Does Tone Polarity Exist? Evidence from Plural Formation among Bangime Nouns

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Abstract: This study introduces Bangime, a language isolate spoken in Mali (Lewis, 2009), into the literature, through an examination of tonal processes associated with the formation of plurals. The purpose of this study is to offer evidence for the existence of the phenomenon known as ‘tone polarity’. A debate began with Kenstowicz et al.’s (1988) study, in which he referred to tone polarity as an epiphenomenon, simply a ‘reflex’ of the Obligatory Contour Principle (OCP) (Leben, 1973). Since then, researchers have argued for (Cahill, 2004; Newman, 1995), and against (Anttila and Bodomo, 2000; Hyman, 1993), the justification of positing the existence of tone polarity as opposed to dissimilation. Here, it is argued that tone polarity differs from simple dissimilation in Bangime nouns because the target tone bearing unit (TBU) is underlingly toneless, thus adhering to the most current definitions of the phenomenon (Hyman, 2007: 502; Yip, 2002: 159).

1. Introduction

The purpose of this study is to provide hypotheses to two questions: i) Does tone polarity exist, and ii) what are the underlying tonal patterns on nouns in the singular and plural forms? This paper is organized as follows: The introduction, in §1, provides a background to the controversy over tone polarity. Because Bangime is being newly introduced to the literature, §2 is devoted to a brief overview of the language. Next, in §3, the author proposes that the plural marker be treated as underlingly toneless and that it undergoes the controversial phenomenon, tone polarity, to receive its tone. In §4, a proposal is outlined in which certain nouns are have floating tones. The conclusion in §5 mentions some issues pertaining to markedness found in the language.

1.1 Background

A debate began with Kenstowicz et al.’s (1988) study, in which he referred to tone polarity as an epiphenomenon, simply a ‘reflex’ of the Obligatory Contour Principle (OCP) (Leben, 1973). Since then, researchers have argued for (Cahill, 2004; Newman, 1995), and against (Anttila & Bodomo, 2000; Hyman, 19931), the justification of positing the existence of tone polarity as opposed to dissimilation. The goal of this study is to show evidence for the existence of tone polarity using examples from the plural formation of nouns in Bangime. It is argued that tone polarity differs from simple dissimilation in Bangime nouns because the tar-

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1 Though Hyman’s opinion on this issue has not remained constant.
get tone bearing unit, (hereafter TBU), is postulated to be underlyingly toneless, thus adhering to the definition of the phenomenon. Schuh (1978: 241) first defined the difference between tone polarity and dissimilation as the following:

“The phonetic effect of these two processes will be the same, namely, tones on two (usually contiguous) syllables will be the opposite of each other. Rules for the two are distinct, however. In dissimilation the affected syllable has an identifiable underlying tone, requiring a rule of the form [+HI] → [–HI]/ [+HI]____, whereas in polarization the affected syllable has no underlying tone, requiring a rule of the form Tone → [αHI]/ [αHI]____.”

Cahill (2004) further notes the difference between dissimilation, or OCP violations, and tone polarity is that the target TBU is an underlyingly toneless syllable. In his analysis of Kɔnni, he shows that an affix receives its tone via opposition to the final tone of its host root. Newman (1995) also considers tone polarity to be a naturally occurring phenomenon found in languages, different from the OCP.

Though not all authors agree about the specifics of the conditions in which tone polarity may apply, most do concur that tone polarity applies at morpheme boundaries. Exceptions to this generalization include Pulleyblank (1986), who states that polarity must occur at the word-edge. Cahill (2004) shows examples where word-internal morphemes exhibit polarity. Bamana (Creissels & Gregoire, 1993; Dwyer, 1976) also displays an unusual case of tone polarity at the phrasal level.

Tone polarity is usually thought to be found in languages with a two-tone distinction, though cases of tone polarity have been found in Yoruba (Akinlabi & Liberman, 2000) and Mono (Olson, 2001), both of which have a three-way tonal distinction between high, mid, and low.

1.2 Examples of tone polarity

Examples of tone polarity have been shown throughout African languages in at least three distinct language families, spanning five phyla, as illustrated in (1).

