Morphologically-conditioned OCP effects in Bantu tonology: Evidence from Kinyore

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1. Introduction

Kinyore is a Bantu language spoken in western Kenya.[1] In this paper we would like to present a sketch of some tonal alternations in the verbal tonology, focusing specifically on a productive process of leftward binary spreading of certain H's. Accounting for which H's undergo spreading and which do not is the first aim of this paper. Secondly, we would like to illustrate the various effects of the Obligatory Contour Principle (Leben 1973, Goldsmith 1976a) upon the verbal tonology, namely downstep and fusion. Determining when each occurs is complex and is the subject of rigorous analysis. It will be shown that there is a correlation between the position of certain morphological boundaries, relative to the tones in question, and the selection of either downstep or fusion as repairs of the OCP.

Within the OT analysis to follow, we utilize the pro-spreading constraint EXTEND, as presented in Casimjee (1995), Kaun (1995), Odden (1998), and Bickmore (1998, 2000) which demands that that the edge of a feature span be more nearly aligned with the edge of a morphosyntactic domain than its input correspondent feature span. In the case of Kinyore, we demonstrate that EXTEND has the effect of compelling H tone spread. However we show that, in the case of binary spreading, EXTEND, as has been formalized to date, cannot alone be successful because candidates which show unbounded spreading will also satisfy EXTEND. In order to achieve descriptive adequacy, EXTEND must either be parameterized in such a way to penalize cases of no spreading or unbounded spreading, or supplemented with another constraint which penalizes candidates that have spread excessively. We have adopted this latter course in adopting a general *H constraint, as in Bickmore (2000). Finally, we demonstrate that it is useful to posit a less stringent version of the OCP – one relativized specifically to the macrostem boundary (Odden 1998; Bickmore 2000, 2003), which is crucial to our analysis of Kinyore and would seem to often play an useful role in analyses of Bantu tonal systems more generally.

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[1] Under Guthrie's (1967-71) classification, Kinyore is designated as E.33, belonging to the same subgroup as a host of other Luyia languages. This language is known by several names; including Kinyore, LuKinyore, OluKinyore, Nyole, Nyoole, Lunyole, and Olunyole. All data used in this paper was elicited in Albany, New York from Violet Horne (from the Kakamega District), a native speaker of the language. We would also like to thank Lee Bickmore, who considerably aided us in improving this paper. We are unaware of any prior linguistic or tonal description of Kinyore.

[2] The orthographic symbols we have used in this paper generally reflect their IPA values. We have used <č> to represent the palato-alveolar affricate. Underlining indicates our proposal for which elements bear a H tone in the input.

2 The Kinyore data

Kinyore is like many Bantu languages in that verb roots are of two tonal varieties (cf. Guthrie 1967-71, Clements and Goldsmith 1984). Infinitival forms exemplifying this are given in (1) and (2). The verbal structure is as follows: Preprefix /o-/ − Class Prefix /xu-/ − Object Marker (*optional*) − Root − Extension(s) (*optional*) − Final Vowel /-a/.

(1) Verbal Infinitives with H-toned roots

a. ò-xù-t<u>éé</u>x-à	‘to cook’
b. ò-xù-t<u>éé</u>x-èl-à	‘to cook for’
c. ò-xù-b<u>í</u>s-à	‘to hide (trans.)’
d. ò-xù-s<u>áá</u>mb-à	‘to bring’
e. ò-xù-h<u>éé</u>ng-à	‘to look’
f. ò-xù-x<u>á</u>làk-à	‘to cut’
g. ò-xù-s<u>ú</u>kùm-à	‘to push’

(2) Verbal Infinitives with toneless roots

a. ò-xù-yààns-à	‘to love’
b. ò-xù-rèèb-à	‘to ask’
c. ò-xù-sàày-à	‘to pray’
d. ò-xù-lììnd-à	‘to wait’
e. ò-xù-čès-à	‘to harvest’
f. ò-xù-čès-èl-à	‘to harvest for’
g. ò-xù-h-à	‘to give’

(3) H-toned verbs with object /mú-/ (3sg.)

a. ò-xú-m<u>ú</u>-t<u>éé</u>x-à	‘to cook him/her’
b. ò-xú-m<u>ú</u>-s<u>áá</u>mb-à	‘to bring him/her’
c. ò-xú-m<u>ú</u>-b<u>í</u>s-à	‘to hide him/her’
d. ò-xú-m<u>ú</u>-x<u>á</u>làk-à	‘to cut him/her’

