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The Annual Proceedings of the Berkeley Linguistics Society is published online via eLanguage, the Linguistic Society of America's digital publishing platform.
Tone Metathesis in the Dangme Imperative

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0. Introduction

Metathesis is a well-attested process, although perhaps more so in diachronic than in synchronic analysis. In the synchronic realm, it is more commonly found as a purely morphophonemic phenomenon than as a device that signals some grammatical category or function. In terms of form, the most familiar type of metathesis is, of course, transposition of segments, although transposition of syllables and other phonological units is also found. This paper presents a case of metathesis which is in a sense triply rare: it is synchronic, it participates in the marking of a grammatical category, and it operates on tones rather than on segments.

Our data come from Dangme, a Kwa language spoken in Ghana, and involve the formation of the imperative. In Dangme, the imperative verb may take one of several different forms, depending upon the tone of the stem, as well as upon the environment in which the stem occurs. The various possibilities are illustrated in (1-3):

(1) (a) lá 'Sing!' H lá
(b) ko lá 'Don’t sing!' MH
(c) kpalé lá 'Sing again!' MHH
(2) (a) yé 'Eat!' H ye
(b) kó ye 'Don’t eat!' HM
(c) kpalé ye 'Eat again!' MHM
(3) (a) doó 'Dance!' MH dò
(b) kó dò 'Don’t dance!' HL
(c) kpalé dò 'Dance again!' MHL

This paper gives a unified account of the surface tone patterns observed in these data. Following Kropp Dakubu (1987:25-27), we assume that the Potential marker, a floating H tone which immediately precedes the verb stem, is present in such examples. For M and L tone stems, this H tone associates leftwards when there is segmental material preceding the verb, as in the (b) and (c) forms of examples (2) and (3) above. However, when the verb stem is utterance-initial (as in the (a) forms of (2) and (3)), we argue that this floating H undergoes a rule of tone metathesis (in conjunction with other rules). The picture is somewhat more complicated for H tone stems, but we argue that the same rule of tone metathesis can be appealed to in the
utterance-initial cases. This formulation allows for an elegant account of the forms of the Dangme imperative, and provides evidence that transposition of tones must be included in any inventory of metathesis types.

1. The Potential Marker

Dangme makes use of a Potential aspect marker which has only tonal features specified. This floating H tone is positioned before the main verb of the clause, and appears in a wide range of constructions, such as futures, certain modalities, and hortatives. These are illustrated in (4-6), below:6

(4)  na má nā lē
   nā ma nā lē
   Na FUT POT see 3SG
   'Na will see it'
(5)  e-sa né é-dō
   e- sa né e- dō
   3SG-be+good that 3SG-POT dance
   'He ought to dance'
(6)  wá-dō
   wa- dō
   1PL-POT dance
   'Let’s dance'

In each case, the floating H tone of the potential marker appears before the verb stem. It is linked to the syllable preceding the verb by a rule of H Tone Linking, as shown in (7):

(7) H Tone Linking

   V
   \f
   T H

Examples (4-6) illustrate the behavior of M tone syllables preceding a floating H. The behavior of a H tone syllable preceding a floating H has already been illustrated in the (c) examples of (1-3) (where \textit{kpalē} ‘return’ is underlyingly MH). When the syllable before the Potential marker is L, however, the outcome is somewhat different. Rule (7), H Tone Linking, does not apply, but instead the vowel lengthens, and the H tone is linked to the new V slot. (8) provides an example of this in the optative construction, and the rule of Vowel Lengthening is given in (9).
(8) naá nā lè
    nā ʼ nā lè
Na POT see 3SG
'May Na see it'

(9) Vowel Lengthening
  V   V   V
 |   -->   |
L H   L H

Note, in addition, that the surface tone melody of such lengthened syllables is MH, rather than the expected LH. This is the result of a regular rule of tone assimilation, which raises L to M before either a M or a H. In order to account for this assimilation, we adopt here the model of tone found in, for example, Hyman and Pulleyblank (1988), in which the features [upper] and [raised] attach to a tonal node. The assimilation rule is shown in (10), and (11) illustrates the operation of rules (9) and (10) in the derivation of (8).