(1) Languages which have been analyzed as displaying tone polarity


c. Nilo-Saharan: Fur (Lojenga, 2002)

1.3 Arguments against tone polarity

The following examples in (2), from plurals in Moorè, and the analysis provided in (3), illustrate the claim that tone polarity can be considered dissimilation motivated by the OCP.
Note that the analysis assumes the following: all plural markers are underlying high, and a three way contrast exists among L, H, and Ø in the language.

(2) Adapted from (Kenstowicz et al. 1988: 78)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. kò–dó</td>
<td>kò–dó</td>
<td>sack</td>
</tr>
<tr>
<td>b. kú–rì</td>
<td>kú–à</td>
<td>stone</td>
</tr>
<tr>
<td>c. nwáb–gá</td>
<td>nób–sé</td>
<td>tree species</td>
</tr>
</tbody>
</table>

(3) Derivations of plural forms. Adapted from (Kenstowicz et al. 1988: 86)

<table>
<thead>
<tr>
<th>UR</th>
<th>k o r d o</th>
<th>k u g a n o b s e</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Rule</td>
<td>OCP Violation</td>
<td>Tone Spread</td>
</tr>
<tr>
<td>PR k o r d ó</td>
<td>k ú g á</td>
<td>n ó b s é</td>
</tr>
<tr>
<td>L</td>
<td>H</td>
<td>H H→Ø</td>
</tr>
</tbody>
</table>

The diagram in (3) illustrates that in Mooré, tone is underlying assigned to each TBU. The example derivation from (2a) above shows that if the stem contains two opposing tones, no rule applies. The example from (2b) illustrates that if the underlying form has two tones of the same value, the second deletes due to the OCP. The following step, (not shown), would be to spread the remaining tone to the newly toneless TBU. As such, it is shown in (3) that if a TBU is underlyingly toneless, it also receives its tone via a spreading rule. Thus, these examples do not conform to the specifications of tone polarity outlined above.

Hyman’s (1993) review of Dagbani reiterates that the plural suffix in the related Gur language is underlyingly high. The high tone of the suffix remains unchanged after roots in which the final vowel is underlyingly low but is deleted after roots which end in a high tone due to violations of the OCP. The syllable with the deleted H then becomes L by default. As in the explanation above, toneless roots in which the affix spreads back to the root make up the remainder of the examples. These stems surface with a sequence of HH tones. Though Anttila & Bodomo’s (2000, 2002) studies of Dagaare tones analyze suffixes as underlying null and assign high as a default tone, they continue to agree that the cause of the shift is an OCP violation, not tonal polarity.

2. Language overview

The language Bangerime, or Bangime [bǎŋímì], is spoken by seven villages located in the Bandiagara area of central-eastern Mali by an estimated 1,200 (Gordon, 2005) to 3,000 (Blench & Dendo, 2005a) speakers. The language is classified as an isolate (Lewis, 2009).²

² Though Stefan Elders spent approximately six months in Bounou from 2006 to 2007 doing fieldwork on Bangerime, he was unable to publish any material concerning the language besides a presentation in Bamako (Elders, 2006) prior to his death in 2007.
Briefly, the facts concerning the language pertaining to the study are listed as follows: Bangime is morphologically an isolating language; there are very few derivational or inflectional affixes in the language. The plural marker, –nde, is an exception, thus its tonal alternations are the focus of this study. The tonal system contrasts /L/, /H/, and /∅/. If spreading is present, the direction of association is R → L. Only rising tones are permitted in Bangime and contour tones are limited to the left edge of the word. Both the direction of association and the presence of rising tones with the exclusion of falling tones are of interest as well since these are marked processes (Bao, 1999).

Vowel length is contrastive in the language. Permissible syllable types of non-derived noun roots include following: CV, CVV, ČVN, CVVN, and ČGV. Disyllabic words may have a long vowel in the first or second syllable, though not in both. For the purposes of this study, examples consisting of regularly plural-forming noun roots without other derivational or inflectional affixes are used in order to rule out other tonal effects.

2.1 Methodology

Data were collected by the author from two native speakers of Bangime in the village of Bounou during the Summers of 2008 and 2009. All the data included in this study was recorded using an M-Audio Microtrack II digital recorder and was analyzed using the program Praat. Microsoft Excel was used for plotting pitch tracks and formant values, and storing lexical items. Transcriptions represented in this paper are phonetic and are written in IPA format. Lexical items are listed in citation form unless otherwise noted. The nouns used in this study were selected from a corpus gathered for a dictionary (Hantgan 2009). The nouns used in this study in particular were selected because they represent various syllable shapes.

