Globalization
and the Future of African Languages

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Tonal Complexes & a Lokaa Conspiracy

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Introduction

Of interest to the present discourse are two phenomena in Lokaa [lòkóó] tonal phonology, H tone Insertion and Blocking in Lokaa verbs, and Tonal metathesis in Lokaa associative constructions, questions, and relative clauses. In Lokaa, an Upper Cross language of Nigeria (Farasclas 1988), verbs must have at least one high tone in isolation. A verb which has no underlying H tone must have one inserted. However, if there is a High tone clitic or prefix preceding the verb, H tone insertion is blocked. Secondly, a noun (plus clitic) cannot have two high tones separated by an L tone (i.e. HLH); such a sequence metathesizes to create a HHL sequence.

First, the study shows that a traditional autosegmental analysis is not capable of accounting for these phenomena without making additional wrong predictions. It also argues that these phenomena are symptomatic of higher-level organization of tones, called tonal complexes (Akinlabi and Liberman 2001a, b). Tonal ephenthesis in verbs or its blocking, and tonal metathesis take place to satisfy word level requirements of forming tonal complexes. In both processes, H tone blocking and tonal metathesis, there is a conspiracy to avoid an HLH tone sequence within a domain. This conspiracy is accounted for if it is assumed that what is being avoided is having two tonal complexes in one domain. The domain of a tonal complex in Lokaa is a verb (plus a preceding clitic), or a noun (plus a preceding clitic). Again, it is assumed that each of these constitutes a prosodic word.

What are Tonal Complexes?

Tonal complexes are structured combinations of tones that are analogous to the structured combinations of segments in moras, syllables and feet (Akinlabi & Liberman 2001a,b). Tonal complexes are "bound states" of (two or more) unlike tones, such as [HL] or [LH], and they have a role in organizing tonal features somewhat analogous to that of moras and syllables in organizing segmental features.

Using the syllable analogy above, the following comparisons can be made:

(a) Tone contour formation is like re-syllabification, in which a coda consonant becomes an onset for a following syllable.
(b) Tone polarization and polarized tone ephenthesis are like the ephenthesis of vowels and consonants in rescuing forbidden or marked syllable structures. And the phonetic dissimulation of tone sequences is like the different phonetic interpretation of high vowels or nasals in onset versus rhyme positions in syllables.
(c) H tone insertion is like the insertion of vowels to allow unsyllabifiable consonants to be syllabified.
(d) Tonal metathesis is like the metathesis of segments dictated by syllabic well-formed considerations.

Therefore, constraints mentioning such tonal structures can motivate deletion, ephenthesis, spreading or re-ordering of tonal features, just as constraints on syllable or foot structure may motivate such processes in well-known cases of segmental phonology.

Specifically, what is proposed here is a tonal unit consisting of paired HL or LH tones. Similarly, it is argued that such units, long postulated as underlying elements in accentual systems, also play a crucial role in tonal phonology more generally.¹

¹ We would like to thank the organizers of the 24th West African Languages Congress, especially Professors Ben Elugbe and Francis Egbohke for inviting Akinlabi to give a plenary talk. We would also like to thank Professor Alex Iwaro without whose help this paper would not have been written. Finally, we would like to thank the participants at the Rutgers Optimality Research Group, especially Professors Paul Delacy, Jane Grimshaw, Alan Prince, and Bruce Tesar for comments on an earlier version of the proposals made here. In the talk presented at 24th WALC, we discussed the facts of Lokaa and Tem. In this paper, we will restrict our comments to the facts of Lokaa, for reasons of space and time. The proposals discussed here constitute part of an ongoing project.

² Similar ideas can be found in Bamba (1991), Manfredi (1995), Leben (2002) and elsewhere.

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The Form of a Tonal Complex

A tonal complex has a maximal form (L (H L)). This can be seen as roughly like a CVC syllable, with the High tone playing the part of the vowel in most cases. As in the syllabic case, the permitted partial forms must include the core High tone, so that apart from (LHL) the expected variants are (H L), (L H) and (H). As in the case of syllabic sequences, there may be further restrictions, for example forbidding word-internal clusters of Low tones.