(10) Tone Assimilation
    o   o
    \-\-\-
    \[-]\ [+u]

(11) naá nā lè 'May Na see it'
    UR       na       nā      le
    |       |       |       |       |       |       |
    L       H       L       L

Vowel   naa       nā      le
Length   |  \   |       |       |
(and assoc) L   H     L     L

Assim    naa       nā      le
         |  \   |       |       |
         M   H   L     L

Having examined the behavior of the Potential marker in the constructions of (4-6) and (8), we turn now to its behavior in the imperative. This will be done in two stages: first, we will discuss formation of the imperative with M and L tone verbs, and second, we will discuss formation of the imperative with H tone verbs, a task which presents considerably more problems.
2. The Imperative of L and M Tone Verb Stems

Examples (12) and (13) show that these imperatives behave exactly like the examples of the last section, as long as there is some segmental material preceding the floating H tone of the Potential marker:

(12)  
(a)  
\[
\begin{array}{c}
\text{kó ye} \\
\text{ko} \\
\text{NEG POT} \\
\text{eat}
\end{array}
\]

'sDon't eat!'

(b)  
\[
\begin{array}{c}
kpalé ye \\
kpalé \\
\text{return POT} \\
\text{eat}
\end{array}
\]

'Eat again!'

(13)  
(a)  
\[
\begin{array}{c}
\text{kó dò} \\
\text{ko} \\
\text{NEG POT} \\
\text{dance}
\end{array}
\]

'Don't dance!'

(b)  
\[
\begin{array}{c}
kpalé dò \\
kpalé \\
\text{return POT} \\
\text{dance}
\end{array}
\]

'Dance again!'

In each of these examples, the floating H tone is linked to the preceding syllable by application of rule (7). The main verb retains its underlying tone in all cases.

When the imperative form of L and M tone verb stems is utterance-initial, however, we find significant differences from the data just presented. This is illustrated in (14) and (15):

(14)  
\[
\begin{array}{c}
yé \\
\text{'Eat!'}
\end{array}
\]

'stem: ye'

(15)  
\[
\begin{array}{c}
dóó \\
\text{'Dance!'}
\end{array}
\]

'stem: dò'

A first hypothesis about example (14) might be that the potential marker links to the right when there is no segmental material to the left. However, there are two arguments against such an analysis. First, we have already demonstrated that Dangme has leftward linking of floating tones. This hypothesis would force us to posit an additional rule of rightward linking. All other things being equal, an analysis with linking in only one direction is preferable. A second, and conclusive argument against adding a rule of rightward linking is that this would entirely fail to account for the surface form of utterance-initial L tone verb stems, as in (15).
Note that the behavior of forms like (15) is reminiscent of the behavior of a L tone syllable preceding a floating H tone (as in (8)), in which we found vowel lengthening and surface MH tone. However, in the utterance-initial imperative forms, the floating H precedes the L tone syllable, rather than follows. In order to account for this, we propose that the floating tone undergoes a rule of Floating H Metathesis when there is no segmental material preceding it. Such a stem then undergoes the regular rules of Vowel Lengthening (9) and Tone Assimilation (10). The rule of Floating H Metathesis is given in (16).\(^{10}\)

(16) Floating H Metathesis  
\[
\begin{array}{c}
\text{H} \\
\text{T}
\end{array}
\]

(\text{where } [ \text{ represents the utterance boundary})

Rules (7), (9), (10), and (16), then, provide us with an account of the behavior of utterance-initial L and M tone imperatives in Dangme. The functioning of these rules in the derivation of (14) and (15) is illustrated in (17):\(^{11}\)

(17) stem: ye 'eat' \hspace{1cm} stem: do 'dance'  
\text{UR} \hspace{1cm} \text{do}  
\begin{array}{c}
\text{ye} \\
\text{H} \\
\text{M}
\end{array} \hspace{1cm} \begin{array}{c}
\text{do} \\
\text{H} \\
\text{L}
\end{array}

\text{H Metathesis} \hspace{1cm} \text{do}  
\begin{array}{c}
\text{ye} \\
\text{M} \\
\text{H}
\end{array} \hspace{1cm} \begin{array}{c}
\text{do} \\
\text{L} \\
\text{H}
\end{array}

