Opacity in Bantu: In support of the internal organisation of features

Nancy C. Kula

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Hans Rausing Endangered Languages Project
Department of Linguistics
School of Oriental and African Studies
Thornhaugh Street, Russell Square
London WC1H 0XG
United Kingdom

Department of Linguistics:
Tel: +44-20-7898-4640
Fax: +44-20-7898-4679
linguistics@soas.ac.uk
http://www.soas.ac.uk/academics/departments/linguistics

Hans Rausing Endangered Languages Project:
Tel: +44-20-7898-4578
Fax. +44-20-7898-4349
elap@soas.ac.uk
http://www.hrelp.org

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Opacity in Bantu: in support of the internal organisation of features[1]

NANCY C. KULA
University of Essex

1. INTRODUCTION

Opacity is a long-standing issue in phonology that goes back to Kiparsky's (1973) observation in rule interaction that has since defined counterfeeding and counterbleeding opacity as follows (Kiparsky 1973: 79):

(1) A rule (A → B / C__D) is opaque to the extent that there are surface representations of the form:

   (i) A in the environment C__D (apparent underapplication, counterfeeding opacity)
   (ii) B in the environment other that C__D (apparent overapplication, counterbleeding opacity)

The curiosity lies in the fact that in (i) the rule fails to apply even though its conditions are met and in (ii) the rule applies even though its conditions are not met. This paper presents an example of the former case drawn from the Bantu language Kinyamwezi where a process of depalatalisation fails to apply even though its conditions are met. This is however not a classic case of opacity as depalatalisation while not applying in particular environments does apply in others as will shortly be exemplified. The depalatalisation facts are interrelated with a palatalisation process that produces outputs that are the target of depalatalisation. The paper is organised as follows; section 2 briefly exemplifies the model of feature organisation assumed; section 3 gives the palatalisation and depalatalisation facts illustrating how counterbleeding opacity results from them; section 4 offers an analysis that relies on feature organisation to account for the disparity in the application of depalatalisation and finally, section 5 offers some concluding remarks.

2. INTERNAL ORGANISATION OF FEATURES

Within dependency-based frameworks like Government Phonology (GP) it is generally assumed that the set of features – referred to as elements – used to describe segments is a fairly small set of as few as 6 and maximally about 12 elements. This small number of privative features is motivated by the need to avoid the over-generation of possible segment types and inventories. The

[1] Extended versions of this work have appeared in Kula (2006, 2008).

mechanism used to expand the diminished set of elements in order to account for the contrasts expressed in different languages is the organisation of the elements into differing head-dependent relations that alter the amount of characteristic input that an element may contribute to a particular feature configuration. In most GP work it is merely assumed that one element within a combination is the head but further development in this area has argued for the idea that there is some internal organisation to the elements in a manner akin to feature geometry (Clements 1985 and subsequent work). The set of elements assumed for the current exposition are (A I U H L h ʔ) used in both vowel and consonant representations. Within consonants these elements respectively contribute pharyngeality/coronality, palatality, labiality, aspiration, nasality/voice, frication and glottality. Within vowels A I U also contribute lowness, highness and backness/roundedness, respectively. For a recent articulated theory of element dependency see Botma (2004) from which we derive two dependency relations within element organisation; namely, an immediate dominance relation between a head and its dependents in contrast to a branching dependency relation. As generally assumed in element geometries, a difference in phonological representation equates to a difference in phonetic output. Thus the difference between a voiced labial stop and a labial nasal, for example, is that (L) is in an immediate dominance relation in the former but in a branching dependency relation in the latter where in both cases the same elements are involved.

(2) Immediate dominance relation Branching dependency relation

Although this is by no means always the case, it is usual to find branching dependency structures in those cases where the dependent feature forms an outer shell to the core part of a segment, such as nasality (represented by the L-element in branching dependency as in (2)), aspiration (the H-element in branching dependency), glottalisation (the ʔ-element in branching dependency) and palatalisation (the I-element in branching dependency). These representations follow from the organisation of elements where *place* dominates *manner* and *phonation* is in a branching dependency position. Needless to say that each of these could be complex and consist of more than one element. We will regard the palatalisation process in Kinyamwezi, discussed in the following section, as exemplifying a case of branching dependency.