Long vowels are represented by the notation {VV}, with tone marked on both vowels of the sequence. Tones are marked with an acute accent for high {’}, a grave accent for low {`}, and a combination for rising {¨}. Morpheme boundaries are indicated with a dash {-} in between morphemes. A superscript {ⁿ} following a target vowel or approximant is used to represent nasality. This study employs the theoretical framework of Autosegmental Representation (Goldsmith, 1976), within the confines of Optimality Theoretical (OT) (Prince & Smolensky, 1993/2004).

3. Tone polarity in Bangime

In Bangime, as in the Gur languages noted above, tones of opposite values are exemplified in plurals, as shown in the examples in (4) below. Note that the plural suffix –nde assumes the opposite tone of its respective root. The examples in (4a) show stems with various numbers of syllable shapes and sizes with a low tone on the ultimate root mora alternate with a high tone on the ultimate stem mora. Those in (4b) illustrate that if there is a high tone on the root ultimate mora, there is a low tone on the stem ultimate mora.

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3 Note that null or zero refers to toneless syllables, not default mid.
4 The terms root and stem will be used as defined by Aronoff (1994).
(4)  \[\begin{array}{lll}
\text{Singular} & \text{Plural} & \text{Gloss} \\
\hline
\text{a.} & \text{low tone on ultimate root mora} & \text{high tone on ultimate stem mora} \\
\text{CV} & \text{i.} & \text{b}^\text{wē} & \text{b}^\text{wē}–\text{ndē} & \text{mosquito} \\
\text{CVV} & \text{ii.} & \text{tē} & \text{tē}–\text{ndē} & \text{forge} \\
\text{CGV} & \text{iii.} & \text{tī}^\text{nō} & \text{tī}^\text{nō}–\text{ndē} & \text{blacksmith} \\
\text{CVCV} & \text{iv.} & \text{gījə}^\text{n} & \text{gījə}^\text{n}–\text{ndē} & \text{shadow} \\
\text{CVVCNV} & \text{v.} & \text{tōtō} & \text{tōtō}–\text{ndē} & \text{anvil} \\
\text{b.} & \text{high tone on root ultimate mora} & \text{low tone on stem ultimate mora} \\
\text{CV} & \text{vii.} & \text{kē} & \text{kē}–\text{ndē} & \text{thing} \\
\text{CVV} & \text{viii.} & \text{tī} & \text{tī}–\text{ndē} & \text{older sibling} \\
\text{ix.} & \text{sii}^\text{n} & \text{sii}–\text{ndē} & \text{mongoose} \\
\text{CVVCV} & \text{x.} & \text{dūūqū} & \text{dūūqū}–\text{ndē} & \text{forest} \\
\text{CVCV} & \text{xi.} & \text{kūwō} & \text{kūwō}–\text{ndē} & \text{house} \\
\text{CVCVCV} & \text{xii.} & \text{birōndə}^\text{n} & \text{birōndə}–\text{ndē} & \text{corn} \\
\end{array}\]

3.1 Analysis

Based on the tonal behavior in the above examples, stipulations must be made in the grammar in order to generate the correct surface outcomes. Since contour tones are allowed on syllables with either one mora, as in (4a.v.) ‘anvil’, or two, as in (4b.ix.) mongoose, it is proposed that the TBU is the syllable.

Even though Hyman (2007: 14) states that it is almost unheard of in West African languages, the presence of contour tones and the series of like-level tones at the left edge of the word as in examples such as (4a.v.) ‘anvil’ and (4b.xii.) ‘corn’, provide evidence that linking and spreading must take place from right to left.\(^5\)

As noted above, the definition of tone polarity insists that the tone on the target TBU is underspecified. Hyman and Schuh (1974: 100) state, “since it would be arbitrary to propose a specific underlying tone in the above cases, [referring to Margi] tonal polarity differs from tonal (or segmental) dissimilation, where one of two identical specified features dissimilates.” Thus, the constraints and example tableaux are posited below to account for the data in (4) above.