(1) Maximal form of a tonal complex: (L (H L))
(2) Other variants: (a) (H L) (b) (L H) (c) (H)

One crucial difference between syllables and tonal complexes is that unlike syllables the domain of a tonal complex may vary from a single tone-bearing unit to a phrase. This variation is language dependent.

It is suggested that the true form of a tonal complex may actually be something like (3) (I is “initial tone” and A is “accent”):

```
   T   C
 /\   /
 I   A
 /\   /
 w   w
 T1  T2  T3
```

In the default case, a tonal complex is binary branching with the positions I and A as seen above. The stronger position is the head. If there is a single tone it occupies the head (or strong) position, with the other position left vacant, or filled by “spreading” or “epenthesis”, depending on the constraint hierarchy of the language. This immediately brings up the question of whether a Low tone can occupy the position of a head. In the unmarked case the head is occupied by a High tone, but a Low tone may occupy the head position (just like a consonant can be syllabic), especially if it is the only tone within the domain and if the constraint hierarchy of the language does not allow tone insertion or some other process to supply a High tone. For example, isolation forms of Lokaa nouns can have all Low tones. In such contexts the Low tones form a tonal complex by themselves.

Finally, Akinlabi and Liberman (2001a) propose the following informal well-formed constraints for the association of tones and tonal complexes.

(a) Association lines cannot cross (and cannot skip either).
(b) Do not delete underlying association lines.
(c) Every tone must be associated with some tonal complex.
(d) Every tonal complex must be associated with some tone-bearing unit.
(e) Every strong position in a tonal complex must be associated with some tone.
(f) Every weak position in a tonal complex must be associated with some tone.
(g) Don’t add association lines.
(h) Every tone-bearing unit must be associated with some tonal complex.

The above constraints are not meant to be exhaustive; we employ a few others in the discussion of Lokaa below. In the next several sections, we describe the facts of Lokaa tone, and then show how some of the ideas sketched above can help explain these facts.

Tonal Contrast

For the purpose of this study an introduction to tonal contrast in Lokaa nouns is necessary. The description presented in section (3.1) draws heavily from Iwara, Akinlabi and Truckenbrodt (2003), to which the reader is referred for additional details.

Like many of the Benue-Congo languages, Lokaa operates a two-tone system, High and Low, as illustrated in the following nominal minimal pairs (Iwara 1982:55-60):

```
(4) a. étó ‘stick’       étó ‘road’
 b. Êtò ‘house’       Êtò ‘hyena’
 c. kèbé ‘impotence’  kèbè ‘squirrel’
 d. èkòó ‘advice’     èkòò ‘friendship’
```

Tone Insertion in Verb stems

The verbal system shows a simple underlying contrast between stems with H and stems with L tone. Disyllabic H-stems occur with H on both syllables, while disyllabic L-stems occur with a LH tonal pattern in the imperative and imperative.

\[(5)\]

<table>
<thead>
<tr>
<th>H-stems</th>
<th>L-stems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperative</td>
<td>yómé ‘measure’</td>
</tr>
<tr>
<td>and</td>
<td></td>
</tr>
<tr>
<td>Infinitive</td>
<td>tó (lòbó) ‘cry (crying)’</td>
</tr>
<tr>
<td></td>
<td>mà́ná (bóó) ‘hold (something)’</td>
</tr>
</tbody>
</table>

In general, while disyllabic nouns may carry L tone throughout as in the first three examples in the second column in (4), verbs cannot have all-L surface realizations. Following Iwara, et al. (2003), we analyze the final H in the L-tone class in (5) as a tone that is inserted so as to meet a demand on the presence of at least one H tone in verbs (6a). Its insertion on the right, rather than on the left, may be seen to allow left-alignment of the verbal stem with the underlying tone of the verb, represented as in (6b). The process can be represented informally as follows:

\[(6)\] a. Verbs have at least one H tone in isolation.

\[b. \quad \text{bá́ná} \rightarrow \quad \text{bá́ná} \quad | \quad | \quad L \quad H\]

The requirement that verbs have at least one H can also be seen with monosyllabic stems. These may be monomoraic (short), as in (7a), in which case they are always H. They may also be bimoraic (long), in which case they can be all-H (from /H/), as in (7b), or LH (from /L/), as in (7c). The latter two cases are comparable to the bisyllabic forms. The absence of monomoraic L-stems supports the contention that there is a ban on verbs with L tone only at work.