3. KINYAMWEZI PALATALISATION

The causative in Kinyamwezi like in many other Bantu languages can be formed in two ways.[2] By suffixation of the causative suffix *-iiʃ-* or by palatalisation of the root final consonant of the verb. In previous work (Kula 2000, 2002) I have argued that the latter process can be characterised as resulting from the absorption of a floating palatal element (I) that is consistent with the now extinct short causative of Bantu that was denoted by *-i-*. Let us consider the data for the set of alveolars and velars that undergo palatalisation in the formation of the causative.

(3) Root-final alveolars

	verb stem		causative	verb gloss
(a)	kulas-á	→	kulaʃ-á	'shoot'
(b)	kubon-á	→	kubony-á	'see'
(c)	kugul-a	→	kuguj-a	'buy'
(d)	kukaánz-a	→	kukaánj-a	'wash'
(e)	kwiibúúnh-a	→	kwiibúúɲhy-a	'swim'

The root final alveolars /s n l nz nh/ in (3) are turned into their palatal counterparts [ʃ ny j nj ɲhy] respectively, in the causative. Consider now the parallel behaviour of root-final velars given in (4).

(4) Root-final velars

	verb stem		causative	verb gloss
(a)	kubak-á	→	kubtʃ-a	'burn'
(b)	koog-a	→	kooj-a	'bathe'
(c)	kubuuŋg-a	→	kubuunj-a	'put into'
(d)	kunuuŋh-a	→	kunuuɲhy-a	'stink'

In (4), the root final velars /k g ŋg ŋh/ are palatalized to [tʃ j nj ɲhy] respectively, in the causative. Notice that (3c) and (4b), (3d) and (4c) and (3e) and (4d) each produce the same palatal under causativisation. Let us begin by considering the process of palatalization in detail.

3.1. Palatalisation as branching dependent I-element

Before we go into the actual representation of palatalisation I present in (5) the elemental representations of the alveolar and velar set of segments that undergo

[2] All data are drawn from Maganga and Schadeberg (1992) but see also Steere (1882) and Velten (1901). The data discussed here are part of a complex set of data with regard to competing outputs of depalatalisation that for lack of space will not be discussed here. See Hyman (2002) for an analysis based on analogy and Kula (2002) for an alternative analysis.

palatalisation.[3] These representations all reflect immediate dominance relations (given here without the graphics for space considerations) where the leftmost element in each expression is head and simplex expressions are headed.

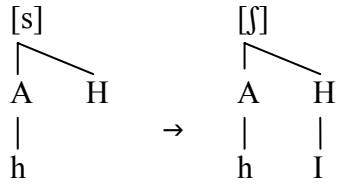
(5) Elemental representation of Kinyamwezi velars and alveolars

alveolars			velars		
s	(A.h.H)	nz (h.L.A)	k	(ʔ.H)	ŋh (L.H)
n	(A.ʔ.L)	nh (L.H.A)	g	(ʔ)	
l	(L)		ŋ	(ʔ.L)	

In the representations in (5) voice is the unmarked option for voice and as such remains unrepresented in voiced segments. Velarity is expressed by the absence of a place element.

As suggested earlier the palatalizing I-element has been argued to be a floating element that is not represented in constituent structure. The argumentation follows from the fact that only the palatalizing effect of the element is seen on the root final consonant without any alternation in constituent structure. The floating element is in this sense subsumed into the consonantal representation of the root final consonant, i.e. into one of the representations in (5) above. The idea is that the palatalising I-element assumes a branching dependency position in the representation that it attaches to viz. (6) below.

(6) Palatalisation process: kulas-a → kulaʃ-a ‘make shoot’



Supporting evidence for this analysis can be drawn from the difference seen between five-vowel and seven-vowel Bantu languages with regard to this palatalisation process. The Proto-Bantu vowel system is reconstructed as having seven vowels from which a subset of languages have undergone reduction to produce five-vowel systems (Meeussen 1967). The observation with respect to palatalisation (referred to as spirantisation in the Bantu literature owing to its relation to the Proto-Bantu vowel system) is that whilst the five-vowel languages generally undergo palatalisation that involves total absorption of the triggering agent, the seven-vowel languages never consistently undergo such total absorption but also display gliding effects (Labroussi 1999). This seems to point to the fact

[3] The velar and alveolar representations given here are part of the larger consonantal set of Kinyamwezi that is generated from a language specific set of Licensing Constraints, (see Kula 2002 for detailed discussion). Voiceless nasals are denoted by an /h/ after a nasal.

