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Authors
Harry, O
Hyman, LM

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Phrasal Construction Tonology

The case of Kalabari*

Otelemate Harry and Larry M. Hyman
University of the West Indies, Mona / University of California, Berkeley

Although it is common for “replacive” tonal patterns to be assigned by word-level morphological constructions, it is far less common for such overriding schemas to be assigned by specific phrase-level syntactic constructions. Kalabari, an Ijo language of Nigeria, does exactly this: Whenever the noun is preceded by a modifier, it loses its tones and receives different “melodies” depending on the constructional word class of the preceding specifier/modifier, either /HL/, /HLH/, /LH/, or /L/. In this paper, we first document the assignment of these different syntactic melodies and then provide evidence for how they developed diachronically. We then present a brief survey of other linguistic phenomena which partially resemble the Kalabari system, but conclude that tone is the only phrasal phonological property that can be assigned by construction from word to word.

Keywords: tone, constructions, phrasal phonology

1. Introduction

The purpose of this paper is to present an analysis of an unusual situation whereby phrasal tones are assigned by construction in Kalabari [káláɓàrì], an Ijo language spoken in Nigeria (Harry 2004).\(^1\) As seen in Table 1, Kalabari distinguishes H(igh) vs. L(ow) lexical tones which exhibit the following patterns on mono-, bi-, and trisyllabic words:\(^2\)

<table>
<thead>
<tr>
<th>Word</th>
<th>Tone Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>bárà́</td>
<td>H</td>
</tr>
<tr>
<td>bárà̀</td>
<td>L</td>
</tr>
<tr>
<td>bárà́</td>
<td>H↓</td>
</tr>
<tr>
<td>bárà̀</td>
<td>L↓</td>
</tr>
</tbody>
</table>

In addition to H and L, ↓ represents a “downstepped” H tone, which is lower in pitch than the preceding H, but higher than the pitch of a L tone, hence bárà́ [–] ‘hand’ vs. bélè [–] ‘light’. In what follows, we first present an unusual set of facts concerning the realization of these tones in different constructions and then present an account of how this situation arose diachronically. We then consider phenomena in other languages which are in part reminiscent, but not identical to the Kalabari system. We conclude that the assignment of phonological features by
construction is a unique property of tone, and thus of considerable typological significance both for phonology and for how syntactic constructions can be marked.

While the examples in Table 1 illustrate lexical tones, we note that it is common for tone to be assigned instead by word-level morphological constructions. For example, as seen in (1), when Kalabari verbs are detransitivized, a /LH/ “melody” replaces their lexical tones:

As the above examples illustrate, transitive verbs contrast a number of tone patterns which, when detransitivized, neutralize to monosyllabic LH, bisyllabic L-H, or trisyllabic L–L-H. The above is a classic case of what Welmers (1973:132–3) termed “replacive tone”: A morphological process assigns a tone pattern which overrides the input lexical tones of the base. One can also view the /LH/ intransitive melody as templatic, i.e. not unlike inflectional or derivational features assigning different CV structures, as in Arabic (McCarthy 1981).

Table 1. Tone patterns in Kalabari

<table>
<thead>
<tr>
<th>monosyllabic</th>
<th>bisyllabic</th>
<th>trisyllabic</th>
</tr>
</thead>
<tbody>
<tr>
<td>L sò 'go'</td>
<td>L–L mènì 'flesh'</td>
<td>L–L–L kpi kpirì 'blunt'</td>
</tr>
<tr>
<td>H só 'sky'</td>
<td>L–H dáwò 'learn'</td>
<td>L–L–H èrí sè 'storm'</td>
</tr>
<tr>
<td>H–H kúró 'fall'</td>
<td>L–L–L wón kírè 'now'</td>
<td></td>
</tr>
<tr>
<td>H–L ké lè 'light'</td>
<td>L–L–H kló lì 'lure'</td>
<td></td>
</tr>
<tr>
<td>H–h L–r L–H 'hand'</td>
<td>H–L–H akp ákpá 'shell'</td>
<td></td>
</tr>
<tr>
<td>H–H–h L–r má 'judge'</td>
<td>H–H–l–h L–r 'be judged'</td>
<td></td>
</tr>
<tr>
<td>H ‘sky’</td>
<td>L–H ‘learn’</td>
<td>L–L–h ‘be answered’</td>
</tr>
<tr>
<td>H–H–l–h ‘begin’</td>
<td>H–H–l–r ‘be answered’</td>
<td></td>
</tr>
<tr>
<td>H–L–r ‘hide, cover’</td>
<td>H–L–r ‘be hidden, covered’</td>
<td></td>
</tr>
<tr>
<td>H–L ‘light’</td>
<td>L–r ‘be mixed up’</td>
<td></td>
</tr>
<tr>
<td>H–L–r ‘be mixed up’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Far less common, however, is for such overriding schemas to be assigned by specific phrase-level syntactic constructions. Kalabari does exactly this: Within the noun phrase, the noun appears finally, potentially followed only by plural and definite markers or one of a few other isolated modifiers (see §4). Whenever the noun (N) is non-initial, it loses its tones and receives one of four different tonal “melodies” depending on the constructional word class of the preceding specifier/modifier. Thus compare the different realizations of the underlying /H-H/ tone pattern of /námá/ ‘meat’:

(2)

<table>
<thead>
<tr>
<th>construction</th>
<th>phrasal tones</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. N + N</td>
<td>HL</td>
<td>töɓɔ̀ námà</td>
</tr>
<tr>
<td></td>
<td></td>
<td>child meat</td>
</tr>
<tr>
<td>b. PossPro + N</td>
<td>HLH (→ H-^H)</td>
<td>iná ná^má</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3pl meat</td>
</tr>
<tr>
<td>c. Determiner + N</td>
<td>LH</td>
<td>tɔ námà</td>
</tr>
<tr>
<td></td>
<td></td>
<td>which meat</td>
</tr>
<tr>
<td>d. Quantifier + N</td>
<td>L</td>
<td>jà námà</td>
</tr>
<tr>
<td></td>
<td></td>
<td>some meat</td>
</tr>
</tbody>
</table>

As seen in (2a), a nominal possessor assigns a /HL/ melody to the possessed noun, while a pronominal possessor assigns a /HLH/ melody, realized as H-^H (H followed by downstepped H) on the last two syllables in (2b). In (2c) a /LH/ melody is assigned by determiners such as the interrogative tɔ ‘which’, while (2d) shows that a /L/ melody will be assigned by quantifiers (including numerals). The following shows that the five tonal patterns found on bisyllabic nouns neutralize and receive the indicated construction-specific tones (‘garri’ is a West African food made with cassava):

(3)

<table>
<thead>
<tr>
<th>‘the child’s’ (HL)</th>
<th>‘their’ (HLH)</th>
<th>‘which’ (LH)</th>
<th>‘some’ (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. námá ‘meat’</td>
<td>töɓɔ̀ námà</td>
<td>iná ná^má</td>
<td>tɔ námà</td>
</tr>
<tr>
<td>b. pùlò ‘oil’</td>
<td>töɓɔ̀ pûlò</td>
<td>iná pù^lò</td>
<td>tɔ pûlò</td>
</tr>
<tr>
<td>c. bélè ‘light’</td>
<td>töɓɔ̀ bélè</td>
<td>iná bê^lè</td>
<td>tɔ bélè</td>
</tr>
<tr>
<td>d. gàrì ‘garri’</td>
<td>töɓɔ̀ gàrì</td>
<td>iná gà^rì</td>
<td>tɔ gàrì</td>
</tr>
<tr>
<td>e. bà^râ ‘hand’</td>
<td>töɓɔ̀ bàrà</td>
<td>iná bà^râ</td>
<td>tɔ bàrà</td>
</tr>
</tbody>
</table>

Such data raise two types of questions. First, how should the constructional tones be analyzed synchronically? That is, how are they assigned, and how do they potentially interact with each other? Second, why does Kalabari have constructional tones? Specifically, how are they related to what is found in other languages, and where do they come from diachronically? In the following sections we will first
document the different constructional tones in further detail (§2), then consider how the different melodies interact (§3). This is followed by discussion of the few post-nominal modifiers (§4) and tone reduction in the verb phrase, including relative clauses (§5). After presenting a diachronic analysis which accounts for how the system arose (§6) we examine potentially related phenomena in other languages (§7) but conclude that tone is the only phonological property that can be assigned from word to word (§8).

2. The tonal melodies

As mentioned, there are four phrasal tonal melodies in all: /HL/, /HLH/, /LH/, and /L/. As we will see, these are found in well-defined constructions. In this section we follow Harry’s (2004) two-step analysis involving tone deletion (TD) + assignment of a tonal melody. After illustrating how each of these affects a simple noun head in this section, we consider cases involving more complex noun phrase structures in §3.

2.1 Tone deletion + /HL/ melody: N₁ + N₂

In Kalabari, nominal possession consists of simple juxtaposition of the possessor before the possessed. The resulting sequence, which we indicate as N₁ + N₂, is superficially non-distinct from noun compounding. As was seen in (3), the possessor noun (N₁) keeps its lexical tones, while the second, possessed noun (N₂) receives a HL melody. The examples in (5) show that the same tone melody assignment applies independent of the tonal shape of N₁:

(5) a. féní ‘bird’ H-H → féní námà ‘the bird’s meat’ (cf. námà ‘meat’)
   b. tôbô ‘child’ L-L → tôbô námà ‘the child’s meat’
   c. sîrí ‘leopard’ H-L → sîrí námà ‘the leopard’s meat’
   d. èkpé ‘he-goat’ L-H → èkpé námà ‘the he-goat’s meat’
   e. é↓bé ‘insect (sp.)’ H↓H → é↓bé námà ‘the insect’s meat’

The trisyllabic N₂ nouns in (6) show that the /HL/ links to last two syllables, suggesting for the moment that the melody targets the right edge of the second noun:
As will be confirmed by numerous further examples below, any syllable that does not receive a H or L tone from a constructional melody receives its output tone from what precedes it. Thus, when the N₁ ends L in (6a), the underlined first syllable of the N₂ nouns is realized L (either by spreading or as a default), while in (6b) the first syllable of N₂ is realized H when the N₁ ends H. In this case the H of /féní/ ‘bird’ has spread onto these syllables. Such H tone spreading is quite frequent and will be seen in many of the examples to follow.