\text{Vowel} \hspace{1cm} \text{doo}  
\text{Length} \hspace{1cm} \text{doo}  
\text{(and assoc)} \hspace{1cm} \text{doo}  
\begin{array}{c}
\text{n/a} \\
\text{L} \\
\text{H}
\end{array} \hspace{1cm} \begin{array}{c}
\text{n/a} \\
\text{MH}
\end{array}

\text{Assim} \hspace{1cm} \text{doo}  
\begin{array}{c}
\text{n/a} \\
\text{\textbackslash} \\
\text{MH}
\end{array}

\text{H Tone} \hspace{1cm} \text{n/a}  
\text{Link} \hspace{1cm} \text{n/a}  
\begin{array}{c}
\text{ye} \\
\text{\textbackslash} \\
\text{M} \\
\text{H}
\end{array} \hspace{1cm} \begin{array}{c}
\text{\textit{Yé 'Eat!'}} \\
\text{\textit{Doó 'Dance!'}}
\end{array}
Up to this point, we have restricted our discussion to monosyllabic verb stems. We turn now to disyllabic verb stems, still restricting ourselves to those with M and L tones:

(18) čikə̆
    'Smoke (e.g. meat)'
    stem: čikə̆

(19) bəlé̆e
    'Surround!'
    stem: bəlé̆

These forms are in fact consistent with the data presented above. Since the rule of Floating H Metathesis (16) is written with reference only to the tones and the single tonal node involved, it will apply whether one or more than one tone bearing unit is linked to that tonal node. (20), then, illustrates the derivation of the forms in (18) and (19):

(20) stem: čikə̆ 'smoke'    stem: bəlé̆ 'surround'
    UR
    \ /
    H M
    Baye
    \ /
    H L

    H Meta-
    thesis
    \ /
    M H
    Baye
    \ /
    L H

    Vowel n/a bəlé̆e
    Length \ /
    (and assoc) L H

    Assim. n/a bəlé̆e
    \ /
    M H

    H Tone čikə̆ n/a
    Link. \ /
    M H

čikə̆ 'Smoke!'    bəlé̆e 'Surround!'

Finally, consider (21) and (22), which might be taken to be counterexamples to our analysis, on the grounds that they show no evidence of Floating H Metathesis:

(21) sáke
    'Pluck!'
    stem: sáke

(22)
This behavior, however, is actually predicted by our analysis, because a stem with two distinct tones (i.e. two tonal autosegments) will not meet the conditions for the rule (since rule (16) only allows for metathesis of the floating H around a single tonal autosegment). The Potential marker, therefore, does not undergo metathesis, and is simply not realized in this situation, resulting in an imperative form whose tones are identical to those of the stem form.

There is one revision we must make to (16), however, in the light of these data. This is to insert a word boundary at the right margin of the rule. This revision prevents it from moving the floating H into a position within a stem between two distinct tones. The revised rule is presented in (23):

(23) Floating H Metathesis (revised)

\[
\begin{array}{c}
\text{H} \\
\text{T}
\end{array}
\]

3. The Imperative of H Tone Verb Stems

We turn now to the imperative form of verb stems with underlying H tone. While these forms introduce considerable complication into an analysis of the Dangme imperative, they do not affect our central claim that a rule of Tone Metathesis is one of the processes involved.

Consider first the utterance-initial imperative in (24):

(24) lá 'Sing!' stem: lá

For examples such as this, we can simply say that Floating H Metathesis operates vacuously -- that is, that the floating H tone is transposed and linked to the stem, but that its effects are invisible due to the fact that the stem is already H.

However, non-utterance-initial imperatives, as in (25), do not show the expected behavior with respect to linking of the floating tone:

(25) ko lá stem: lá
    ko lá
    NEG POT sing
    'Don’t sing!'
Here, apparently, the floating H tone does not link to the left, but is instead deleted. A first approximation of a rule of Floating H Deletion appears in (26):

(26) Floating H Deletion
\[
\begin{array}{c|c|}
    & \circ & \\
    \hline
    0 & 0 & \\
    T & H & H \\
\end{array}
\]

However, this rule is too general, in that it predicts that the Potential marker will always delete before a H tone verb stem. That this is not true is illustrated by examples (27) and (28):