\[(7)\]

<table>
<thead>
<tr>
<th>a. monomoraic</th>
<th>b. bimoraic /H/</th>
<th>c. bimoraic /L/</th>
</tr>
</thead>
<tbody>
<tr>
<td>tá ‘shoot’</td>
<td>táá ‘investigate’</td>
<td>táá ‘win’</td>
</tr>
<tr>
<td>dó ‘clean up’</td>
<td>dódó ‘to be satisfied/full’</td>
<td>dódó ‘throw away’</td>
</tr>
<tr>
<td>wú ‘pin’</td>
<td>wúú ‘[river] be swollen’</td>
<td>wúú ‘steal’</td>
</tr>
</tbody>
</table>

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The understanding of the final H of LH verbs along the lines proposed in (6) receives further support when one level of complexity is added. The Aorist is marked with the agreement prefix [á-], ‘you’ in (8). As shown in (9a), the addition of this prefix to a H-stem leads to an all-H verb form, as expected. Of interest here is the addition of [á-] to L-stems as in (9b). The prefixal [á-] here surfaces as H, which motivates the assignment of an underlying H tone to this prefix in our analysis. Interestingly, the final H tone that was seen on the unprefixed L-stems in (5) and (7c) is not realized in (9b).

\[(8)\] Subject-agreement ‘you’: [á-]

\[(9)\] Aorist

a. H-stem

\[á-tó ‘you cried’ \quad \text{cf.: yóó (bóó) ‘weave’}\]
\[á-mán ‘you held’ \quad \text{cf.: bá́ná ‘place’}\]
\[á-táá ‘you shot’ \quad \text{cf.: táá ‘win’}\]
\[á-dó ‘you were full’ \quad \text{cf.: dóó ‘throw away’}\]

b. L-stem

\[á-tó ‘you walked’ \quad \text{cf.: yóó (bóó) ‘weave’}\]
\[á-mán ‘you placed’ \quad \text{cf.: bá́ná ‘place’}\]
\[á-táá ‘you won’ \quad \text{cf.: táá ‘win’}\]
\[á-dó ‘you threw away’ \text{cf.: dóó ‘throw away’}\]

Here the demand on H tones in verbs (6a) is satisfied by the prefixal [á-], so there is no need for the insertion of a final H. This lends support to the understanding of the final H in (5) as a default, as proposed in (6).

Further evidence that the inserted H tone is not necessary if there is already an H in the input comes from a class of nominalized verbs. These nominalized verbs are formed by reduplicating a verb stem, and prefixing [yóó/ýɔɔ] to this base, depending on the ATR quality of the stem vowel. The data in (10), from Iwara (1982:113), are monosyllabic verb stems, while those in (11) represent the bisyllabic verb stems.

The tonal generalizations from the nominalized verbs in (10) and (11) are the following. The nominalizing prefix has an underlying L-tone, since this tone is invariant regardless of the tone of the verb stem. The (prefixal) reduplicant must have a H tone (since this too is invariant) and the stem itself retains the input tone of the verb.

\[(10)\] Nominalized verbs

(a) H tone verbs

\[kpé \quad \text{yó-kpékpé ‘learn/learning, teaching’}\]

\[\]
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(13) Assumptions:
(a) The verb stem by itself or in combination with a preceding clitic or prefix forms a tonal domain.
(b) Within this domain, the maximal tonal pattern allowed is LHL (cf. Maximal tonal complex).
(c) Within this domain, there must be a HIGH tone.
(d) If a HIGH tone does not occur **underlyingly** then one is inserted.
(e) If one of the elements in this domain has a HIGH tone the insertion is blocked.

It is proposed that tones group into **tonal complexes** in Lokaa, and that in verbs the domain of a complex is V⁰, which comprises a verb in isolation, or a verb and a subject clitic, or basically a Prosodic Word (PrWd). The proposal that the tonal complex domain is a PrWd is supported by the fact that it is also the domain of vowel harmony, as the examples in (10) and (11) show. If tones are assumed to group into tonal complexes in this domain, the reason that we have H insertion is that what represents the nucleus of a complex, an H tone, is missing from L tone verbs in isolation, either in imperatives or in infinitives. Thus the H insertion is like the insertion of a vowel to license a stranded consonant so that it can be parsed into a syllable.