Since nominal possession is recursive, the question naturally arises as to what happens in a N₁ + N₂ + N₃ construction, as in the representative forms in (7).

As seen, the H of the HL melody goes on the last syllable N₂, while the L goes on the first syllable of N₃. Unmarked syllables receive their tone as in earlier examples. The tone of the first syllable of N₂ is L in (7a) vs. H in (7b), the latter resulting from H tone spreading from /féní/. It is not possible to tell if the unmarked final syllable of each N₃ is L by tone spreading or by default. The generalization which we will be able to draw from further examples is that a melodic H targets a word-final syllable, while a melodic L targets a word-initial syllable. This yields the assignments shown on N₂ and N₃ in (7).

2.2 Tone deletion + /HLH/ melody: PossPro + N

As was seen in (3), possessive pronouns assign a HLH tonal melody to the following noun. In the first two output columns in (8) we see that /HLH/ will map as H-↓H on a bisyllabic noun, whether the possessor ends H or L.6

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The 'my' forms in the third output column show a curiosity of the possessive construction: If the pronoun consists of a L tone vowel and the noun is bisyllabic, rather than deriving H-\(\downarrow\)H, the HLH melody links to the final syllable, which then undergoes lengthening in order to accommodate the tonal contour. (As in many tone languages, Kalabari does not allow a tonal contour on a short vowel.) This thus yields \(i\,n\text{àmà}^{\downarrow}\) instead of \(i\,n\text{àmà}\), etc.\(^7\) The output forms of /námá/ 'meat' in (9) show both of these two realizations, but more importantly that all possessive pronouns assign the same /HLH/ melody to the following noun:

\[
\begin{array}{llll}
9 & i\,n\text{âmà}^{\downarrow}\text{á} & 'my meat' & wânà\,n\text{âmà}^{\downarrow}\text{á} & 'our meat' \\
& i\,n\text{âmà}^{\downarrow}\text{mà} & 'your meat' & ôminà\,n\text{âmà}^{\downarrow}\text{mà} & 'your (pl.) meat' \\
& ô\,n\text{âmà}^{\downarrow}\text{á} & 'his meat' & inà\,n\text{âmà}^{\downarrow}\text{mà} & 'their meat' \\
& à\,n\text{âmà} & 'her meat' & & \\
& àn\,n\text{âmà} & 'its meat' & & \\
\end{array}
\]

In general, the HLH melody otherwise has mapping properties similar to HL. Thus, the HLH is right-aligned on trisyllabic nouns as seen in (10), the first syllable taking the same tone as the end tone of the preceding pronoun:

\[
\begin{array}{llll}
10 & i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
\end{array}
\]

Also as in the case of HL, the tones of the HLH melody separate over a \(N_1 + N_2\) sequence. As seen in (11), the first H goes on the last syllable of the \(N_1\), the L on the first syllable of \(N_2\), and the second H on the last syllable of the \(N_2\):

\[
\begin{array}{llll}
11 & i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
& i\,fènì\,n\text{âmà} & 'my bird’s meat' & i\,fènì\,n\text{âmà} & 'my bird’s meat' \\
\end{array}
\]
The same mapping is seen even more clearly when there is an N₃:

(12) a. ɪ̀ + fénì + minjì + kùkù → i fèní minji kùkù ‘my bird’s water pot’
    L H-H L-L H-H H L H
    1sg bird water pot

b. ɪ́ + tồɓɔ̀ + sɪ́rì + námà → i tôɓɔ́ sìrì nàmà ‘your child’s leopard meat’
    H L-L H-L H-H H L H
    2sg child leopard meat

These forms make it even clearer that the tones have a preference for mapping by word: The first H goes on the last syllable of N₁, the L goes on the first syllable of N₂, and the second H goes on the last syllable of N₃. Otherwise, it would have been possible for the second H to map onto the last syllable of N₂, incorrectly yielding *ɪ̀ fèní minji kùkù. That the melodic tones are distributed by word is further evidence that we are dealing with a constructional phenomenon, not a purely phonological one (see further below).

2.3 Tone deletion + /LH/ melody: Determiner + N

In addition to the interrogative tô ‘which’ in (3), prenominal demonstratives, which distinguish sex-based gender in the singular, assign a LH melody to the following noun:

(13) ɓí námà ‘this animal’ (m.) má námà ‘these animals’
    má námà ‘this animal’ (f.) ~ mi’¹nà námà ‘these animals’
    mí námà ‘this animal’ (n.)

The following shows that all bisyllabic nouns neutralize as L-H after demonstratives:

(14) a. námá ‘meat’ H-H → mí námá ‘this animal’
    mi’¹ná ‘these animals’

b. pùlò ‘oil’ L–L → mí pùlò ‘this oil’
    mi’¹ná ‘these oils’

c. bèlè ‘light’ H-L → mí bèlé ‘this light’
    mi’¹ná ‘these lights’

d. gàrì ‘garri’ L–H → mí gàrì ‘this garri’
    mi’¹ná ‘these garris’

e. bà’rà ‘hand’ H-’H → mí bàrá ‘this hand’
    mi’¹ná ‘these hands’
More complex structures show that the LH melody maps as a sequence of Ls followed by a single H tone:

(15) a. mí + féní + námá → mí fènì nàmá 'this bird’s meat'
    H   H-H    H-H    L   H
    this bird meat
b. mí + minjì + kúkú → mí minjì kùkú 'this water pot'
    H   L–L    H-H    L   H
    this water pot
c. mí + féní + minjì + kúkú → mí fènì minjì kùkú 'this
    H   H-H    L–L    H-H    L   H
    this bird water pot
    bird’s
    water
    pot
d. mí + tòbò + sírì + námá → mí tòbò sírì nàmá 'this
    H   L–L    H-L    H-H    L   H
    this child leopard meat
    child
    leopard
    meat

This observation will be important for our diachronic account in §6.

2.4 Tone deletion + /L/ melody: Quantifiers/numerals + N

In addition to já ‘some’, illustrated in (3), the quantifiers tòwá ‘many’, ìndé ‘how many’, and most numerals assign an all L melody to the following noun:

(16) a. námá ‘meat’ H-H → sòná ‘five animals’ tòwá ‘many animals’
    nàmà
    b. pùlò ‘oil’ L–L → sòná ‘five oils’ tòwá ‘many oils’
    pùlò
    c. bélè ‘light’ H-L → sòná ‘five lights’ tòwá ‘many lights’
    bèlè
    d. gàrì ‘garri’ L-H → sòná ‘five garris’ tòwá ‘many garris’
    gàrì
    e. bàrà ‘hand’ H-H → sòná ‘five hands’ tòwá ‘many hands’
    bàrà

Longer nouns show the same patterns. Thus, /kùkàlì/ ‘fruit’ → sòná kùkàlì ‘five fruits’, tòwá kùkàlì ‘many fruits’. However, as seen in the fuller table in (17), the numerals ‘1’–’3’ are irregular in different ways:

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(17) féní ‘bird’ sàní ‘pepper’ bèlè ‘light’ gàrì ‘garri’ wá’rí ‘house’
1’ gb́ró féní sàní bèlè gàrì wá’rí
2’ mà féní, féní sàní bèlè (*bèlè) gàrì, gàrì wá’rì, wá’rí
3’ tɪ́rá féní, féní sàní sàní bèlè gàrì, gàrì wá’rì, wá’rí
4’ ínía féní sàní bèlè gàrì wá’rí
5’ sóná féní sàní bèlè gàrì wá’rí
6’ sóníá féní sàní bèlè gàrì wá’rí
7’ sónsmá féní sàní bèlè gàrì wá’rì
8’ níná féní sàní bèlè gàrì wá’rí
9’ éséníá féní sàní bèlè gàrì wá’rí
10’ óyíá féní sàní bèlè gàrì wá’rí

That gb́ró ‘one’ assigns HL, e.g. gb́ró féní ‘one bird’, suggests that it is a noun.10 The numeral mà ‘2’ either reduces all but /H-L/ nouns to all L or allows the base tones of the noun to be realized. The numeral tɪ́rá ‘3’ either assigns HL to the noun or allows the latter to be realized with its base tone. The remaining numerals assign an all L tonal melody to the following noun.

2.5 Tone deletion + no melody assigned

In addition to the above melodies, a further tone pattern concerns four toneless kinship terms which are irregular after a possessive pronoun (Harry 2004: 56). Rather than receiving the /HLH/ melody expected after a possessive, the tone of the possessive pronoun spreads onto them:11

(18) a. dà ‘father’ L → i dà ‘my father’ i dà ‘your father’
b. jìngì ‘mother’ L–L → i yìngì ‘my mother’ i yìngì ‘your mother’
c. dì ‘husband’ L → i dì ‘my husband’ i dì ‘your husband’
d. tà ‘wife’ L → i tá ‘my wife’ i tá ‘your wife’

As in the preceding cases we assume that tonal deletion first applies. The difference here is that no tonal melody is assigned, thus making this construction distinct from the quantifier construction, which assigns a /L/ melody (§2.4). We will see in §5 below that a similar tone deletion + spreading pattern occurs between an object and a verb.