that whilst there are two distinct /i/ vowels in the seven-vowel languages there is only one in the five-vowel languages. Now if the high front vowels are represented in constituent structure in the morphemes in which they occur then for five-vowel languages where *i*-containing morphemes do not trigger palatalisation (cf. the applicative *-il-*, the perfective *-ile*) the agent of palatalisation must be a floating segment. In contrast, in seven-vowel languages where gliding effects are seen in some cases of palatalisation, we can conclude that a contrast can be drawn between floating and non-floating triggers.[4]

Note that in phonology-morphology interactions in Bantu, all suffixation processes target the verb root/base to the exclusion of the final-vowel. Thus all the processes postulated target a root/base to produce an output to which the final-vowel (*-a*) is attached to give the final surface form. It is perhaps in keeping with this structure that suffixes tend to be of the -VC- shape and if they are not they are incorporated into the root/base final consonant (baring some exceptions).

I will assume the analysis of palatalisation as presented in (6) for the remainder of this paper, i.e. as the addition of the I-element in a branching-dependency position. Let us now consider the depalatalisation process that results in opacity effects.

3.2. Depalatalisation triggered by following suffixes

Apart from palatalisation as discussed above there is a processes of depalatalisation that changes palatal segments to non-palatals in Kinyamwezi.[5] Consider the following examples in (7) where depalatalisation occurs after suffixation of the perfective suffix *-ile* which itself then undergoes palatalisation.

(7) Depalatisation of causativised bases

	causative	input to caus.+perf.		caus.+perf	verb gloss
(a)	biʃ-a	biʃ-ile	→	bis-ije	‘hide’
(b)	bats-a	batʃ-ile	→	bak-ije	‘light’
(c)	bony-a	bony-ile	→	bon-ije	‘see’

In the data in (7) depalatalisation of the causativised bases reverses the original palatalisation process i.e. [ʃ] → [s], [ny] → [n] and [tʃ] → [k]. One explanation for the depalatalisation process could be that the language has a palatal OCP that disprefers having a sequence of palatal segments. Opacity is manifested in cases where depalatalisation fails to apply even though there are root/base final palatals as the data in (8) show.

[4] In fact in many Bantu languages including Kinyamwezi the distinction between two high front vowels has been neutralised and is now expressed as a tense-lax opposition in the mid vowels.

[5] Depalatalisation is motivated by the need to have a palatal in base final position in predominantly causative bases. I can see no motivation for this process apart from the saliency of the base-final position as the marker of the end of a phonological domain.

(8) Blocked depalatalisation

(a)	buutʃ-a	→	buutʃ-iiʃ-a	'make carry'
(b)	buutʃ-a	→	buutʃ-ije	'has carried'
(c)	liiʃ-a	→	liiʃ-ije	'has caused death'
(d)	ʃook-a	→	ʃooʃ-a	'make go back'

These examples would then violate a palatal OCP as they allow a sequence of palatals. They are in this sense a case of counterfeeding opacity as they present a scenario where the conditions for depalatalisation to apply are met but the process does not take place. Examples (8b-c) directly contrast with those in (7) as although an added perfective suffix is palatalised (from -ile to -ije) the root-final consonant does not undergo depalatalisation. A causative suffix containing a palatal segment in (8a) also does not trigger depalatalisation and a root initial palatal does not undergo depalatalisation with the palatalisation of the root final consonant in (8d).

The obvious difference between (7) and (8) is that the root-final palatals in (7) are derived in contrast to those in (8) which are lexical. The generalisation can be captured as in (9) below.

(9) Depalatalisation in lexical versus derived palatals

C_1 - C_2 #	*Depalatalisation*	
LEXPAL – LEXPAL	×	
LEXPAL – DERIVPAL	×	
DERIVPAL – LEXPAL	✓	→ Ø - LEXPAL
DERIVPAL – DERIVPAL	✓	→ Ø - DERIVPAL

The schema in (9) illustrates that two lexical palatals in sequence are allowed. We can conclude from this that lexical palatals do not undergo depalatalisation. For the same reason two palatals will be adjacent if the initial one is lexical and followed by a derived one. On the other hand, whenever a derived palatal is initial, then depalatalisation will take place regardless of the kind of palatal that follows. The challenge that these facts pose to an analysis is that there is no immediate way of differentiating a derived from a lexical palatal if we standardly assume that a non-palatal becomes palatal. In fact we may want to assume that the structure in terms of component features that a lexical and a derived segment have is identical due to their identical phonetic manifestation. In vowel harmony, for example, when a high vowel [i] is lowered to the mid vowel [e] preceding an [e] like in Bantu high vowel lowering, it is taken that the [e] derived from vowel harmony has the same features as the lexical one and presumably also the same feature organisation. The contribution of this paper is to call this assumption into question and argue that differences in phonological organisation may exist between otherwise identical segments and that it is such differences that explain the attested opacity effects in Kinyamwezi.

