is, of course, consistent with the long-recognized universal tendency for the number of nasalized vowels to be less than that of oral vowels.

The nasalized consonants  $\check{v}$ ,  $\check{l}$ ,  $\check{h}$ , and less so  $\check{y}$  are rare in the languages of the world. It is extremely unusual to assign them phonemic status. Their highly marked status may explain another unusual feature of UMBundu phonology: Generally, nasality spreads either left-to-right (normally from syllable-initial nasals) or right-to-left (normally from syllable-final nasals). In UMBundu, nasality spreads both ways from nasalized consonants.



## CONCLUSION

A remarkable feature of Umbundu Phonology is the two-directional spread of nasality:  $V\check{C}V \rightarrow \check{V}\check{C}\check{V}$ . Uni-directional spread, which is much more common in languages, tends to start from a nasal segment in either of the two peripheral positions of the syllable. The marked status of the nasalized Umbundu consonants, i.e. the difficulty they cause speaker and hearer alike, is reduced by the spread of nasality over both adjacent vowels.

In this paper, I have presented data on nasalized segments in Umbundu and I have attempted to analyse the relevant contrasts. I have produced evidence for an unusual segment inventory containing three nasalized vowels and four nasalized continuants at the level of phonological representation. My analysis, which does not explicitly invoke highly specific theoretical principles, has been aimed at presenting enough descriptive detail to make alternative analyses possible. Structural phonemic and auto-segmental approaches come to mind first, but recent work by John M. Stewart (personal communication) suggests that much insight is to be gained by redefining the respective domains of redundancy conditions, automatic adjustment rules, and phonological rules proper.

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