2.6 No tone deletion + variability

The last construction to be considered in this section concerns adjectives, which are very few in Kalabari as most lexemes that express property concepts are verbal.
As seen in (19), nouns generally occur in their base tones after the adjectives òpù 'big' and kálá 'small':

(19) ū̀ fêní ‘bird’ ̀fî̀ nî̀ ‘fire’ sî̀rî ‘leopard’ èkpé ‘he-goat’ wà̀rí ‘house’
              ‘big’ òpù + fênî, fênî ̀fî̀ sî̀rî èkpé wà̀rí
‘small’ kálá + ̀fênî ̀fî̀ ́sî̀rî èkpé ̀wà̀rí

The one exception is that an all H noun tends to lower to all L after òpù (cf. bùrùmá → òpù bùrùmà ~ òpù bùrùmá ‘big indigo’). Failure to lower is less preferred, indicating emphasis on the noun. Since the adjective kálá ‘small’ imposes a downstep before H-initial nouns, we assume that it ends in a floating L, i.e. /kálá’/.

There is reason to believe that òpù and kálá are the only adjectives in Kalabari, as all other lexemes expressing qualities can be fully conjugated. Thus observe that the four major conjugational categories of the sentences on the left are also distinguished in the corresponding noun phrases on the right:

(20) FACT námá sìí ̀m ‘the animal became bad, is bad’
              sì námà12 ‘bad animal’
PROG námá sì árì ‘the animal is becoming bad’
              sì árì námà ‘animal becoming bad’
FUT námá sì ̀bà ‘the animal will become bad’
              sì ̀bà námà ‘future bad animal’
PERF námá sì tè ̀tè ‘animal has become bad’
              sì tè námà ‘completely bad animal’

The forms to the right are nominalizations identical to subject relative clauses (‘animal which is bad’ etc.), which we will further discuss in §5. For now, note that the modified noun has all L tone in the progressive and future vs. a HL tone pattern in the factative and perfect. We attribute this to a H tonal morpheme in the case of the factative, and a floating H which follows the perfect marker tè (cf. (51) and subsequent examples for comparable facts in other relative clauses). After the H tone adjectival verb ìwò ‘new’, the only difference is that the perfect marker tè now has a H tone:

(21) FACT námá ìwò ̀m ‘the house became new, is new’
              ìwò wà́rì ‘new house’
PROG námá ìwò árì ‘the house is becoming new’
              ìwò árì wà́rì ‘house becoming new’
FUT námá ìwò ̀bà ‘the house will become new’
              ìwò ̀bà wà́rì ‘future new house’
PERF námá ìwò tè ̀tè ‘the house has become new’
              ìwò tè wà́rì ‘completely new house’

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We conclude that true adjectives tend not to affect the base tones (other than lowering an all H noun to all L), while verbal adjectives assign a tonal pattern according to their last tone: after L, the noun will be all L; after H it will receive a HL melody.13

3. Tone melodies in complex noun phrases

Having established the four tonal melodies in §2, each of which is assigned by a modifier to the following noun, the question we now ask is what happens if there is more than one such modifier. Table 2 summarizes the tone patterns we have seen thus far (recall that both féní ‘bird’ and námá ‘meat’ are H-H):

Table 2. The four tonal melodies in Kalabari

<table>
<thead>
<tr>
<th>Construction</th>
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<td>H L</td>
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<tr>
<td>PossPro + N</td>
<td>HLH</td>
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<td>Determiner + N</td>
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<td>Quantifier + N</td>
<td>L</td>
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We already saw in (7), (11), and (12) that the respective HL or HLH melody is mapped over however many nouns may be in a genitive relationship. But what if the melodies conflict?14

For the purpose of addressing this question the word order possibilities of the elements we have seen thus far within the Kalabari noun phrase are schematized in (21).

\[(22)\quad \text{Dem} / \text{Poss} + \{ \text{Num}_1 + \text{Adj}_1 \} + \text{Noun}_1 + \{ \text{Num}_2 + \text{Adj}_2 \} + \text{Noun}_2 + \text{Def} \]

\[\quad \text{LH} \rightarrow \; \text{HLH} \rightarrow \; \text{L} \rightarrow \; \text{HL} \rightarrow \; \text{L} \rightarrow\]

As seen, demonstratives and possessive pronouns are mutually exclusive (indicated by the slash) and precede both numerals and adjectives. The latter two preferably occur in this order, although Adj + Num is also sometimes possible (as indicated by the braces). As also indicated, a Noun\_2 can (only) be modified by a numeral and/or adjective. Thus, for descriptive purposes, one way to capture the recursive \[(\text{Num}) \; (\text{Adj}) \; \text{Noun} \] constituent is to recognize a determiner phrase (DP) and the following phrase structure rules in (23).
Recall that adjectives are the only modifiers that can have no tonal effect on a following noun. It is thus interesting to observe that they occur closest to the modified noun. With this established, we can now ask the following two questions: (i) What happens if multiple modifiers precede the head noun? (ii) What happens if each noun is modified in an N₁ + N₂ construction? (The definite marker and other postnominal modifiers are treated in §4.)

The short answer is that the first word can usually assign its tone melody to what follows, but in some cases there are other possibilities. Consider first structures where there is a specifier plus a numeral or adjective. In (24) we observe that if the specifier is a demonstrative, the only acceptable resolution is for its LH melody to be assigned to the entirety of what follows:

(24) a. \( \text{Dem} + \text{Num} + \text{N} \) \( \text{mí}^{\prime} \text{ná} + \text{ṣöná} + \text{fěnì} \rightarrow \text{mí}^{\prime} \text{ná söná fěnì} \) ‘these five animals’

\( \text{HLH} \quad \text{H-H} \quad \text{H-H} \quad \text{L-H} \quad \text{H} \)

\( \text{t}h\text{e} \text{five} \text{bird} \)

b. \( \text{Dem} + \text{Adj} + \text{N} \) \( \text{mí} + \text{òpù} + \text{sirì} \rightarrow \text{mí òpù sirì} \) ‘this big leopard’

\( \text{H} \quad \text{L-L} \quad \text{H-L} \quad \text{L-H} \quad \text{H} \)

\( \text{t}h\text{is} \text{big} \text{leopard} \)

On the other hand, if the specifier is a possessive pronoun, either its HLH or a HL melody may be used:

(25) a. \( \text{Poss} + \text{Num} + \text{N} \) \( \text{i} + \text{ṣöná} + \text{fěnì} \rightarrow \text{i söná fěnì} \) ‘my five animals’

\( \text{L} \quad \text{H-H} \quad \text{H-H} \quad \text{L-H} \quad \text{H} \)

\( \text{my} \text{five} \text{animals} \)

b. \( \text{Poss} + \text{Adj} + \text{N} \) : \( \text{iyè} + \text{òpù} + \text{sirì} \rightarrow \text{iyè òpù sìrì} \) ‘my big leopard’

\( \text{L-L} \quad \text{L-L} \quad \text{H-L} \quad \text{H-L} \quad \text{L-H} \)

\( \text{my} \text{big} \text{leopard} \)

If the first word is a numeral and the second an adjective, either the numeral L is assigned or a HL melody is again possible:
(26)  a.  **Num + Adj + N:** sóná + òpù + féní → sóná òpù féní ‘five big birds’
    H-H  L-L  H-H  L
    ~ sóná òpù féní
    H-H  L-L  H-H  H  L
    five big bird

As in (25b), (26) shows that although adjectives do not assign a tone melody to a following single head noun, they can themselves be targeted by a melody from the left. When followed by an **N₁ + N₂**, an adjective can either allow the **N₁** to be realized with its base tones, as expected, or optionally allow a **HL** melody to be assigned to a **N₁ + N₂** sequence:

(27)  a.  **Adj + N₁ + N₂:** òpù + námá + wá + rí → òpù námá wá ‘big animal’s house’
    L-L  H-H  HLH
    ~ òpù námá wá ‘big animal house’
    H  L

There also is variation in **N₁ + N₂ + N₃** constructions, this time involving how the **/HL/** melody assigned by **N₁** is mapped onto what follows:

(28)  a.  é‘né + mìnjì + fʊ́rʊ́ → é‘né mìnjì fɔ́rɔ́ ‘rainwater smell’
    HLH  L-L  HLH  H  L  [ [ N₁ – N₂ ] – N₃ ]
    rain water smell
    ~ é‘né mìnjì fɔ́rɔ́
    H  L

b.  ~ é‘né mìnjì fɔ́rɔ́
    H  L

c.  tôbɔ́ + âbájì + námá → tôbɔ́ âbájì námá ‘child’s ocean animal’
    child ocean animal

d.  ~ tôbɔ́ âbájì námá
    HL

In (28a,c) the **HL** melody assigned by the **N₁** is mapped over **N₂** and **N₃**, as expected. However, (28b,d) show that it is also possible to assign the **HL** to the **N₂**. As seen in the choice of examples, this occurs independently of whether the tripartite noun phrase is left- vs. right-branching and does not seem to have to do with different emphases or the distinction between possession and compounding.

While the above gives an idea of the range of variation found in relatively simple noun phrases, more possibilities arise with more complex structures. As an example, note the three possibilities in (29) where the compound ‘water pot’ is preceded by three modifiers:
As seen in all three variants, the demonstrative má ‘these’ requires an immediate drop to L after it. The expected output is in (29a), where the L and H of the demonstrative LH melody are mapped to the first and last syllables of the entire string. In (29b) we see that the final H is unexpectedly missing, as it is in (28c), where a HL melody is assigned to the last two words. While further investigation of every potential phrase structure is needed, about all we can say is that after one exceeds a certain complexity, the two possibilities in (29b,c) become available: either failure of the final H of the LH melody to be realized or assignment of a default HL somewhere in the string (recall the second variants in (25) where the final H of the possessive HLH melody also failed to surface).