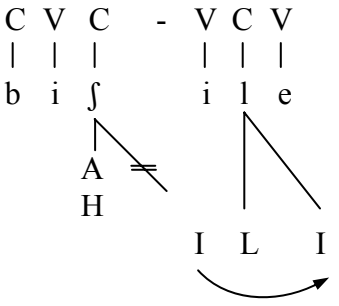
4. ACCOUNTING FOR OPACITY VIA ELEMENT DEPENDENCIES

As argued in Kula (2008) the contrast between derived and lexical palatals in Kinyamwezi derives from representational differences in melodic structure. Developing the idea of head-dependent relations already introduced, derived palatals are treated as having the palatalising I-element in a branching dependency relation to the rest of the phonological expression, while the same element is in an immediate dominance relation in non-derived palatals. Consider the graphic representation of this in (10).

(10) (a) derived palatal (b) non-derived palatal

In this sense, there is a representational difference between a lexical [tʃ] and one that has /k/ as its source, which is basically a velar stop that has acquired an I-element in the course of derivation. This I-element, because of its branching position, has a looser, more fluid relation with the rest of the elements and is totally displaced into a following target of palatalisation such as the perfective suffix where it also assumes a branching dependency relation. This displacement has the surface effect of depalatalisation. The non-branching immediate dominance I-element of (10b), on the other hand, can spread the I-element while retaining its position and thereby fails to show OCP effects. Consider the relevant derivations in (11a-b).

(11) (a) biʃ-ile → bis-ije ‘made hide’

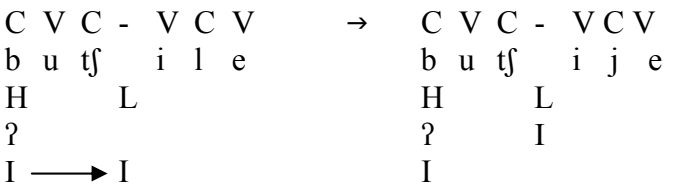


In (11a) the I-element in branching position is displaced to the following target of palatalisation resulting in depalatalisation of the root-final palatal and palatalisation of the following suffix consonant.

In contrast to (11a), the non-derived palatal [tʃ] in (11b) spreads its I-element into the following target resulting in a sequence of adjacent palatals:

(11) (b) Palatalisation with non-derived palatals

buutʃ-ile → buutʃ-ije 'has made carry'



What the current analysis affords us via the branching dependency relation is for the I-element to spread without a trace. The analysis is in the spirit of ideas expressed in Harris and Lindsey (1992) where it is argued that different elemental compositions may map onto identical positions in the acoustic signal. In Kula (2005) it is further argued that such positions are exhaustively defined for each language and that it is this exhaustivity that forces minimally different and competing combinations of elements to converge on the same position in the acoustic signal. The current view is that differences between segments may not only be in terms of their featural content but may simply be in terms on their organisation.

5. CONCLUSION

The palatalisation process in Nyamwezi has been accounted for as the addition of an (I) element that results in a derived palatal where the spreading element resides in a branching dependency position. This is in contrast to lexical palatals where the I-element assumes an immediate dominance relation with the other elements in the representation. This representational difference between derived and lexical palatals, though phonetically mapping onto identical positions in the speech signal, allows us to capture the opacity effects seen with respect to depalatalisation. The latter process only targets derived palatals to the exclusion of lexical ones because the branching dependency position allows elements to spread without leaving a trace in the original position. For elements in an immediate dominance relation spreading leaves the I-element in the origin intact. This recourse to representational differences between otherwise identical segments is a property that is independently motivated in the theory where such structural differences are used to capture segment contrasts while maintaining a small set of features/elements. This analysis is therefore comfortably couched within the confines of Government Phonology albeit in those versions that allow the internal organisation of features.

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