(27) e-sa ně́ é-lá
    e- sa      ně́ e-    lá
    3SG-be+good that 3SG- POT sing
    'He ought to sing'
(28) e-sa ně́ ó-bá lá
    e- sa      ně́ o- ba    lá
    3SG-be+good that 2SG-come POT sing
    'You (sg) ought to come sing'

In fact, we have found that there are only three morphemes which cause the floating H of the Potential to be deleted: the Negative marker ko, and the first person plural and second person plural pronouns wa- and ŋe-.¹⁴ The behavior of the latter two is illustrated in (29) and (30):

(29) e-sa ně́ wa-lá
    e- sa      ně́ wa-    lá
    3SG-be+good that 1PL- POT sing
    'We ought to sing'
(30) e-sa ně́ ŋe-lá
    e- sa      ně́ ŋe-    lá
    3SG-be+good that 2PL- POT sing
    'You (pl) ought to sing'

Furthermore, this deletion of the floating H occurs only when the main verb bears H tone. (31) and (32) illustrate the operation of regular leftward linking of the floating H to these pronouns when the verb stem is M or L, rather than H:
(31) e-sa né wá-kpe
e- sa né wa- kpe
3SG-be+good that 1PL- POT sew
'We ought to sew'

(32) e-sa né fê-dô
e-sa né fê- dô
3SG-be+good that 2PL- POT dance
'You (pl) ought to dance'

At this point, we see no way to predict the loss of the Potential marker in these forms, and will tentatively write it off to lexical idiosyncracy. Rule (26) can be generalized a bit, as shown in (33), but will only be triggered by this small set of morphemes.

(33) Floating H Deletion (revised)

\[
\begin{array}{c}
\text{o} \\
\text{M} \\
\text{\textbullet H} \\
\text{\textbullet H} \\
\emptyset \\
\end{array}
\]

Finally, note that (as expected) disyllabic stems behave in the same way that monosyllabic stems do; (34) illustrates the vacuous application of Floating H Metathesis, and (35) illustrates Floating H Deletion:

(34) jâlé

stem: jâlé

'Rinse!'

(35) ko jâlé

ko jâlé

NEG POT rinse

'Don’t rinse!'

This section has shown, then, that there are certain problems with the formation of the imperative of H tone stems; specifically, that instead of linking leftwards, the Potential marker is deleted when it appears after certain morphemes and before such a stem. Satisfactory resolution of these problems is beyond the scope of the present paper. The data do not contradict our claim, however, that the rule of Floating H Metathesis is operative in the formation of the imperative when the verb stem is in utterance-initial position, even when that stem has underlying H tone.
4. Conclusion

Formation of the imperative in Dangme involves placement of a floating H tone marking Potential aspect in a position immediately before the verb stem. When the stem bears M or L tone, this H tone is linked leftward to the preceding syllable if one is available. When the stem bears H tone, there is some irregularity in leftward linking of the floating H. When there is no preceding syllable for the H tone to link to, however, we have shown that a rule of Floating H Metathesis moves the floating tone to the right of the stem (no matter what tone that stem bears), thus allowing normal leftward linking. In the case of L tone verb stems, this rule must operate in conjunction with a small number of other rules, which are independently motivated by cases not involving Floating H Metathesis.

Floating H Metathesis also operates in disyllabic verb stems in which the two syllables have identical tones, but it fails to operate in disyllabic stems in which the syllables have two different tones. This falls out naturally from an autosegmental account, which requires that in the former case there be only one tonal autosegment associated with the two tone bearing units, but that in the latter case there be two. That is, autosegmental representation makes it possible to include disyllabic stems whose syllables have identical tones under our statement of the rule of Floating H Metathesis, and to exclude disyllabic stems whose syllables have two different tones, which is precisely what is needed to account for the data. A linear approach would require recourse to ad hoc stipulations in order to account for these facts, whereas their behavior is not only accounted for, but is predicted by a non-linear approach.

Finally, we would like to point out that the formation of the Dangme imperative provides an example of the relatively rare use of metathesis as a regular process that participates in expression of a grammatical category, as opposed to its rather more common function as an often irregular diachronic process by which historical change is effected. This case is all the more interesting in that the elements which are transposed are tones -- tone metathesis being another relatively rare phenomenon. This fact argues for the position that metathesis is a process which is not restricted solely to segments, but that it is instead a more general process with the ability to transpose various types of elements, including something as seemingly unlikely as tonal nodes.