While the above concerns multiple modifiers on a single head noun, it is also possible that the two (or more) nouns of an N1 + N2 structure each have their own modifier(s). In this case the unexpected variants similar to those seen above are again observed. Thus, in (30), the final H of the demonstrative LH melody is not realized:

Similarly, the examples in (31) show that the final H of the possessive HLH melody is also not realized in comparable structures:
(31) a. ɪ̀ + sóná + námá + kálá + wá́rí →
L  H-H  H-H  H-H ` HLH
1sg five animal small house
ɪ̀ sóná  námá  kálá  wàrì  ‘my five animals’ small house
ɪ̀ rɪ́ →

b. ɪ̀ + kálá + námá + sóná + wá́rí →
L  H-H  H-H  H-H  HLH
1sg small animal five house
ɪ̀ kálá  námá  sóná  wàrì  ‘my small animal’s five houses’
ɪ̀ rɪ́ →

It would appear that the recursive NP structure from (23b) somehow blocks the final H of both LH and HLH melodies, thereby suggesting that these final Hs may be related. In §6 we suggest that the final H of the possessive HLH melody has the same determiner origin as the final H of the demonstrative LH melody. 16

4. Postnominal modifiers

We have seen in the preceding sections that almost all modifiers precede the noun in Kalabari. Notable exceptions are the plural marker àméé, a few quantifiers such as mámgba ‘all’, and the singular and plural definite markers which distinguish gender in the singular, as illustrated in (32). 17

(32) námá bè ‘the animal’ (m.)  námá mà ‘the animals’
námá mà ‘the animal’ (f.)
námá mè ‘the animal’ (n.)

As seen in (33), neither an initial noun nor the following modifier undergoes tonal reduction:

(33) ‘plural’ ‘all’ ‘definite’
  a. námá ‘meat’ H-H → námá áméé námá mámgba námá mè
  b. púlò ‘oil’ L-L → púlò áméé púlò mámgba púlò mè
  c. bélè ‘light’ H-L → bélè áméé bélè mámgba bélè mè
  d. gàrì ‘garri’ L-H → gàrì áméé gàrì ́mámgba gàrì ́mè
  e. bà́rá ‘hand’ H-L → bà́rá áméé bà́rá mámgba bà́rá mè

As also observed, the L tone of the initial vowel of the plural marker àméé assimilates to a preceding H tone, while in (33d) both mámgba and mè undergo downstepping after gàrì. This latter change is due to a general rule in the language that inserts a downstep after a word-final L-H sequence which is followed by H in...
the next word. Since downstep is most commonly attributed to L tone (Clements & Ford 1979, Hyman 1979), we assume a floating L tone insertion rule, informally stated in (34).\textsuperscript{18}

\begin{equation}
\varnothing \rightarrow \text{L} / \text{L} \text{H} \text{__} \# \text{H}
\end{equation}

The properties of the plural marker àmëë, which is rarely if ever required, can be summarized as follows: (i) It can only appear directly after a noun, potentially either noun in a N\textsubscript{1} + N\textsubscript{2} construction; (ii) it does not undergo tone reduction; (iii) everything after it is realized L. Whether this should be identified with the L melody of quantifiers, or whether the subsequent Ls are simply the result of tone deletion, it is clear that no other tonal melody can be assigned across or after àmëë:

\begin{equation}
\text{a. : námá + wà̄rî + àmëë \rightarrow námá wà̄rï àmëë ‘the animal(‘s) animals’ houses’}
\end{equation}
\begin{equation}
\text{animal \ house \ pl}
\end{equation}
\begin{equation}
\text{animal pl \ house}
\end{equation}
\begin{equation}
\text{b. námá + àmëë + wà̄rî \rightarrow námá ámëë wà̄rï ‘the animals’ house’}
\end{equation}
\begin{equation}
\text{c. ~ námá ámë wà̄rï L}
\end{equation}

As seen in (35c), the HL of àmëë can be shortened to H, as is also optionally the case for monosyllabic and VCV nouns in N\textsubscript{2} position (cf. note 6). Since àmëë must directly follow a noun, we speculate that there might be a historical link between its HL tone and the HL assigned in N\textsubscript{1} + N\textsubscript{2} constructions (cf. námá àmëë(wà̄rï àmëë ‘the animals’ houses’, where the plural marker appears after both nouns).

The examples in (36) show the same realizations of the plural marker after a possessive pronoun + noun:

\begin{equation}
\text{a. ìnà + námá + àmëë + wà̄rî \rightarrow}
\end{equation}
\begin{equation}
\text{L–L \ H–H \ L–HL \ HLH}
\end{equation}
\begin{equation}
\text{3pl \ animal \ pl \ house}
\end{equation}
\begin{equation}
\text{înà nà̄má àmëë + wà̄rï ‘their animals’ house’}
\end{equation}
\begin{equation}
\text{HLH \ L}
\end{equation}
\begin{equation}
\text{b. ìnà + námá + wà̄rî + àmëë \rightarrow}
\end{equation}
\begin{equation}
\text{L–L \ H–H \ HLH \ L–HL}
\end{equation}
\begin{equation}
\text{3pl \ animal \ house \ pl}
\end{equation}
\begin{equation}
\text{înà nà̄má wà̄rï + àmëë ‘their animal(‘s) houses’}
\end{equation}
\begin{equation}
\text{H \ L H}
\end{equation}
\begin{equation}
\sim \text{înà nà̄má wà̄rï + àmëë}
\end{equation}
\begin{equation}
\text{H \ L}
\end{equation}
The output in (36a) shows that the HLH possessive melody is mapped on the following noun ‘animal’, not on the combined ‘animal + plural’. The forms in (36b) show that the final H of the HLH possessive melody is optionally not realized before əmɛ̀. Similarly, the final H of the LH demonstrative melody is also optionally not realized before əmɛ̀:

(37) a. mà + fénì + əmɛ̀ → mà fènì əmɛ̀ ‘these birds’
    H H-H L-HL L
    these bird pl

b. mà + námà + əmɛ̀ → mà nàmà əmɛ̀ ‘these animals’
    H H-H L-HL L H
    these animal pl

~ mà + námà + əmɛ̀ → mà nàmà əmɛ̀
    H H-H L-HL L

In (38) we see that mámgbà ‘all’ can also modify either noun of an N₁ + N₂ construction.

(38) a. námà + wàrí + mámgbà → námà wàrì mámgbà ‘all animal(s’) houses’
    H-H HLH H-L H L
    animal house all houses’

b. námà + mámgbà + wàrí → námà mámgbà wàrì ‘the house of all animals’
    H-H H-L HLH L
    animal all house

As also seen in (38a), mámgbà does not itself undergo reduction. It is realized H-L in (38b), which is identical to its input tones. However, other examples clearly show that it does not participate in the mapping of tonal melodies. Thus, in i námàwàrí mámgbà ‘all my animals’, the HLH possessive melody is realized on the last syllable of /námà/ as it would be without mámgbà (recall (8) and note 8). The two variants in (39) show that the final H of the LH demonstrative melody is optionally not realized before mámgbà:

(39) a. mí + námà + mámgbà → mí nàmà ‘mámgbà ‘all the animals’
    H H-H H-L L H
    this animal all house’

b. ~ mí nàmà mámgbà
   L

(39a) also shows the application of the downstep insertion rule (34). Again we wonder if the H-L of mámgbà is diachronically related to the HL melody assigned by nouns.
The final postnominal modifiers are the definite markers listed earlier in the table in (32). As was seen in the examples in (33), these markers are all /H/ and do not undergo tone reduction. The main issue that comes up is whether the final H of LH and HLH melodies are realized when followed by a H tone definite marker. When the definite marker co-occurs with an initial demonstrative, two variants are regularly observed:

(40) a. mí + námá + mé → mí námá ′mé 'this animal'
    H  H-H  H  L  H
  this   animal   def

b. ~ mí námà mé
    L

c. mí + būrúmá + mé → mí būrúmá ′mé 'this indigo'
    H  H-H-H  H  L  H
  this   indigo   def

d. ~ mí būrúmà mé
    L

In (40a,c) the H of LH is realized and the rule in (34) results in the H of the definite marker mé being downstepped. In the slightly dispreferred variants in (40b,d) the final H of the LH melody does not appear on the noun, although one interpretation is that it is realized via the H of the definite marker mé (cf. §6).

When we turn to the possessive HLH melody, we find the following skewing:

(41) a. inà + námá + mé → inà nàmá ′mé 'this their animal'
    L-L  H-H  H  H L H
  3p  animal   def

b. *inà námà mé
    H  L

c. inà + būrúmá + mé → inà būrúmá ′mé 'this their indigo'
    L-L  H-H-H  H  H L H
  3p  indigo   def

d. ~ inà būrúmà mé
    H  L

As seen in (41a,b), when the noun is bisyllabic, the HLH possessive melody must be fully realized. However, as seen in (41c,d), when the noun trisyllabic (or longer), it can be realized with the HLH melody or (with a slight dispreference) with only HL. Again, one is tempted to propose that the H of the final definite marker is standing in for the last part of the HLH melody.
Finally, let us consider one other effect of the definite markers about which we shall have to speculate. As seen in (42), there sometimes appears to be an unaccounted for H tone assigned by the definite article.

