Leftward High tone spread and downstep in Nyore

Michael Parrish Key and Mokaya Bosire
University at Albany
State University of New York

1 Introduction

Nyore is a Bantu language spoken in western Kenya.[1] In this paper we would like to present a sketch of Nyore 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) 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 morphological boundaries, relative to the tones in question, and the selection of either downstep or fusion as strategies to avoid violations of the OCP.

Within the optimality-theoretic account to follow, we crucially utilize EXTEND, a correspondence constraint presented in Casimjee (1995), Kaun (1995), Odden (1998), and Bickmore (1998, 2000) which stipulates the linear relationships between Tone-Bearing Units (TBU) and tones in both the input and the output. In the case of Nyore, we demonstrate that EXTEND has the effect of compelling High 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, if not absolutely necessary, to refer to morphological boundaries in the annotation of OT constraints. For recent examples of this in Bantu, see Odden (1998) and Bickmore (2000, 2003).

2 The Nyore data

Nyore 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/.[2]

(1) Verbal Infinitives with H-toned roots

a. ò-xù-tééx-à	‘to cook’
b. ò-xù-tééx-èl-à	‘to cook for’
c. ò-xù-bís-à	‘to hide (trans.)’
d. ò-xù-sáámb-à	‘to bring’
e. ò-xù-hééng-à	‘to look’
f. ò-xù-xálàk-à	‘to cut’

g. ò-xù-sú̲kùm-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-sààỳ-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'

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

a. ò-xú-mú̲-té̲é̲x-à 'to cook him/her'

b. ò-xú-mú̲-sá̲á̲mb-à 'to bring him/her'

c. ò-xú-mú̲-bí̲s-à 'to hide him/her'

d. ò-xú-mú̲-xá̲làk-à 'to cut him/her'

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

a. ò-xú-mú̲-yààns-à 'to love him/her'

b. ò-xú-mú̲-rèèb-à 'to ask him/her'

c. ò-xú-mú̲-čès-èl-à 'to harvest for him/her'

d. ò-xú-mú̲-lîìnd-à ‘to wait for him/her’

We assume in the analysis to follow 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 optimality-theoretic 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 phonetic 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 Nyore is the syllable, given the fact that there is no tonal constrast 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 Nyore. These data are given in (7).

(7)

a. nd- á-xá[$_{MS}$ ꜜxú- h- a
1sg.-T/A- 2sg.-give-FV
'I have given you(sg.)'

b. nd- á-xá[$_{MS}$ ꜜbá- 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). 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).

(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 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 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

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)).

First, let's consider the form in (1a) in the simple tableau in (14).

(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-a 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 σ     σ
     |     |
     H     H
```

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

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-$^!$xú-h-à* 'I have given you(sg.)'

nd-a-xa-xu-h-a | | H_1H_2	EXTEND (H-L) Pre-stem	OCP-IMS	MAX (H)	*H	UNIF	OCP
a.☞ nd-a-xa-xu-h-a \ / | H_1 H_2				***		*

<table>
<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 by adherence to EXTEND (H-L). Candidate (17a) does extend the leftmost input H and is the grammatical candidate.

4 Conclusion

In this paper we have presented a description and analysis of Nyore verbal tonology. 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. Working within an OT framework, we have analyzed leftward binary spread as a function of the constraint EXTEND. We then argued that this constraint alone was insufficient to rule out candidates which showed unbounded spreading.

We examined the role of the OCP in Nyore and showed that it, in some instances, is respected at the expense of fusion of discrete input H's, while at other times is violated, assuming that the language tolerates structural OCP violations in the output of the phonology, in which case a downstep is realized. We also argued for a morphologically-conditioned and necessarily highly-ranked OCP constraint, which seems plausible given that the unconditional OCP constraint is violated by some grammatical forms. While our approach to Nyore verbal tonology has some precedence in the literature, only more research will determine whether this analysis may be profitably extended to other tonal systems.

Notes

[1] Under Guthrie's (1967-71) classification, Nyore 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, Lunyore, Olunyore, 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 Nyore.

[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.

[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).

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

[5] Independent evidence shows that UNIF >> OCP. This will be made clear in the tableau in (17).

References

Bickmore, L. (1998). Bounded tone spreading as feature extension. Handout of paper presented at the 72nd Annual Meeting of the Linguistic Society of America, New York.

Bickmore, L. (2000). Downstep and fusion in Namwanga. *Phonology* 17. 297-331.

Bickmore, L. (2003). High Tone Spreading and the OCP in Chilungu. Paper presented at the 4th World Congress of African Linguistics, Rutgers University.

Casimjee, F. (1995). Isixhosa tonology: an optimal domains theory analysis. Ms, University of Illinois.

Casimjee, F. and C. Kisseberth (1998). Optimal domains theory and Bantu tonology: a case study from Isixhosa and Shingazidja. In: L. Hyman, C. Kisseberth (eds.) *Theoretical Aspects of Bantu Tone*. Stanford: CSLI. 265-314.

Clements, G.N. and J. Goldsmith (eds.) (1984). *Autosegmental Studies in Bantu Tone.* Dordrecht: Foris.

Guthrie, M. (1967-71). *Comparative Bantu* (4 vols.). Farnborough, Hants.: Gregg.

Kaun, A. (1995). *The typology of rounding harmony: an Optimality Theoretic approach.* PhD dissertation, UCLA.

Leben, W. (1973). *Suprasegmental Phonology*. PhD dissertation, MIT. Distributed by Indiana University Linguistics Club.

McCarthy, J. and A. Prince (1993a). Prosodic Morphology I: constraint interaction and satisfaction. Ms, University of Massachusetts, Amherst and Rutgers University.

McCarthy, J. and A. Prince (1993b). Generalized alignment. In: *Yearbook of Morphology* 1993. 79-153.

McCarthy, J. and A. Prince (1995a). Faithfulness and reduplicative identity. In: Beckman et al., 1995. 249-384.

Meeussen, A.E. (1967). Bantu grammatical reconstructions. Annales du Musée Royal de l'Afrique Centrale 61, 80-121.

Meeussen, A.E. (1980). Bantu lexical reconstructions. Archives d'Anthropologie/ Schrief voor Anthropologie 27.

Myers, S. (1998). Surface underspecification of tone in Chichewa. *Phonology* 15.

367-391.

Odden, D. (1986). On the role of the Obligatory Contour Principle in phonological theory. *Lg* 62. 353-383.

Odden, D. (1998). Principles of tone assignment in Tanzanian Yao. In: L. Hyman, C. Kisseberth (eds.) *Theoretical Aspects of Bantu Tone*. Stanford: CSLI. 265-314.

Prince, A. and P. Smolensky (1993). Optimality Theory: Constraint Interaction in Generative Grammar. Ms, Rutgers University and University of Colorado, Boulder.