Furthermore, if a prefixed verb or a verb plus a preceding clitic must form one tonal complex domain, then the lack of insertion of the final H in these forms is explained. Such an insertion will create two tonal complexes instead of one. It is instructive to note that the gratuitous insertion of a final H tone into a structure with an H tone clitic (such as 9) will result in an HLH sequence, while the insertion of an H tone in the nominalized verbs in (10) and (11) will result in an LHLH sequence. Each of these structures must group into two tonal complexes, since there are two H tones separated by an L. HLH cannot constitute a single tonal complex, just as VCV cannot constitute a single syllable.

In addition to the constraints on tonal complex formation stated in section 2, an account of Lokaa verbal tone must include constraints requiring the following:

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(11) Disyllabic verbs (data from Ljaja Eno)
- kówá  yò - kókówá  ‘peel/peeling’
- tàlí  yò - tátàlí  ‘pull/pulling’
- páná  yò - pápáná  ‘touch/touching’

Note that the L tone monosyllabic verb stems in (10b) have rising tones in isolation, and their bisyllabic counterparts in (11) have LH in isolation. In the nominalized forms of the verbs, the final H in both monosyllabic and disyllabic verbs has disappeared. Notice that the disyllabic verbs prove that we cannot account for the absence of the final H with an assumption that there is nowhere for it to dock, since the final H in these cases do not create contours.

In a rule-based approach, the tonal characteristics of the verbs in isolation can easily be accounted for by a high tone insertion rule. In a constraint based approach such as the one assumed in this work, the HIGH tone can be accounted for with a constraint that requires at least a HIGH tone in verbs, as informally stated in (6a). But two questions arise from these tonal characteristics of verbs, which have no explanation in either approach:

(12) Unexplained issues in Lokaa Verb Tonology:
(a) Why should EVERY verb have at least one HIGH tone in isolation?
(b) Why is the high tone suddenly unnecessary just in case there is a clitic (9), or a prefix (10, 11) that has a HIGH tone?

Proposed Account of Lokaa Tone Insertion
The above questions are both easily explained with the following:
(14) Additional constraints:
(a) Underlying tones are left-aligned.
(b) Tonal complexes are headed.
(c) Heads must be H tones.
(d) There is only one tonal complex per domain.

These constraints, though informally stated here, are ranked high in Lokaa. Tone insertion in L verbs is compelled by the constraint requiring H heads in (14b,c), thereby forcing a violation of the constraint that forbids tone insertion (section 2). Tone insertion is blocked by the constraint limiting verbal domains to one tonal complex in (14d).

For the sake of completeness, let us consider an approach that does not assume tonal complexes. To handle the above data, such an approach will require a constraint forbidding a rising tone LH after a high tone, something like *H LH. This would be formally correct. But the question is: what will be the motivation behind such a constraint? Having an LH after an H creates an HLH sequence, or in the approach taken here, a tone sequence that must be parsed into TWO tonal complexes. If there can only be one tonal complex in a V, the ban is completely explained. More importantly, while the ban on LH works for monosyllabic verbs (because there is a contour), this approach is unable to explain why there is no H insertion in bisyllabic verbs (as in 11) where inserting an H does not create a rising tone (LH) after an H tone.

Tonal metathesis in Nouns
The second phenomenon, tonal metathesis, occurs in nouns. In this section, the facts of three constructions: associative constructions, questions and relative clauses are discussed. And the facts of associative constructions in detail are presented, using the other two constructions as additional evidence of the same process of metathesis.

Just as already noted above for verbs, a High tone prefix appears to cliticize with a following noun. But since nouns can have any type of tonal combination, and since underlying tones are in general not deleted in Lokaa, what we find is that LH nouns metathesize to become HL whenever there is an H tone clitic or prefix. The argument here is that in the three constructions, tonal metathesis occurs to allow the tonal sequence of a noun plus clitic to be parsed into a single tonal complex.