3.1.1 Constraints

a. Markedness constraint

The following markedness constraint is drawn directly from Cahill (2004). Though Cahill’s constraint specifically refers to a noun class suffix found in Konni, the same constraint can be used here. When ranked highly, it ensures that the tone on the stem-final TBU surfaces with an opposing value to the closest adjacent tone, in this case, that of the root.

i. \text{POLAR}: The last tone of a plural stem is opposite in value to the immediately preceding tone.

\(^5\) Note that Newman (1974) evaluated Kanakuru as being right to left association despite Goldsmith’s (1976a) Wellformedness Convention that languages spread tones to empty TBU’s left to right.
b. Faithfulness constraints

The following faithfulness constraints are listed in Yip (2002) and are drawn from McCarthy and Prince (1995). These constraints militate against changing underlying tones from input to output forms.

ii. IDENT-IO(Tone): If α is a TBU in the input and β is a correspondent of α in the output, then the tonal specification of α must be identical to the tonal specification of β.

iii. DEP-IO(Tone): Output tones must have input correspondences.

3.1.2 Tableaux

Given these three constraints, the tableaux in (5) and (6) illustrate the proposed analysis of the forms above in (4a.iv.) and (4b.xi.).

(5) /giğɔn + ndɛ/ → [giğɔn-ndɛ] ‘shadow–PLURAL’

<table>
<thead>
<tr>
<th>/giğɔn + ndɛ/</th>
<th>‘shadow’</th>
<th>POLAR</th>
<th>DEP(T)</th>
<th>ID(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. HL0 gi jɔn ndɛ</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. HLH gi jɔn ndɛ</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. HHL gi jɔn ndɛ</td>
<td></td>
<td>*</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

This tableau shows that the fully faithful candidate, (5a), loses due to the fact that it violates the highly-ranked POLAR constraint in that the final TBU is not assigned a tone which opposes that of its neighbor. The winning candidate in (5b) is more harmonic than the candidate in (5c) because it only incurs a violation of DEP(T), due to the epenthesis of the H tone on the plural suffix. The losing candidate in (5c) does fulfill the stipulations made by the POLAR constraint, however, it loses not only because it epenthesizes a L tone on the plural suffix, it also changes the underlying value of the root-final TBU, thus violating ID(T).

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6 Singular forms are not shown since they are easily assumed from the data shown above.

7 This candidate could also be ruled out by the constraint SPECIFY T, that a TBU must be associated with a tone. This is based on the Wellformedness Condition (WFC) (Goldsmith 1976) and is formalized in Pulleyblank (1997) and Yip (2002).
(6) /kùwó + ndɛ/ → [kùwó–ndɛ] ‘house–PLURAL’

<table>
<thead>
<tr>
<th>/kuwo + ndɛ/ ‘house’</th>
<th>POLAR</th>
<th>DEP(T)</th>
<th>ID(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. LH₀</td>
<td>ku wo ndɛ</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>L H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. LHL</td>
<td>ku wo ndɛ</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>L H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. LLH</td>
<td>ku wo ndɛ</td>
<td>*</td>
<td>*!</td>
</tr>
<tr>
<td>L L H</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tableau in (6) shows that the exact same constraints and ranking as were illustrated in (5) may apply to an example where the stem final tone is L instead of H.

3.1.3 Ranking

The ranking of the above posited constraints is shown below:

POLAR >> DEP(T), ID(T)

3.1.4 Richness of the base

A relevant question to pose at this point concerns the validity of positing the plural suffix as being underlingly toneless. According to the theory of Richness of the Base (ROB) (Prince & Smolensky 1993), any number of an infinite candidate set may be posited as the input form; with the relevant constraints in the appropriate ranking order, the output candidate should remain the same for a given language. Therefore, the following tableaux address this issue.

(7) /ɡíjɔⁿ + ndɛ/ → [ɡíjɔⁿ–ndɛ] ‘shadow–PLURAL’

<table>
<thead>
<tr>
<th>/ɡíjɔⁿ + ndɛ/ ‘shadow’</th>
<th>POLAR</th>
<th>DEP(T)</th>
<th>ID(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H L H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. LHL</td>
<td>gi jɔⁿ ndɛ</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>H L H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. HHL</td>
<td>gi jɔⁿ ndɛ</td>
<td><em>!</em></td>
<td></td>
</tr>
<tr>
<td>H H L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The tableau above in (7) shows the possibility of positing the underlying tone of the plural suffix as H. This would appear to be optimal since the fully faithful candidate would incur no violations and would therefore emerge as the winner. This is preferable, according to the principle of Lexical Optimization (Prince & Smolensky 1993), which states that, without evidence to the contrary, the input representation should correspond to the output as closely as possible in order to minimize faithfulness violations.