(42) a. òpù + féní + mé → òpù féní mé ‘the big bird’

       L–L     H–H     H   H–H

       big   bird    DEF

b. ~ òpù féní mé

       L

c. ~ òpù féní ⁴mé

       L H

d. féní + púlò + mé → féní púlò mé ‘the bird’s oil’

       H–H     L–L     H   H L

       bird   oil    DEF

e. ~ féní púló ⁴mé

       H H

In each set, the first output is the one expected from the discussions in previous sections. In addition (42b) is also expected in that an all H noun can optionally lower to all L after the adjective òpù ‘big’ (cf. (19)). The output in (42c) is surprising in that there appears to be an extra floating H tone between the noun and the definite marker (which in turn undergoes downstepping by the rule in (34)). Perhaps even more intriguing is (42e), where the output is H–H with the definite marker again downstepping. To produce this output we would need the derivation in (43), where the first step is to insert a floating L by rule (34):

(43) … púlò + H + mé → púlò + H + L + mé → púlò + ‘+ mé [púló ⁴mé]

Whether this is motivated or not, what is significant is that the definite article is partially determining the output of what precedes, something which also arises in relative clause constructions (cf. note 23). If this were to develop further, Kalabari could become like Tommo So (Heath & McPherson 2013, McPherson 2012), where the triggers of tonal melodies could be either on the left or the right of their targets (cf. §7).

To conclude this section, let us briefly mention that the definite markers occur in absolute last position, potentially preceded by the plural marker, e.g. námá ⁴ámëè má ‘the animals’. No other combinations of post-nominal modifiers are grammatical.
5. Tone reduction in the verb phrase

While all of the preceding discussion has concerned cases where tone reduction and tonal melodies target the head noun within the noun phrase, we now show that the lexical verb of a verb phrase also undergoes tonal reduction. We illustrate this first in main clauses and then consider relative clauses.

As seen in (44a), bisyllabic verbs contrast the same five tone patterns we have seen in nouns, repeated in (44b).

(44) a. verbs b. nouns
L–L sélè 'choose' pùlò 'oil'
H-L kámà 'increase' bèlè 'light'
L-H dɔ̃ki 'discover, find out' gàrì 'garri'
H-H érì 'see' námá 'meat'
H-3H /HLH/ kò kò 'keep' wá rì 'house'

Kalabari is a head-final (OV) language. Whenever an object is present before the verb, the verb loses all of its tones and the last tone of the object spreads onto the verb:

(45) a. the object ends L érì → èrì (=sélè, kámà, dɔ̃ki, kòkò)
pùlò 'oil' L–L → ó pùlò èrì téɛɛ 'he has seen the oil'
bèlè 'light' H–L → ó bèlè èrì téɛɛ 'he has seen light'
lùbùlù 'sheath' L–L–L → ó lùbùlù èrì téɛɛ 'he has seen the sheath'

b. the object ends H–H, H-3H sélè → sélè (= kámà, dɔ̃ki, érì, kòkò)
námá 'meat' H–H → ɔ námá sélè téɛɛ 'he has chosen the meat'
wá rì 'house' H-3H → ɔ wá rì sélè téɛɛ 'he has chosen the house'
búrúmá 'indigo' H–H–H → ó búrúmá sélè téɛɛ 'he has chosen the indigo'

3c. the object ends L–H sélè → sélè (= t̊kámà, t̊dɔ̃ki, t̊érì, t̊kòkò)
gàrì 'garri' L–H → ɔ̀ gàrì sélè téɛɛ 'he has chosen the garri'
kòkàlì 'fruit' H–L–H → ɔ kòkàlì sélè téɛɛ 'he has chosen the fruit'
In the above forms, all five verbs are realized all L in (45a) and all H in (45b), while the verbs in (45c) are realized as all H preceded by a downstep inserted by rule (34).19

In our survey of the noun phrase, the only case of tone deletion with unbounded tone spreading concerned the four exceptional kinship terms in (18) which agree in tone with a preceding possessive pronoun. The process is, however, quite regular within the verb phrase. While the examples in (45) involve a simple noun object, the tone of the object NP must be calculated first before it can be determined what the tone of the verb will be. Thus compare the following examples involving the H-H noun fènì ‘bird’, where the final tone of the object NP is different from the lexical final tone of the noun:

(46) a. the object ends L  érì → èrì  (=sèlè, kàmà, dòkì, kòkò)
    sòná fènì ‘five birds’ → ò sòná fènì èrì tèɛɛ  ‘he has seen five birds’
      3sg five bird see TAM

b. the object ends  sèlè → sèlè  (= kâmâ, dòkì, èrî, kòkò)
   H-^H
   í  fè^ni ‘your bird’ → òrì í fè^ni sèlè tèɛɛ  ‘he has chosen your
      3sg 2sg bird choose TAM
      bird’

c. the object ends L-H  sèlè → i sèlè  (= i kâmâ, i dòkì, i èrî, i kòkò)
   mí fènì ‘this bird’ → ɔ̀ mí fènì i sèlè tèɛɛ  ‘he has chosen this
      3sg this bird choose TAM
      bird’

As seen, it is the derived tone of the last word of the object noun phrase that determines the tone of the verb. Thus, the verb is L–L after post-numeral L–L fènì in (46a), H–H after post-possessive H–^H fè^ni in (46b) and ^H–H (with downstep insertion) after post-demonstrative L–H fènì in (46c).

It is only an object that can trigger the above effects. A preceding non-object does not cause tone reduction on the verb, e.g. the postpositional phrases involving polar tone kè ~ kè ‘with’ (instrument, manner) and nà ~ nà ‘with’ (comitative) seen in (47).

(47) a. /pèlè/ ‘cut’ : òrì ogiè kè pèlè tèɛɛ  ‘he has cut with a knife’
      3sg knife with cut TAM

b. /sò/ ‘cook’ : ò pùlò kè sò tèɛɛ  ‘he has cooked with oil’
      3sg oil with cook TAM

c. /mènji/ ‘walk’ : ò rì oyi ò bù mànji tèɛɛ  ‘he has walked with the
      3sg man with walk TAM
      man’

d. /dèrì/ ‘laugh’ : ò tòbò nà dèrì tèɛɛ  ‘he has laughed with the
      3sg child with laugh TAM
      child’
The verb also remains unchanged when directly preceded by the subject, e.g. the verb *sɛ̀lɛ́* `be chosen` derived from */sɛ̀lɛ̀/ `choose` by the detransitivizing process illustrated earlier in (1):

(48) a. pùlò `oil` L–L → pùlò sɛ̀lɛ́ ìtɛ́ɛ́  ‘the oil has been chosen’
   b. bèlɛ̀ `light` H-L → bèlɛ̀ sɛ̀lɛ́ ìtɛ́ɛ́  ‘the light has been chosen’
   c. námá `meat` H-H → námá sɛ̀lɛ́ ìtɛ́ɛ́  ‘the meat has been chosen’
   d. wá̀rɪ̀ `house` H-H → wá̀rɪ̀ sɛ̀lɛ́ ìtɛ́ɛ́  ‘the house has been chosen’
   e. gàrɪ̀ `garri` L-H → gàrɪ̀ sɛ̀lɛ́ ìtɛ́ɛ́  ‘the garri has been chosen’

It should also be noted that each noun phrase constitutes a separate prosodic constituent. Thus, there is no tonal interaction between the subject and object:

(49) a. féní + pùlò + ërɪ̀ + ìtɛ́ɛ́ →
   H-H    L-L    H-H    HLH
   bird    oil    see    TAM
   féní    pùlò    ërɪ̀    ìtɛ́ɛ́    ‘the bird has seen the oil’
   b. tʊ̀ɓɔ̀ + námá + sɛ̀lɛ̀ + ìtɛ́ɛ́ →
       L-L    H-H    L-L    HLH
       child    meat    choose    TAM
       tʊ̀ɓɔ̀    námá    sɛ̀lɛ̀    ìtɛ́ɛ́    ‘the child has chosen the meat’

Object + verb sequences exhibit the same reduction + unbounded spreading in any type clause, affirmative or negative, declarative or interrogative. This includes relative clauses. In the following examples, the verbs *fúrú* `steal` and *sɛ̀lɛ̀* `choose` undergo reduction and spreading from the preceding object, as before; *bé* is the masculine definite singular marker:

(50) a. pùlò `oil` L–L → pùlò fúrú tʊ̀ɓɔ̀ bé ‘the child that stole the oil’
   b. bèlɛ̀ `light` H-L → bèlɛ̀ fúrú tʊ̀ɓɔ̀ bé ‘the child that stole the light’
   c. námá `meat` H-H → námá sɛ̀lɛ̀ tʊ̀ɓɔ̀ bé ‘the child that chose the meat’
   d. wá̀rɪ̀ `house` H-H → wá̀rɪ̀ sɛ̀lɛ̀ tʊ̀ɓɔ̀ bé ‘the child that chose the house’
   e. gàrɪ̀ `garri` L-H → gàrɪ̀ sɛ̀lɛ̀ tʊ̀ɓɔ̀ bé ‘the child that chose the garri’
      object verb child DEF

What is particularly significant is the H-L tone on */tʊ̀ɓɔ̀/ `child`. It turns out that the head of the object relative construction regularly receives a H-L melody in the factative tense:

(51) a. tʊ̀ɓɔ̀ `child` L–L → pùlò fúrù tʊ̀ɓɔ̀ bé ‘the child that stole the oil’

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b. siri 'leopard' H-L → pùlò fùrú siri bé 'the leopard that stole the oil'

c. féni 'bird' H-H → pùlò fùrú féni bé 'the bird that stole the oil'

d. pèlìá 'ladyfish' L-H-H → pùlò fùrú pèlìá bé 'the ladyfish that stole the oil'

e. kòkòrà 'fish (sp.)' L–L-H → pùlò fùrú kòkòrà bé oil steal subject def 'the fish (sp.) that stole the oil'

Even though such relative clauses are possibly nominalizations ('the oil stealing child', 'the meat choosing child' etc.), this H-L should not be identified with the N₁ + N₂ HL melody. When we consider all four of the TAMs seen earlier in (20), the situation becomes clearer:

(52) FACT námá pùlò fùrú ḳ̀m ‘the animal stole the oil’ /´m̀/ → ´
pùlò fùrú námá bé ‘the animal that stole the oil’
PROG námá pùlò furu árí ‘the animal is stealing the oil’ /árí/
pùlò fùrú árí námá bé ‘the animal that is stealing the oil’
FUT námá pùlò fùrú bà ‘the animal will steal the oil’ /´bà/
pùlò fùrú bà námá bé ‘the animal that will steal the oil’
PERF námá pùlò fùrú tə́ɛ ‘the animal has stolen the oil’ /tə́ɛ/ → tə́
pùlò fùrú tə námá bé ‘the animal that has stolen the oil’
main: animal oil steal TAM
rel: oil steal TAM animal def

The first line of each pair illustrates the TAM marking in the main clause, while the second line shows the corresponding object relative clauses. As seen, in the main clause, the factative and future place a H tone on the final syllable of the verb, which we set up as an initial floating H in the underlying representations /´m̀/ and /´bà/. In the corresponding relative clauses, the future continues to assign a H to the preceding syllable, this time the relativized verb, while both the factative and perfect assign a H tone onto the head noun, as seen earlier with adjectives in (20) and (21). As seen in the last column of (52), we consider this floating H to be from the form that the TAM marker takes in relative clauses. The same facts are seen in the following intransitive relative clauses involving the verb /ɗɛ̀rì/ 'laugh' and the noun /tòbàrà/ 'antelope':

(53) FACT dèrì tòbàrà bé ‘the antelope that laughed’
PROG dèrì árí tòbàrà bé ‘the antelope that is laughing’
FUT dèrì bà tòbàrà bé ‘the antelope that will laugh’
As in the case of transitive relatives, we consider the above to be nominalizations (the ‘laughing antelope’, ‘the having laughed antelope’ etc.). As seen, the H assigned by the factative and perfective maps onto the penult of the trisyllabic noun tóbárà. When the subject noun is a compound, e.g. pìrí námà ‘bush animal’ (from pìrí ‘bush’ + námà ‘animal’), the H goes on the final of the first noun and the L begins on second noun:

(54)   FACT  dèrì pìrí námà bě́ ‘the bush animal that laughed’
       PROG  dèrì árì pìrí námà bě́ ‘the bush animal that is laughing’
       FUT   dèrì bà pìrí námà bě́ ‘the bush animal that will laugh’
       PERF  dèrì tè pìrí námà bě́ ‘the bush animal that has laughed’

This is rather significant, since such mapping is exactly what we reported in the case of a N₁+ N₂+ N₃ construction (cf. (7)). Since we have attributed this H to the TAM markers, relative clauses provide an important window into the origin of the tonal melodies. Specifically, the HL melody observed in the above factative and perfect relatives is from the floating H of the TAM marker + the L that results from tone reduction. Having established this rather clear case, we now turn to the question of diachronic origins in the next section.

6. Towards a diachronic account

In the past sections we have seen that Kalabari has a system whereby the tones of non-domain-initial words are deleted, and the tonal melodies /HL/, /HLH/, /LH/, and /L/ are assigned by construction. The tones of a verb are also deleted when preceded by an object and replaced by the last tone of the object NP. The questions which remain are the following:

i. Why does Kalabari reduce non-initial tones in the above syntactic contexts? A partial answer we can give is that prosodic reduction frequently targets the lexical head of an XP constituent, e.g. the N of an NP, the V of a VP, whether a language is head-initial or head-final (cf. §7).

ii. Why does Kalabari assign these different melodies? The answer we will propose in this section is that there has been a reanalysis of original syntactic markers.

iii. Why does most of this happen in the noun phrase? Could another language assign different melodies to the verb, depending on what kind of complement
precedes (object, adpositional phrase, adverbial etc.) or perhaps different kinds of objects?

In answer to the third question, we would suggest yes, but it would require special diachronic sources parallel to those which we will now consider. We propose two such sources:

i. The L of the /LH/ melody is the result of tone reduction. The H of this melody is a final determiner tone.

ii. The L of /HL/, /L/ and probably /HLH/ melodies again comes from reduction. The H of /HL/ is from a lost linker or “connective” particle, while the final /H/ may again originate as a mark of determination.

Starting with the source of the demonstrative LH melody, we saw in §4 that Kalabari has a system of final /H/ tone definite markers. We also saw that although an initial demonstrative assigns a LH melody, as in (55a), when a definite marker is present, the final H of the LH melody is usually not realized, as in (55b), but may also be, as in (55c).

(55) /námá/ ‘animal’
   a. m̀ nàmá ‘this animal’
   b. m̀ nàmà m̀ w/def. marker
   c. m̀ nàmá ɗm̀ idem.

Recall also from (24) that a demonstrative generally assigns a /LH/ melody in more complex noun phrases. We propose therefore to identify the H of the /LH/ melody with the mark of final determination. This could either mean that another /H/ tone morpheme was present or, more likely, that the final H seen on an overt determiner became generalized to noun phrases (or perhaps more aptly, determiner phrases) with an initial demonstrative or other determiner. The two-step development would have thus been to reduce everything after the initial determiner to L, followed by the assignment of a right-edge H.

A two-step reconstruction is also required for the HL and HLH melodies. This time the initial H comes from a lost or reanalyzed connective particle that occurred in the relevant constructions. As our first piece of evidence, we note that Kalabari currently maintains two overt connectives, ná and bë, used in specific constructions only. As seen in (56), both have H tone and both make the following noun L:

(56) a. ná is used to mean ‘associated with’ a particular people or language
   Kálábári ná fènì ‘Kalabari bird’ (a bird that the Kalabaris have)
   H L (cf. fènì ‘bird’)
b. *bé is used to indicate something associated with a place (whether a proper or common noun)

\[
\begin{array}{llll}
\text{Dégémà bé fié} & \text{‘Degema food’} & \text{wá ri bé nùmè} & \text{‘the house song’} \\
\text{H L} & \text{(cf. fié ‘food’) } & \text{H L} & \text{(cf. nùmè ‘song’) }
\end{array}
\]

To get the /HL/ melody of the N₁ + N₂ construction, we assume that there was a /H/ tone connective that has since been lost. After the N₂ was reduced to all L, the H of the connective was assigned to the N₂ to produce the observed /HL/ melody. We saw a similar development in factative and perfect tense relative clauses in (52)–(54), where a grammatical H tone combines with the L from tone deletion to form a HL melody.

The /L/ melody has the most direct source: all we need to say is that there was reduction to L after a quantifier or numeral. For this account to go through, we have to dismiss the possibility that there was a *L tone connective that caused the tonal changes. Recalling the numerals presented in (17), one might observe that all of them end in [a] except gbɔ́rů ‘one’ (which was said to be a noun). In addition, a number of other inherently plural morphemes also end in [a]: jà ‘some’, tɔwá ‘many’, mì*ná ‘these’, má ‘definite (pl.)’. There is good evidence that [a] was originally a plural prefix on nouns — cf. àwɔ(mìé) ‘children’ (sg. tòb); and the general plural marker àmèe, both with a-. In fact, Jenewari (1977: 193) writes it as a prefix: ìɓì bùrù ‘good yam’, ìɓì à-ɓùrù ‘good yams’. However ìɓìà bùrù is also possible, since this a- cannot occur if the noun is initial or in isolation (*à-ɓùrù). Thus *a- appears to have undergone resegmentation onto the preceding numeral, quantifier or determiner. In the case of numerals the final -a is always H tone in agreement with the preceding syllable, e.g. tírà ‘three’, iniá ‘four’, súná ‘five’ (monosyllabic ma ‘two’ is L tone). Although the noun had an historical *a- prefix after numerals, we do not believe there was any connective. As a result, the melody is simply L from tone deletion.

This leaves the more complex /HLH/ melody assigned by possessive pronouns. We suggest a tripartite reconstruction of reduction to L both preceded and followed by a H: the first H would be the connective tone, the L from reduction, and the second H from the H of determination. In other words, the HL of /HLH/ is the same as the N₁ + N₂ HL melody, and the LH of HLH is the same melody as assigned by demonstratives and other initial determiners. Recalling from (23c) that possessive pronouns and demonstratives are mutually exclusive, both being spell-outs of the specifier of NP, we can perhaps view final H also as a specifier tone.

With this reconstruction we can now better address question (iii) above, whether a corresponding system could potentially arise in the verb phrase. We think so — and, in fact, it is already happening with respect to the different TAMs
in relative clauses. Further distinctions could potentially arise from different post-
positions marking objects, obliques etc. which could combine with a reduced all L
verb pattern. As mentioned, the head of an XP often undergoes tone reduction (cf. §7),
especially in the case of the verb, which may have fewer or no tonal contrasts
to begin with. This raises the interesting question of whether in such cases the pro-
sodic reduction of heads begins historically in the verb phrase or the noun phrase
— with or without the additional complication of assigned melodies. What we can
conclude from the Kalabari case, at least, is that tone patterns can be assigned by
syntactic construction, something that rarely, if ever, occurs with other phonologi-
cal features. For example, we know of no cases where, say, a possessive nominal
assigns penultimate stress and a demonstrative assigns final stress on a following
head noun. In the next section we compare Kalabari with other languages where
one word determines the tones of another.