(4) Toneless verbs with object /mú-/ (3sg.)

a. ò-xú-m<u>ú</u>-yààns-à	‘to love him/her’
b. ò-xú-m<u>ú</u>-rèèb-à	‘to ask him/her’
c. ò-xú-m<u>ú</u>-čès-èl-à	‘to harvest for him/her’
d. ò-xú-m<u>ú</u>-lììnd-à	‘to wait for him/her’

We assume in this analysis that TBU’s exhibit a two-way tonal contrast in the input. However, while it is possible to constrain input representations within a derivational framework, i.e. an underlying contrast between H and toneless (L being underspecified); the same assumption is not viable in an OT account, given the principle of the Richness of the Base. Instead, it is the constraints which choose the correct outputs, irrespective of the specification of non-contrastive features in the input. Therefore, a H-toned TBU may potentially contrast with either a toneless TBU or a L-toned TBU in the input. For the purposes of this paper, we follow Myers (1998) and Bickmore (2000) in assuming that L tones are essentially realized only within the phonetic component and that this is accomplished by positing an undominated constraint like the following:

(5) *L

Assign a penalty for each occurrence of the autosegment L.

To account for the tone patterns given in (1) − (4), we propose that the underlying status of the verbal morphemes are as follows. Furthermore, we propose that the TBU in Kinyore is the syllable, given the fact that there is no tonal contrast in bimoraic syllables.

(6) Underlying tonal status of verbal morphology

a. Preprefix /o-/, Class Prefix /xu-/, Final Vowel /-a/, and Extension /-el/: toneless
b. Object /mú-/: H-toned
c. Verb roots are either H-toned (1) or toneless (2)

Clearly, the tonal status of the verb root cannot predict whether the Class Prefix /xu-/ will surface as H or L. Instead, it is the presence or absence of a prefixal H introduced by the Object /mú-/ that is crucial in determining the tonal value of the Class Prefix /xu-/. Therefore, we have a clear case of leftward binary spreading of a prefixal H, shown by the data in (3) and (4), whereas we do not observe spreading of a root H. While Casimjee and Kisseberth (1998) identify leftward spread of "grammatical" H's as somewhat common in their survey of Bantu tonology, it seems that legitimate documented cases of leftward spread of prefixal H's are scarce.

We will now consider a configuration in which downstep occurs in Kinyore. Downstep occurs just in case two adjacent H autosegments come together, either via spreading or by concatenation if the two Hs flank the macrostem (MS) boundary. Data are given in (7).

(7) a. nd- á-xá[$_{\text{MS}}$ $^{!}$xú- h- a
1sg.-T/A- 2sg.-give-FV

'I have given you(sg.)'

b. nd- á-xá[$_{\text{MS}}$ $^{!}$bá- h- a
1sg.-T/A- 3pl.-give-FV

'I have given them'

Notice that this configuration is different from those in (3) and (4) in that the macrostem boundary (shown in (7) with the annotation "[$_{MS}$") intervenes between distinct H's. This was not the case in (3) and (4) where all input H's fell within the macrostem domain.

At this point, we must strongly emphasize that we do not view downstep as being realized in the phonology, but rather within the phonetic component. Moreover, we follow Odden's (1986) analysis of Kishambaa in assuming that structural OCP violations are tolerated in the output of the phonology. When the phonetic component encounters adjacent TBU's linked to distinct H's, a downstep is realized between them. Thus we assume the form in (7a) at the output of the phonology has the following structure:

```
(8)     nd-a-xa[MSxu-h-a
             \ /      |
             H1       H2
```

If this is the representation of a form which exhibits downstep we cannot possibly have the same representation for the forms in (3) and (4) where there is no downstep. Instead, we must assume that the H's fuse so that the phonetic component cannot insert a downstep. Both downstep and fusion are seen as resolutions to possible OCP violations, with the selection being dependent on the position of the input H's in relation to the macrostem boundary.