"Associative" Constructions
In Lokaa associative constructions, an associative marker occurs between Noun1 and Noun2. The associative marker is [C5]. The consonant varies depending on the noun class of the first noun referred to as N1. The vowel of the associative marker is invariably [a]. In the following examples, it is clear that the associative marker must have an underlying high tone. The underlying tonal structure of the preceding N1 is never altered; it is the tonal structure of N2 that is affected by the H-tone of the associative marker. Therefore the examples in (15-18) are arranged based on the tone of N2, with HH in (15), HL in (16), LL in (17) and LH in (18). Secondly, it does not matter what the underlying tone of N1 is, the effect of H tone of the associative marker on N2 is consistent regardless of the tone of N1. The crucial tonal fact that is the focus is that an XX + H + LH becomes XX + H + HL. That is, a potential HLH sequence is reversed to HHL.

(15) N2 as HH
(a) HH + HH
   [úkwa] → [úkwa wó éfém]
   canoe → crocodile's canoe
(b) LH + HH
   [létu] → [létu já éfém]
   head → crocodile's head
(c) HL + HH
   [ítóm] → [ítóm yó éplá]
   shrine → shrine of the market
(d) LL + HH
   [kóét] → [kóét kó éfém]
   leg → crocodile's leg

Summary: XX + H+ HH → HHH

(16) N2 as HL
(a) HH + HL
   [éplá] → [éplá yó kétóm]
   market → Lizard's market
(b) LH + HL
   [létu] → [létu já kétóm]
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(d) \[ \text{LL} + \text{LH} \rightarrow \text{HHL} \]

Summary: \[ \text{XX} + \text{H} + \text{LH} \rightarrow \text{HHL} \]

Overall Summary:
Apparently, the segmental nature of associative marker is determined by N1, but it criticizes with N2\(^2\), as revealed by its tonal interaction with N2. The summary of the tonal outputs in (15) – (18) is as follows.

(a) \[ \text{XX} + \text{H} + \text{HH} \rightarrow \text{HHH} \]
(b) \[ \text{XX} + \text{H} + \text{HL} \rightarrow \text{HHL} \]
(c) \[ \text{XX} + \text{H} + \text{LL} \rightarrow \text{H} \text{HL L} \text{ (Associative H Spreads)} \]
(d) \[ \text{XX} + \text{H} + \text{LL} \rightarrow \text{HHL} \text{ (Spreading and disassociation, or Metathesis?)} \]

Two Possible Analyses of LH initial Nouns
The focus here is on the LH N2 nouns in (18), since the others are relatively straightforward. There are at least two possible approaches to the surface forms of the LH nouns in (18); (a) tone spreading and disassociation and (b) tonal metathesis. First is to illustrate the proposals under each account and, second, to show that “tone spreading and disassociation” makes the wrong prediction when additional facts are considered. Finally, is to foreground a proposal on the presumption that tonal metathesis accounts for all the facts.

Spreading and disassociation (or deletion): This approach assumes that the H tone of the associative marker spreads to the first syllable of N2, displacing its tone, and which in turn, displaces the tone of the next syllable, and etc. The final H is not realized since there is nowhere for it to dock. That is, the predicted output is HHL \rightarrow \text{HL} (\#).

(19) Graphic representation of “Spreading and disassociation”; beginning with the associative H. The first mora is the associative H, and the next LH is N2 tone. (The circled H indicates that the tone is floating or unrealized.)

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\(^{2}\) Note that this is the opposite of what happens in Lokaal compounds. There the second noun selects the class marker of the compound, but the ATR harmonic value of the class marker is determined by the first noun. (See Akinlabi and Iwara 2004 for details.)
This view must be considered because as the examples in (17) show the H of the associative marker spread to the initial L of N2 in LL nouns, to produce H HL L. The main problem with this approach is that the final syllable of N2 is never realized as an LH contour; rather the final H disappears, as (19) shows.6

Metathesis: Under the second approach, tonal metathesis, the (initial) L1H of the second noun (N2) metathesizes to HL. That is, HLH → HHL. The graphic representation is given in (20).