7. Other systems resembling Kalabari

In the preceding sections we have proposed a two-step analysis of the facts under
consideration: the tones of non-initial words in an XP are deleted, followed by the
assignment of the specific tonal melodies HL, HLH, LH and L. Further evidence
for this two-step approach comes from the closely related language Nkoroo. As
Akinlabi, Connell & Obikudo (2009:449) show, the N₂ tones of an N₁ + N₂ com-
 pound neutralize as all L when the N₁ ends L:

(57) a. mìndì ‘water’ + íkákí ‘tortoise’ H-H-H → mìndì íkàkì ‘turtle’
    b. dùɔ ‘farm’ + kírì ‘ground’ H-L → dùɔ kírì ‘village’
    c. bɔɔkɔ ‘chicken’ + tɔkú ‘child’ L-H → bɔɔkɔ tɔkú ‘chick’
    d. mìndì ‘water’ + àbànà ‘pit’ L–L–L → mìndì àbànà ‘well’

When the N₁ ends H, however, the tones of N₂ all neutralize as H-L (pp. 449–451):

(58) a. fóní ‘bird’ + bèbè ‘mouth’ H-H → fóní bèbè ‘beak’
    b. bìs ‘leg’ + kírì ‘ground’ H-L → bìs kírì ‘foot’
    c. ánáná ‘sheep’ + tɔkú ‘child’ L-H → ánáná tɔkú ‘lamb’
    d. bìs ‘leg’ + tɔŋgù ‘edge’ L-L → bìs tɔŋgù ‘heel’
    e. námá ‘animal’ + dìmè ‘hair’ H-H → námá dìmè ‘fur’

The most straightforward interpretation is that N₂ reduces to all L followed by
one-syllable H tone spreading from the N₁. A much more widely known similar
situation is found in Shanghai Chinese, where all but the first tone of nominal
constituents is deleted, with subsequent adjustments dependent on the nature of the first tone (see Zee & Maddieson 1980, Selkirk & Shen 1990, among others).

Concerning, however, the constructional nature of the tone assignments in Kalabari, which differs from other Ijo languages (see below), the only other clearly similar cases come from the Dogon languages recently surveyed by Heath & McPherson (2013). In Tommo So, for instance, adjectives and demonstratives cause a preceding head noun of an NP to become all L (McPherson 2012):

\[
\begin{array}{|l|l|l|l|l|}
\hline
\text{noun} & \text{gloss} & \text{tone} & \text{red. to all L} & \text{no red.} \\
\hline
\text{gámmá 'cat'} & \text{H-H} & \rightarrow & \text{gámmá gém} & \text{gámmá nó gámmá tāándú} \\
\text{tàgá 'shoe'} & \text{L-H} & \rightarrow & \text{tàgá gém tāgá nō tāgā tāándú} \\
\text{pàllà 'cloth strip'} & \text{H-L} & \rightarrow & \text{pàllà gém pàllà nō pàllà tāándú} \\
\hline
\end{array}
\]

As the above examples show, the reduction process is anticipatory in Tommo So vs. perseverative in Kalabari. Another difference is that numerals do not condition tonal reduction in Tommo So vs. adjectives in Kalabari. As in Kalabari, intervening modifiers may also be affected by reduction:

\[
\begin{array}{|l|l|l|l|l|}
\hline
\text{black} & \text{this} & \text{three} & \text{three} & \text{these} \\
\hline
\text{cat} & \text{gámmá gém nō} & \text{gámmá tāándú gém} & \text{gámmá tāándú nō=mbé} \\
\text{shoe} & \text{tàgá gém nō} & \text{tàgá tāándú gém} & \text{tàgá tāándú nō=mbé} \\
\text{strip} & \text{pàllà gém nō} & \text{pàllà tāándū gém} & \text{pàllà tāándú nō=mbé} \\
\hline
\end{array}
\]

Although numerals do not condition reduction, we see in (60b,c) that an adjective or demonstrative can cause both the numeral and the preceding noun to become all L. While the above examples are ambiguous between tone deletion and assignment of a L melody, possessive constructions support the latter interpretation. The examples in (61a,b) show that nouns and alienable possessive pronouns assign a L melody to the following noun (McPherson 2012:14–15):

\[
\begin{array}{|l|l|l|}
\hline
\text{H-H} & \text{íi=} & \text{ge} & \text{gámmá L–L 'the child’s cat'} \\
\text{ge = def.} & \rightarrow & \text{wóm} & \text{gámmá L–L 'his/her cat'} \\
\text{L–H-Ø} & \rightarrow & \text{sānā jāndūlu} & \text{L–L-L 'Sana’s donkey'} \\
\rightarrow & \text{mī} & \text{jāndūlu} & \text{L–L-L 'my donkey'} \\
\text{H-H} & \rightarrow & \text{mī bābē} & \text{H–H 'my uncle'} \\
\text{H-H} & \rightarrow & \text{mī áñigē} & \text{H–L–L 'my friend'} \\
\hline
\end{array}
\]

However, as seen in (61c), inalienable possessive pronouns assign H-H to a bisyllabic noun, H-L-L to a trisyllabic noun. It is clear that Tommo So assigns melo-
dies, as in Kalabari, although in this case the conditioning modifier/specifier can be on either side of the head noun.

While it is hard to find other examples of the Kalabari and Tommo So type, where different word classes or constructions assign different melodies, there are analogous systems where phrasal tone assignments are lexically conditioned, i.e. where the different melodies are assigned by words belonging to the same word class. In fact, this is the general case in Ijo, as reported by Williamson (1988): Within a noun phrase, all tones are deleted except those of the first word, which appears to assign an arbitrary (i.e. unpredictable) tone pattern to the remainder of the phrase. A case in point comes from the Bumo dialect of Izon for which Efere (2001: 158–9) sets up the following arbitrary tone classes A–D, where (L) indicates that a word can start with a L tone vowel:

\[(62)\] 

\begin{align*}
A & \quad \text{(L) H + H} \quad \text{first word = all H followed by all H syllables in the phrase} \\
B & \quad \text{(L) H + L} \quad \text{first word = all H; subsequent syllables = L} \\
C & \quad \text{(L) HL + L} \quad \text{first word keeps its HL drop, subsequent syllables = L} \\
D & \quad \text{(L) H + HL} \quad \text{first word = all H, H on first syllable of second word; subsequent syllables = L}
\end{align*}

Classes A–D are illustrated below in the frame … /náná kímí/ ‘man who owns/ has...’ (whose tones are deleted):

\[(63)\] 

\begin{align*}
A & \quad \text{(L) H + H} \quad \text{bélé ‘pot(s)’} \rightarrow \text{bélé náná kímí} \quad \text{(no L: H all the way to the end)} \\
B & \quad \text{(L) H + L} \quad \text{wári ‘house’} \rightarrow \text{wári náná kímí} \quad \text{(L starts on } \sigma_1 \text{ of second word)} \\
C & \quad \text{(L) HL + L} \quad \text{séri ‘scarf’} \rightarrow \text{séri náná kímí} \quad \text{(L starts on } \sigma_2 \text{ of first word)} \\
D & \quad \text{(L) H + HL} \quad \text{ikíé ‘friend’} \rightarrow \text{ikíé náná kímí} \quad \text{(L starts on } \sigma_2 \text{ of second word)}
\end{align*}

Ignoring the initial i- of ‘friend’ (which is irrelevant for tone assignment), classes A, B, and D have all H tones in isolation. However, their tonal effects on the rest of the phrase are different. From the descriptions to the right it is clear that the A–D distinctions have to do with where L tone begins in the phrase: Whereas class C begins its L on the first word itself, and class A does not impose a L, classes B and D assign a L to the first vs. second syllable of the following word. Once a L has been assigned, all successive syllables are L. Building on Efere’s insights, we might propose a Japanese-like analysis with a HL “pitch-accent”:

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In this analysis, the first word contributes at most one HL pitch-accent to the phrase whose H is realized on the indicated syllable, the L beginning on the following syllable. Class A words have no pitch accent and are realized with default H tones. Class B words have pitch accent on their final syllable, while Class C consists of words that have a HL pitch accent on a non-final syllable (hence on either the first or second syllable or a trisyllabic word): together with class B they exploit all of the possible placements of the HL pitch-accent within the first word. Class D words have a floating HL pitch accent and are thus post-accenting: the H goes on the first syllable of the following word, the L on its second syllable. Any syllable following the L will be pronounced L; otherwise the default tone is H.

A similar situation is observed in the Move dialect of Yagaria, a Papuan language of Papua New Guinea. In this language, Ford (1993: 196–7) distinguishes between “stable” (S) and three types of “unstable” (U) adjective classes:

(65) a. S hógà ‘left’ → hógà kàyálè ‘left pig’ (no change) + all L
    S fáipái ‘white’ → fáipái kàyálè ‘white pig’ (no change) + all L
 b. U₁ lòlé ‘two’ → lòlè kàyálè ‘two pigs’ (L–L + L–L-H)
    U₂ fèlá ‘wild’ → fèlá kàyálè ‘wild pig’ (L–L + L-H-H)
    U₃ kòlí ‘scared’ → kòlì kàyálè ‘scared pig’ (L–L + H-H-H)

As seen in (65a), the stable adjectives hógà ‘left’ and fáipái ‘white’ cause the following noun /kàyálè/ ‘pig’ to become all L. In (65b), the unstable adjectives modify their /L-H/ to L–L and have three different tonal effects on the following noun. Here it would appear that the noun undergoes tonal deletion with the /LH/ of the adjective mapping differently according to tone class: the H starts immediately after U₃, on the second syllable after U₂, and on the third syllable after U₁. Perhaps we can attribute this to the distinct representations in (66).²³

(66) U₃ U₂ U₁
    kòlí fèlá lòlé
    LH LH LH

Again inspired by Japanese, unstable adjectives have a single underlying LH pitch accent either on the first syllable (U₃), the second syllable (U₂), or floating after the adjective (U₁). For this to work we have to assume that that H links to the following syllable, followed by a rule of L tone spreading, as in (67).
In (67a) we begin with the LH assignments from (66) with the noun having undergone tonal deletion. In (67b) the H is assigned to the following syllable. In the case of the floating LH of U₁, both tones are assigned to the following noun. This is followed by a rule of L tone spreading, which extends the L to the following syllable. All we need to add is that syllables preceding the L are L and those following the H are H. Although this works, it is not clear if this analysis has merit. We cite it only to show that an analysis in terms of three different underlying representations does not seem terribly unreasonable.