3 The OT analysis

We now turn to formalizing constraints which can account for the attested tonal patterns within Optimality Theory, as presented in McCarthy and Prince (1993a, b, 1995a) and Prince and Smolensky (1993), and refined in subsequent work. In the OT approach, leftward binary spreading of a prefixal H can be accomplished with an EXTEND constraint, given in (9).[2]

(9) EXTEND(H-L) Pre-Stem

> The leftmost TBU associated with a H in the input must come after the input correspondent of the leftmost TBU of the corresponding H in the output. (The left edge of a H in the input must be extended to the left in the output.)

The concept underlying this constraint is that bounded spreading is the result of a featural extension off an edge (left) of an input H (Bickmore 1998). Penalty assignment is as follows. The constraint finds the output correspondent of the leftmost TBU bearing H_i in the input. If this output correspondent is identical or comes after the leftmost TBU bearing H_i in the output, then a violation is assigned. However, outputs which show both binary as well as unbounded leftward spreading will not violate EXTEND. While it is not

[2] Lee Bickmore points out that there seems to be no agreed upon constraint which compels tone spreading. Because this more purely theoretical issue is not the focus of this paper, we simply choose EXTEND arbitrarily; it is enough for our purposes that there is some constraint which favors spreading.

possible to ignore problematic candidates in OT under the principle of 'freedom of analysis', we instead supplement EXTEND with another constraint ruling out cases of unbounded spreading. This is shown in (10).[3]

(10) *H

Assign a penalty to a TBU linked to a H.

Of course, *H will potentially be violated by many candidates in any given tableau. Thus, what becomes relevant is the number of violation marks received by a particular candidate relative to the number received by competing candidates.

We will also need a few more constraints which allow for a broader and more informative candidate set. These are given below.

(11) OCP

```
* σ   σ
  |   |
  H   H
```

(12) UNIFORMITY-IO

Penalize candidates that have elements in the output which have multiple correspondents in the input.

(13) MAX(H)

Penalize candidates that do not express a H in the output which was present in the input (Penalizes deletion of a H, one common type of which is described by Meeussen's Rule (Meeussen 1967, 1980)).

Consider the analysis of the form in (1a) in the tableau in (14).

[3] We note here that the use of *H is not the same as the general use of *FEATURE, which assigns penalties to all occurrences of a particular feature, as opposed to assigning penalties only to instances in which a feature-bearing unit is linked to that feature (Bickmore 2000).

(14) Tableau for *ò-xù-tééx-à* ‘to cook’:

o-xu-teex-a | H	EXTEND (H-L) Pre-stem	MAX (H)	*H	UNIF	OCP
a.☞ o-xu-teex-a̩ | H			*		
b. o-xu-teex-a \ | H			**!		
c. o-xu-teex-a \ \ / H			**!*		
d. o-xu-teex-a \ \ | / H			**!**		

Candidates (14b-d) all demonstrate spreading which creates gratuitous H linking, penalized by *H. However, notice that EXTEND is not violated because the spreading did not occur in the specified pre-stem domain. The grammatical candidate (14a) does not alter the input in any respect.

Now we consider a case in which there are two adjacent H-toned TBU’s in the input. To account for the fact that we observe leftward binary spreading of a prefixal H without downstep between that H and the root H, we would like to propose that the H’s must fuse. To ensure that the correct output is selected, we must have a method of ruling out candidates in which the prefixal H undergoes spreading, but does not fuse with the root H. As previously discussed, it is not possible to assign the same representation to cases of adjacent H’s which show downstep and those that do not. Given that the macrostem boundary is decisive in the occurrence of downstep, we can easily rule out the aforementioned problematic candidate by introducing a new OCP constraint which is sensitive to the macrostem domain, similar to the one used in Bickmore (2003).

(15) OCP-Intra-Macrostem (OCP-IMS)

$*[_{MS}\ \sigma \quad \sigma$
$\quad\ \ |\quad\ |$
$\quad\ \ H\quad H$

This new constraint would be in a stringency relationship to the general OCP, thus implying that any candidate that incurs an OCP-IMS violation also incurs a general OCP violation.[4] Of course, to assure that an OCP-IMS violation is even more severe than a

[4] The existence of additional linkages, beyond the ones shown in (15), is irrelevant to the constraint.

general OCP violation, OCP-IMS must outrank OCP. This new constraint is shown in the tableau in (16).