(20) Graphic representation of “metathesis”:

\[ \mu \quad \mu \quad H \quad L \quad H \]

There is, in fact, evidence in support of metathesis as opposed to “spreading and disassociation”. “Spreading and disassociation” makes the wrong prediction on the tonal output of trisyllabic and longer nouns. As the forms in (21) show, LHL nouns in N2 position change to HLL. If “spreading and disassociation” were the way to go there is no reason why the supposed displaced H on the second syllable of an LHL noun cannot form a falling tone with the final L or displace the final L, but it never does.

(21) LHL → HLL

(a) [úkwá] [Intéµí] → [úkwá wò lù:temí] / canoe farm / farm’s canoe *[wó lù:temí]

Summary: XX +H+ LHL → HHL.

As the following graphic display in (23) shows, the predicted output of a “spreading and disassociation” approach to an input LHL noun in N2 position is HLL. But this is clearly the wrong output.

(22) Predicted wrong output from “spreading and disassociation” analysis:

\[ H + LHL \rightarrow *HHLH \]

(23) Graphic representation of the wrong output of “spreading and disassociation” (*HHLH):

\[ \mu \quad \mu \quad H \quad L \quad L \]

On the other hand, a metathesis approach makes the right prediction that the initial LH of the noun metathesizes to HL, as shown in the representation (25).

(24) Predicted correct output from metathesis:

\[ H + LHL \rightarrow HHL \]

(25) Graphic representation:

\[ \mu \quad \mu \quad H \quad L \quad L \]

It is safe, therefore, to conclude that metathesis accounts for the output tonal structure of all the nouns with initial LH. The tone reversal that we see in associative constructions is in fact not restricted to this construction alone. It appears that the avoidance of the tonal sequence HLH within a specific domain is a general fact of Lokaa nominal
constructions, and strategy of choice to avoid this sequence is tone reversal or tonal metathesis.

Questions and Relative Clauses
The same tonal change that we see above in the associative constructions is also true of nouns in relative clause constructions (26) (where there is an overt H toned “relator” (Iwara 1982) before the noun), and in questions in which a floating H tone must be postulated to occur before the noun in (27). As in the associative constructions, LH nouns become HLL, while LLL nouns become HL. Both HH and HL nouns remain unchanged.

(26) Relative Clauses (H toned CV “relator”)
(a) HH noun: éyõŋ
   \[yìsòwò fò éyõŋ ò:òfèi] \ The pot that Eyong bought’
(b) LL noun: úbi
   \[yìsòwò' fò úbì ò:òfèi] \ ‘The pot that Ubi bought’
(c) LL noun: yànmèn
   \[yìsòwò bò yànmèn bìmá yàdèi] \ ‘The pot that the people bought’
(d) LH nouns: ìsù and òbò:ì
   \[yìsòwò' fò ìsù ò:òl] \ ‘The pot that Isu bought’
   \[yìsòwò' fò òbò:ì ò:òfèi] \ ‘The pot that the chief bought’

(27) Questions (Floating H tone before noun)
(a) \[mìbòj ëyõŋ ò:ì] \ ‘What did Eyong buy?’ (HH éyõŋ)
(b) \[mìbòj úbì ò:òfèi] \ ‘What did Ubi buy?’ (HL úbì)
(c) \[mìbòj yànmèn yàdèi] \ ‘What did the people buy?’ (LL yànmèn)
(d) \[mìbòj ìsù ò:òfèi] \ ‘What did Isu buy?’ (LH ìsù)
   \[mìbòj òbò:ì ò:ì] \ ‘What did the chief buy?’ (LH òbò:ì)

Again, as it has been observed in the discussion of verbs, it is easy to formulate a rule or a constraint that calls for tonal metathesis in these nominal constructions. But the main question from all of the above data is why metathesize LH? The answer is that if left as it is, the output of the LH nouns will be HLH in combination with the preceding associative marker, and the output of the LHL nouns will be HLHL. Our explanation for metathesis is that the associative marker + noun, the relator + noun, or the floating H question marker + noun each constitutes a single tonal domain. Within this domain there is preference for forming a single tonal complex, if that is at all possible. The combination H + LH should form two complexes, because there are two H tones. Metathesis provides a better single HHL complex, where the initial HH are fused into one H by the Obligatory Contour Principle (OCP) (Leben 1973, Goldsmith 1976, McCarthy 1986, Yip 1988, Myers 1997, and others). An HL noun does not metathesize because the output forms a desirable HHL complex with the preceding H. LL nouns become HHL, which again, form a single complex.