(8) /kùwó + ndé/ → [kùwó–ndé] ‘house–PLURAL’

<table>
<thead>
<tr>
<th>/kuwo + nde/ ‘house’</th>
<th>POLAR</th>
<th>ID-IO[T] (Root)</th>
<th>DEP(T)</th>
<th>ID(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. LHH ku wo nde</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L H H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. LHL ku wo nde</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>L H L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. LLH ku wo nde</td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>L L H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tableau in (8) further illustrates that the correct winner would emerge if an additional constraint, IDENT–IO[Tone](Root) were invoked; stating that, “the value of the tone of the affix in the input is identical with its value in the output”\(^8\). While this alone complicates the analysis, further evidence is also shown below to support the claim that the plural suffix is underlingly toneless.

3.2 Summary

Certainly, the above examples fit even the most current definitions of tone polarity (Hyman, 2007: 502; Yip, 2002: 159). The tone of the plural marker is underspecified until it is suffixed onto the root, at which time it assumes the opposite tone of the root.

4. Evidence for the plural suffix as being toneless

In the above section, it was presented that the surface representations on noun roots in the plural do not shift from the underlying tone on noun roots in the singular. This, however, poses problems for an argument that is based on the definition of tone polarity which relies on the target TBU as being toneless, if Richness of the Base is considered. In this section, further evidence is supplied which supports the presupposition that the plural suffix in Bangime is better analyzed as being underlyingly toneless.

\(^8\) Drawn from Beckman’s (1999: 187) positional faithfulness constraints.
4.1 Data

The plural stems shown below in (9) seem to exhibit tone polarity, as was shown in the examples above in (4). The plural suffix –nde continues to assume the opposite tone of its respective root-final mora. These examples differ from those above in (4), however, because the root-final mora also shifts its tone from its surface isolation form.

The examples in (9a) show stems with various numbers of syllables and a low tone on the ultimate root mora in the singular which alternates with a low tone on the stem ultimate mora in the plural form. However, also note that in the plural forms in (9a), the root ultimate TBU also shifts its tone to H. The examples in (9b) illustrate that if there is a high tone on the root ultimate mora in the singular, there is a low tone on the root ultimate mora and a high tone on the stem ultimate mora in the plural.

(9)

<table>
<thead>
<tr>
<th></th>
<th>Singular</th>
<th>Plural</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>low tone on ultimate root mora ~ high tone on ultimate stem mora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>i.  ๆ</td>
<td>ๆ –nde</td>
<td>water</td>
</tr>
<tr>
<td>CVV</td>
<td>ii.  dɔ̄ɔ̄</td>
<td>dɔ̄ɔ̄ –nde</td>
<td>paper</td>
</tr>
<tr>
<td>CVCV</td>
<td>iii.  kúŋɛ̃</td>
<td>kúŋɛ̃ –nde</td>
<td>calabash</td>
</tr>
<tr>
<td>CVCV</td>
<td>iv.  pínâ</td>
<td>pínâ –nde</td>
<td>fear (n.)</td>
</tr>
<tr>
<td>CVNCV</td>
<td>v.  ɡéŋɡɛè</td>
<td>ɡéŋɡɛè –ndɛ</td>
<td>crocodile</td>
</tr>
<tr>
<td>CVNCVCV</td>
<td>vi.  ŋâmbârà</td>
<td>ŋâmbârà –ndɛ</td>
<td>sheep</td>
</tr>
<tr>
<td>b</td>
<td>high tone on root ultimate mora ~ low tone on stem ultimate mora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CGV</td>
<td>vii.  bów</td>
<td>bów –ndɛ</td>
<td>field</td>
</tr>
<tr>
<td>CVCV</td>
<td>viii.  kò nɔ̄</td>
<td>kò nɔ̄ –ndɛ</td>
<td>doorway</td>
</tr>
<tr>
<td>CVCV</td>
<td>ix.  ɡâyɛ̇</td>
<td>ɡâyɛ̇ –ndɛ</td>
<td>dog</td>
</tr>
<tr>
<td>CVCV</td>
<td>x.  sârdîŋɛ̇</td>
<td>sârdîŋɛ̇ –ndɛ</td>
<td>onion</td>
</tr>
<tr>
<td>CVCV</td>
<td>xi.  sârdîŋɛ̇</td>
<td>sârdîŋɛ̇ –ndɛ</td>
<td>shoe</td>
</tr>
</tbody>
</table>