Notes

1. Our thanks go to John Teye, a native speaker of Dangme currently residing in the United States, for his help in supplying the data used in this paper. In addition, we would also like to thank Claudia Brugman, Kathleen Hubbard, Mary Niepokuj, Joe Salmons, Ronnie Wilbur, and members of the Purdue
Linguistics Group for commenting on previous versions. All errors are of course our own.


4. Goldsmith (1990:25) presents a tone metathesis rule for San Miguel El Grande Mixtec, and Maddieson (1978:352) mentions a few such cases as well (his term is "tonal displacement"). In addition, we have found mention of similar phenomena in at least a few other sources (e.g. for N'kina by Wilkendorf (1988), and for Igbo by Clark (1978)).

5. Maddieson (1978:352) notes that "tone displacement rules generally refer to location of isolated high tones," and ascribes this to the tendency for H to be the marked tone in most tone systems.

6. Abbreviations which are used in the paper are: 1,2,3 = First, second, third person, FUT = Future tense, NEG = Negative, PL = Plural, POT = Potential, SG = Singular.

   Also note that example (4), as well as (8) and (12), illustrate a tone assimilation rule in which a L between a H and another L becomes M. Since this is tangential to our topic, we will just assume its operation where necessary.

7. (i) illustrates this model:

   | X X X X |
   | 0 0 0 0 |
   | / \ / |
   [+u] [+u] [-r] [-r]

   (H) (M) (LM) (L)

   Note that in such a system either the tonal node or one of the features can undergo spreading. Rule (7) is a rule of the former type, in which the tonal node links to the left. Rule (10), the tone assimilation rule, is of the latter type; that is, it is one in which a feature spreads to the left.

8. While Dangme has a surface three tone system, data from the formation of the negative indicate that there are actually four underlying tones. The M
and LM of (i), above, are each phonetically realized as mid tone, but show
different behavior with respect to negative formation (for details see
Macaulay (in preparation)).

As stated in the text, Tone Assimilation operates to raise L to M
before a M as well as before a H; note that our rule predicts that it would
only do so before a M with the features [+u], [-r]. Whether it also operates
before the other M ([u], [+r]) is something we have yet to investigate; if it
does, the formalization of this rule will have to be changed. We leave this a
topic for future research.

9. It has been suggested to us that a simpler way to look at this would be to
assume that a M tone stem such as ye is completely unspecified for tonal
features, and that the process observed here is not linking to the right, but
rather simple association of a floating tone to a toneless syllable. However,
as Macaulay (in preparation) shows, only some M tone stems are of the
unspecified type, while others must be fully specified (that is, the "LM" of
example (i) above). Thus for approximately half of the M tone cases, this
solution would not work.

10. Ultan (1978:372) distinguishes between simple metathesis, which is the
transposition of one element around another (or others), and reciprocal
metathesis, which is the exchange in position of two elements. Our rule of
Floating H Metathesis is of the former type.

11. Note that Vowel Lengthening must be ordered before High Tone Linking
in order to prevent the latter from applying to the L tone form.

12. Following Clements (1981:74-75), we will assume that a surface
representation containing a floating tone is well-formed, and that such
unassociated tones are not phonetically realized.

13. We have considered various ways to handle this problem, including
allowing a floating H be moved into such a position, but then having it delete
by a rule of Floating H Deletion (to be introduced in the next section). The
solution in (23), however, seems best able to capture our sense that Floating
H Metathesis respects the word boundary, and therefore cannot infix a
floating H between two distinct tones.

14. Kropp Dakubu (1987:61) remarks that "the potential marker is ... not
usually expressed if the verb begins with High tone." She points out cases
with the first person plural pronoun wa-, but does not mention ñe-.
Furthermore, her data concerning the tone of ko before H tone verb stems
(1987:57) differs from ours, presumably because she is describing a different
dialect (Ada).
15. Note that the fact that the three morphemes in question all have CV shape, while the 3SG prefix is simply V, is not the relevant factor: as shown in (28), the ingressive marker ha ("come") is CV, but it does not block linking of the Potential marker.

References