If in the associative constructions the associative marker cannot be a tonal complex domain by itself and must join the N2 to form a domain, and if there is preference for having only one tonal complex in this domain, then no ad-hoc rules or constraints are necessary. The reversal of LH to HL ensures that there is only one tonal complex in the domain, except when this is impossible. It will be impossible if the noun already has two tonal complexes in the input to begin with (such as in the case of LHL nouns), or if the noun begins with more than two L tones in a sequence.

Informal Analysis
We have already noted above that metathesis is the repair method of choice to ensure that there is a single tonal complex in the prefix/elitic + noun constructions in Lokaa. Metathesis reverses the underlying linear order of segments (or tones in this case). Prince and Smolensky (1993/2004) propose that the faithfulness constraint that enforces the linear order of segments is LINEARITY. In addition to the constraints already proposed in (14), this is the only additional constraint necessary to bring the tonal sequence in line with the formation of an acceptable tonal complex. We give the relevant version of this constraint as in (28):

(28) **LINEARITY-T**: Preserve the underlying linear order of tones (i.e.
   Do not metathesize tones).

Linearity is obviously violated in the above nominal constructions. Two things force the violation of linearity. The first is the need to parse tones to tonal complexes. The second is the fact that the tones have to be parsed into a single tonal complex, within this domain.
Further Implications

So far we have argued that a higher level of tonal organization (called a tonal complex) has a role to play in explaining and predicting tonal conspiracies in Lokaa. These are H tone insertion in verbs, H tone blocking in verbs, and tonal metathesis in nouns. The last two conspire to avoid HLH sequences within specific domains in Lokaa. While there is no space here to discuss Lokaa’s tonal complexes in detail, we would like to draw attention to certain implications of the proposals made above.

First, in the unmarked case where each tonal complex has at least one high tone, we expect the tonal complexes of Lokaa to be drawn from the set listed in (1) and (2), repeated below for convenience:

(29) Maximal form of a tonal complex: (L (H L))
(30) Other variants: (a) (H L) (b) (L H) (c) (H)

If the OCP is taken into consideration, where each L or H in the four patterns represents “one or more” identical tones (LLL(HHILLLL)), the above largely represents the tonal complexes of Lokaa. In fact, all verbal constructions have at least one high tone, in line with (29) and (30).

In addition however, Lokaa has a marked tonal complex comprising of only L tone in nouns, as in [lě-kòõl] ‘neck’, [kɔtɛn] ‘roof’. There are two approaches to this. First, one can assume that L tones do not form tonal complexes by themselves and only form tonal complexes with preceding H tones in prefixes or clitics, as in some of the examples above. The other is to allow marked tonal complexes headed by L tones when other forms of repairs are disallowed. In these cases, L tones are like syllabic consonant. The preference here is to take the second position for three reasons. First, nouns like these are domains of tonal complexes by themselves, so it is suspect to regard some nouns as tonal complex domains and others not. Secondly, these nouns can be said in isolation with all low tones without additional prefixes. Finally, in a constraint-based framework the constraint on H tones heading tonal complexes should be assumed violable, as seen here.

The second implication of the treatment of the HLH conspiracy is that since such patterns are avoided in fuller domains (prefix/clitic + verb, prefix/clitic + noun), they will either be rare or completely absent from smaller domains. One is not aware of any counterexamples to this generalization in verbs. In nouns, Iwara (2004:145) confirms our prediction when he notes that “nouns of this structure [i.e. HLH, AA & MYL] are particularly rare in the language.” The only example of this structure that Iwara used throughout his paper is [È-sàâ -mà] ‘corn’, which appears to have two stems, and is breakable into two tonal complexes (HL)-(HL).

Conclusion

This study has shown that a conspiracy to avoid an HLH sequence results in two different processes, the blocking of H insertion in verbs and tonal metathesis in nouns. It argued that this conspiracy is symptomatic of higher-level organization of tones; called tonal complexes, and proposed that both processes result from a restriction to one tonal complex within a single domain consisting of a verb plus a clitic, or a noun plus a clitic.

References


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