4.2 Analysis

In the above section, it was presented that the surface representations of noun roots in the plural form do not shift from the underlying tone on noun roots in the singular. It is posited that is not the case for all of the nouns found in the language. In this section, it is hypothesized that another pattern occurs in the language, that of a shift in the tone of the root when the plural suffix is added. Because of this, it is assumed that certain noun roots have a floating tone at the right edge of the word. This floating tone is associated with the noun root’s right edge, and it is aligned to the right edge of the word in the plural stem form as well.

According to Goldsmith (1990) there are two definitions of floating tones: a floating tone may be a morpheme with no segmental content, or it may be a tone which is leftover from the deletion of a floating vowel. The proposed floating tones in Bangime, however, seem to exist for no synchronic reason, and are of the type proposed for Mixtecan languages.

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9 Another suggestion is to posit floating tones following all lexical items, but this would necessitate additional constraints and would also not illustrate the unity of a polarity analysis.
(Daly & Hyman, 2007; Goldsmith, 1990). These floating tones only dock to toneless syllables, similar to the analysis of Kikuyu downstep which is caused when a floating L remains unlinked due to the lack of an empty host (Clements & Ford, 1979).

The examples in (10) illustrate examples of the nouns in (9) in their proposed underlying forms.

<table>
<thead>
<tr>
<th>Noun</th>
<th>Gloss</th>
<th>Noun</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ɥɛ̀</td>
<td>water</td>
<td>d. pína ̀</td>
<td>fear (n.)</td>
</tr>
<tr>
<td>b. dɔ̀ɔ̀</td>
<td>paper</td>
<td>e. ḡɛŋɛ̀ɛ̀</td>
<td>crocodile</td>
</tr>
<tr>
<td>c. kúɥɛ̀</td>
<td>calabash</td>
<td>f. ṇàmbárà</td>
<td>sheep</td>
</tr>
<tr>
<td>g. bẁó</td>
<td>field</td>
<td>j. ʒáɣɛ̀ɛ̀</td>
<td>onion</td>
</tr>
<tr>
<td>h. kúrɛ̀ɛ̀</td>
<td>dog</td>
<td>k. kúwɔ́kɛ̀</td>
<td>shoe</td>
</tr>
<tr>
<td>i. kò nɔ́</td>
<td>doorway</td>
<td>l. sárdìŋe</td>
<td>garden</td>
</tr>
</tbody>
</table>

The nouns in (9) are shown in (10) to underlyingly have a floating tone at the right edge of each word. Note that in the surface forms above in (9), these floating tones are allowed to dock onto the noun in singular form. In the plural forms, the final mora of the root assumes the opposite, or polar tone of the plural suffix.

4.3 Additional constraints

Therefore, the POLAR constraint above must now be modified slightly as in v.

v. POLAR: A toneless mora receives the opposite tone of an adjacent tone at a morpheme boundary.

The following markedness constraints are also introduced at this time:

vi. *FLOAT: A tone must be associated with a TBU. Yip (2002)

vii. ALIGN-R (T,W): Align floating tones with the right edge of a word. This constraint is drawn from Cahill (2007) and based on the family of alignment constraints proposed by McCarthy and Prince (1993, 1995).
4.4 Tableaux\(^\text{10}\)

(11) /kúɛ̀ + ndɛ/ \(\rightarrow\) [kúɛ̀–ndɛ̀] ‘calabash–PLURAL’

<table>
<thead>
<tr>
<th>/kú ɛ̀ –ndɛ/ ‘calabash’</th>
<th>POLAR</th>
<th>DEP(T)</th>
<th>*FLOAT</th>
<th>ALIGN-R</th>
<th>ID(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H 0 L_F 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. H0 L_F 0</td>
<td>ku ɛ̀ ndɛ</td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. HHL_F</td>
<td>ku ɛ̀ ndɛ</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