(16) Tableau for *ò-xú-mú-tééx-à* ‘to cook him/her’:

o-xu-mu-teex-a | | H_1 H_2	EXTEND (H-L) Pre-stem	OCP-IMS	MAX(H)	*H	UNIF	OCP
a.☞ o-xu-mu-teex-ạ \ | / $H_{1,2}$				***	*	
b. o-xu-mu-teex-a \ \ | / $H_{1,2}$				****!		
c. o-xu-mu-teex-a \ / | H_1 H_2		*!		***		*
d. o-xu-mu-teex-a | | H_1 H_2	*!	*		**		*
e. o-xu-mu-teex-a | H_2			*!	*		
f. o-xu-mu-teex-a \ / $H_{1,2}$	*!			**	*	
g. o-xu-mu-teex-a | H_1			*!	*		

We can see that the introduction of OCP-IMS has successfully ruled out problematic Candidate (16c).[5] Candidate (16b) shows unbounded spreading, which violates *H. Candidates (16d) and (16f) show an EXTEND violation because H_1 does not spread at all. Candidates (16e) and (16g) delete either of the H’s, thus violating MAX (H). Finally, the grammatical form (16a) shows fusion with spreading.

A question that may naturally arise at this point is whether a morphologically-annotated OT constraint is well justified. Subsequent data in this paper will show that grammatical forms in the language sometimes incur OCP violations, thus showing that a general OCP alone may not be sufficient to eliminate many candidates.

[7] Independent evidence shows that UNIF » OCP. This will be made clear in tableau (17).

We can now turn to accounting for the configuration presented in (7) in the tableau in (17).

(17) Tableau for the input of *nd-á-xá-ꜝxú-h-à* ‘I have given you(sg.)’

<table>
<tr><th>nd-a-xa-xu-h-a
| |
H_1H_2</th><th>EXTEND (H-L) Pre-stem</th><th>OCP-IMS</th><th>MAX (H)</th><th>*H</th><th>UNIF</th><th>OCP</th></tr>
<tr><td>a.☞ nd-a-xa-xu-h-a
\ / |
H_1 H_2</td><td></td><td></td><td></td><td>***</td><td></td><td>*</td></tr>
<tr><td>b. nd-a-xa-xu-h-a
| |
H_1 H_2</td><td>*!</td><td>*</td><td></td><td>**</td><td></td><td>*</td></tr>
<tr><td>c. nd-a-xa-xu-h-a
\ | /
$H_{1,2}$</td><td></td><td></td><td></td><td>***</td><td>*!</td><td></td></tr>
<tr><td>d. nd-a-xa-xu-h-a
\ | / /
$H_{1,2}$</td><td></td><td></td><td></td><td>****!</td><td>*</td><td></td></tr>
<tr><td>e. nd-a-xa-xu-h-a
|
H_2</td><td></td><td></td><td>*!</td><td>*</td><td></td><td></td></tr>
<tr><td>f. nd-a-xa-xu-h-a
\ /
H_1</td><td></td><td></td><td>*!</td><td>**</td><td></td><td></td></tr>
</table>

Candidate (17c) spreads H_1 and then fuses it with H_2, violating UNIFORMITY. Candidate (17d) is similar to (17c), only differing in that H_1 has spread gratuitously, violating *H. Both candidates (17e) and (17f) delete a H, violating MAX (H). Faithful candidate (17b) violates the OCP, as does the grammatical candidate, but is not compensated for better performance on any higher ranking constraint. Candidate (17a) does extend the leftmost input H and is the grammatical candidate.

4 Conclusion

In this paper we have presented an analysis of some alternations in the verbal tonology of Kinyore. Assuming only a H *vs.* Ø tonal contrast, we have focused specifically on cases of leftward binary spreading of certain prefixal H’s, which seem to behave differently than root H’s.

Having established the mechanics which derive leftward binary spreading of such H’s (i.e. the pro-spreading constraint EXTEND(H-L)-Pre-Stem plus the economy constraint *H), we examined the role of the OCP in Kinyore and showed that, in some instances, it is respected at the expense of fusion (UNIFORMITY-IO) of discrete input H’s, while at other times is violated, in which case a downstep is realized. We also argued for a morphologically-conditioned, stringent OCP constraint, which captures the difference in behavior between pairs of H's which straddle the macrostem boundary and those which are found to the right of the macrostem boundary. We hope that this paper will not only further and inform research on other Bantu tonal systems, but will have some theoretical influence insofar as formalizations of the OCP grounded in stringency are concerned.

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