This tableau crucially illustrates that the floating tone (which is proposed to be present underlyingly in the noun roots in (10)) aligns to the right edge of a noun stem in the plural form. As shown in the fully faithful candidate (11a), the floating tone is banned from remaining floating because of the *FLOAT constraint. Though the winning candidate (12b) violates DEP(T) and the low-ranked IDENT(Tone) constraint, other contenders, such as ones which dock the tone to a TBU which already carried a tone would be dispreferred by the high-ranked SPECIFY T (discussed above, though not included in this tableau). Thus, candidate (12b) is optimal because the floating tone aligns to the right edge of the word and attaches to the underlying toneless plural suffix.

Also, it is necessary for this analysis to state that the OCP is inactive in the language. This is due to the fact that a floating tone docking to a toneless syllable in the plural should be blocked if it creates two tones of the same quality (McCarthy, 1986). In this proposal, this is allowed to occur, as shown in the winning candidate above. This provides further evidence that tone polarity is the source of contrasts in the plural forms, not dissimilation driven by the OCP.

4.5 Ranking

The newly introduced constraints, *FLOAT and ALIGN-R, cannot be ranked relative to each other, though through arguments of transitivity, they both must be ranked below POLAR.

\[
\text{POLAR} \gg \text{DEP(T), *FLOAT, ALIGN-R, ID(T)}
\]

4.6 Summary

The citation forms of the nouns shown in (9) are proposed to have a floating tone at their right edge, as shown in their proposed underlying forms in (10). The final mora of each noun root is suggested to be underlyingly toneless. The floating tone aligns right and docks left in both singular and plural forms. The underlyingly toneless TBU on the root-final mora in the

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\(^{10}\) The floating tone is indicated with a subscript \(\{F\}\) in input and output forms.
plural stem receives its tone through polarity. Though this solution invokes an abstract solution by positing the existence of floating tones, it still fits the definition of tone polarity because a TBU is underspecified until it receives a polar tone, and polarity only occurs at morpheme boundaries. The analysis is favorable to others since both types of nouns receive the same ranking of constraints whether in the plural or singular form.

5.0 Conclusion

Bangime has (at least) two different types of underlying tonal patterns among nouns. In the first type, all tones are underlyingly linked to their respective TBU’s. The singular forms do not change when the plural suffix –nde is attached. The plural suffix receives a polar tone; that which is opposite in value to its host root. In the second type, in addition to underlyingly linked tones on all but the root-final mora, there is a floating tone which only attaches to an underlyingly toneless TBU. The root-final mora is underlyingly toneless and thus receives its tone by the docking of the floating tone in the singular form or by tone-polarity in the plural form. The plural suffix is underlyingly toneless in all forms. Thus, this language provides two data sets with evidence in favor of the phenomenon known as ‘tone polarity’.

Though a lengthy discussion of the marked features found in Bangime tonology is beyond the scope of this study, it is worth mentioning that the very fact that Bangime seems to be a ‘quantity-insensitive tone language’ (Goldsmith, 1990: 167), is highly unusual according to Zhang’s (2001) survey of 187 languages with contour tones. It also falls at the bottom of Yip’s (2002: 27-30) markedness ranking of contours, in that rising contours are more marked than falling ones, and according to both these authors, contour tones are far more likely to occur at the right than the left edge of the word. Cahill (2007) notes the tendency of languages with floating tones to dock rightward, though in Bangime, it is proposed that they dock leftward; these two inconsistencies cross-linguistically are in line with the proposed directionality of association in the language as being from right to left, also a marked process cross-linguistically since tone tends to be perservative rather than anticipatory (Hyman, 2007, 2008).

Firm evidence needs to be provided in order to make the claim that such marked processes outlined above are indeed driving tone in Bangime nouns. There seems to be no reason to predict the distribution of floating tones based on semantic or synchronic reasons in the language, though it is possible that the floating tones do contribute morphological content to nouns, such as a nominalizer, however this requires further investigation. Other constituents of the noun phrase impact the tone of a noun root so the interaction among the floating tones and morpho-syntactic tones also necessitates further investigation.

References


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