While it is possible to account for Bumo and perhaps also Yagaria by assigning different underlying representations to the tonal classes, such an analysis is not always motivated. As a case in point, consider Urarina, an isolate spoken in Peru, in which most words are pronounced all L with one final H in isolation. However, in the right phrasal context the tonal effect can be quite different. In order to account for these differences, Olawsky (2006:128) distinguishes tonal classes A-D, whose effects are indicated in (68).

(68) class tone pattern determined by A-D class of the phrase-initial word
A first word = L; H is assigned to the initial syllable of the following word
B first word = L; H is assigned to the second or third syllable of the following word depending on syllable weight
C first word = L; H is assigned to last syllable [mora?] of the final word of phrase
D first word keeps its final H tone, the following word being all L

Examples are given in (69).

(69) A raaná ‘peccary (sp.)’ → raana rú.a.kaa ‘he has carried a peccary’
B obaná ‘peccary (sp.)’ → obana rú.a.káá ‘he has carried a peccary’
C reemaé ‘dog’ → reemae rú.a.kaá ‘he has carried a dog’
D makusajarí ‘pepper’ → makusajarí rú.a.kaа ‘he has carried the pepper’
Like Kalabari, Urarina is a head final (OV) language in which the tone of the verb is determined by the direct object. Although lexical classes A-D determine where a single H tone will be realized, it is not clear in this case how one might derive these facts by proposing different underlying representations for the four tone classes of nouns.

While the Bumo, Yagaria, and Urarina tonal outputs are determined by lexical properties of the initial word, not by its word class (or by tone spreading in the case of OV in Kalabari), the similarities are striking. What is clearly needed is a systematic comparison of all known systems where phrase-level tones are exclusively determined by a specific constituent within the respective phonological phrase. Recall that the above phenomena are relatively rare in the world’s languages. Nevertheless, although rather limited, we summarize our survey to date in (70), where the numbers in parentheses refer where the examples are cited in the present paper:24

\[(70) \quad N \rightarrow N^/' \_ Y \quad N \rightarrow N^/ \_ Y \quad V \rightarrow V^/' \_ Y \quad V \rightarrow V^/ \_ Y\]

<table>
<thead>
<tr>
<th>Language</th>
<th>N → N’/Y</th>
<th>N → N’/Y</th>
<th>V → V’/Y</th>
<th>V → V’/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haya</td>
<td>Konbali (3)</td>
<td>Haya</td>
<td>Urarina (69)</td>
<td></td>
</tr>
<tr>
<td>Tommo So (59)</td>
<td>Bumo (63)</td>
<td>Yagaria (65)</td>
<td>Kalabari (45)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tommo So (61)</td>
<td>Shanghai</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barasana (72)</td>
<td>N. Mao (74)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the above table, Y stands for the element determining the tonal realization of a head N or V (indicated as a change to N’ or V’). From the above we arrive at the following five generalizations, all of which need to be tested against a larger sample:

(i) **Generalization 1**: The tonal reductions and melodies mostly involve a modifier, specifier, or (less often) an object targeting the head N or V of an NP/VP. The only potential case we have found where a lexical head triggers a tonal change on a modifier comes from Urarina noun + adjective sequences (Olawsky 2006: 122), as seen in (71).

\[(71) \quad B \ hjaané ‘achiote (tree)’ \rightarrow hjaane lanâhaj ‘red achiote’ (H on second syllable of A)\]

\[C \ hjaané ‘urine’ \rightarrow hjaane lanâhaj ‘red urine’ (H on third syllable of A)\]

Although Olawsky mentions certain complexities concerning adjectives, *lanâhaj ‘red’* is listed as being deverbal and not obviously the head of the above...
construction. It may be significant that the example is a perseverative one, particularly with respect to the next two generalizations.

ii. *Generalization 2:* The tonal effects are more commonly perseverative than anticipatory.

iii. *Generalization 3:* The multiple melody cases are all perseverative. While the perseverative cases can assign melodies or condition simple tone reduction, the anticipatory cases (Haya, Tommo So) involve reduction/assignment of L tone only.

iii. *Generalization 4:* The constructional cases may involve the assignment of distinct tonal melodies, while the lexical cases involve different placements of a tone (H, L).

iv. *Generalization 5:* Only tone can do this. We now take this up in the final section.

8. **Conclusion: What else, if anything, is like this?**

We have seen that tone patterns can be assigned by syntactic construction, something that rarely, if ever, occurs with other phonological features. Whereas featural harmonies and stress assignment are almost exclusively word-bound (though possibly extending to “clitic groups”), the phenomena in Kalabari and the other cited languages provide further confirmation that tone can do much more than any other phonological property at the phrase level (Hyman 2011). This is true in two senses. First, there are phonological operations available only to tone, e.g. one word shifting its underlying tone(s) to an internal position in the next word, as we saw in the analysis of Izon in (64). Second, tone has greater versatility in marking phrasal syntactic properties. Since there does not seem to be anything else quite like the constructional and lexical tonal triggers described in the previous sections, we now raise the question of whether we can relate the above to other phenomena in grammar.

In presenting this work orally, we have posed this question to colleagues. The suggestions we have received is that we should try to relate the tonal melodies of Kalabari to: (i) clitics; (ii) agreement; (iii) case marking; (iv) construct state. The idea behind clitics is that different modifiers would each come in with potential enclitics, =HL, =HLH, =LH, =L, which vie with each other to be realized within the phrase. Since we know of no parallels involving segmental clitics, we do not find this interpretation appealing.²⁵

The Kalabari facts also do not seem to be what we expect of agreement, which should go from lexical head to modifier rather than the reverse. In fact, there are
rare cases of what might more aptly be identified as tonal agreement. As seen in the following table, in Barasana, a Tukanoan language of Colombia, possessive pronouns copy their tone, here H-H vs. H-L, on the possessed noun (Gomez-Imbert & Kenstowicz 2000: 438–9):26

\[(72) \quad \begin{array}{|c|c|}
\hline
\sim\text{kúbú} \,(H-H) \,\text{‘shaman’} & \sim\text{bídì} \,(H-L) \,\text{‘pet’} \\
\sim\text{bádí} \,(H-H) \,\text{‘our’} & \sim\text{bádí} \sim\text{kúbú} \\
\sim\text{idà} \,(H-L) \,\text{‘their’} & \sim\text{idà} \sim\text{kúbú} \\
\hline
\end{array}\]

Clearly there is no such surface agreement in Kalabari or the other cited cases.

Another suggestion for comparison is case. Our hypothetical *H connective should of course be identified as a genitive case marker. But what about the other melodies? Again, where is the language in which nouns, possessive pronouns, numerals, and demonstratives assign different segmental case markers?

This leaves the idea of the construct state, where nouns have special forms in different syntactic configurations. Creissels (2009) surveys phenomena in African languages which he interprets as construct state, “a general label for noun forms that are obligatory in combination with certain types of noun dependents” (p. 74). This includes a tonal example from Tswana, where nouns ending H-H have an alternative H-L realization if followed by certain dependents, including a demonstrative, genitive, adjective, or relative clause (p. 80). He also considers the case of Mende where nouns have both a free and construct form. In the following examples, ndopó ‘child’ is in free form, while the second nouns appear in the construct state form:

\[(73) \quad \begin{array}{|c|c|}
\hline
\text{Free forms} & \text{“Construct state” forms} \\
\text{tokó} \,\text{‘arm’} & \text{ndopó-i lok-í} \,\text{‘the child’s arm’} \\
\text{ngíla} \,\text{‘dog’} & \text{ndopó-i yile-í} \,\text{‘the child’s dog’} \\
\hline
\end{array}\]

Creissels (1994: 152ff) analyzes the free forms as having an underlying nasal prefix which is lacking in the construct state forms. Similar facts occur in closely related Kpelle (Welmers 1969). In the cases Creissels reports, it is the head noun that is affected, not a full phrasal domain. Unless we bring in different series of consonant gradation as found, say, in Fula (Arnott 1970), there is usually a binary contrast between two forms (cf. also N. Mao in the next paragraph). We thus again do not know of anything comparable to Kalabari whereby nouns (and intervening modifiers) have multiply distinct syllable shapes or other segmental realizations after another noun vs. possessive pronoun, numeral or demonstrative.
A rather interesting tonal construct state phenomenon is found in Northern Mao, an Omotic language spoken in Ethiopia, brought to our attention by Gwendolyn Hyslop and Mary Pearce. According to Ahland (2012: 145), “… the [nine] citation melodies of two-syllable nouns (the vast majority of nouns in the language) collapse into three melodies when they are modified by any element: MM, ML and LL,” as seen in the following table:

(74) Citation Tone Classes “Construct Noun Melody”

<table>
<thead>
<tr>
<th>Citation Tone Class</th>
<th>Construct Noun Melody</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-H₁</td>
<td>&gt; M-M</td>
</tr>
<tr>
<td>H-H₂, H-L₂, L-H</td>
<td>&gt; L–L</td>
</tr>
</tbody>
</table>

As indicated by the subscripts, there are two H-H and two H-L classes which have the same citation forms, but exhibit different behavior with respect to their construct noun tone. The above changes take place on the noun independent of the nature of the preceding modifier or its tone (Ahland 2012: 147–9):

(75) a. k’ëts’ë ‘land’ H-H₁ → if/k’ëts’ë M-M ‘the land’
     → nà k’ëts’ë M-M ‘this land’

b. p’îfè ‘child’ M-M → if/p’îfè M-L ‘the child’
     → nà p’îfè M-L ‘this child’

c. múnts’è ‘woman’ H-L → if/múnts’è L–L ‘the woman’
     → nà múnts’è L–L ‘this woman’

However, this phenomenon is quite different: Whereas modifiers intervening between the initial word and the head noun are targeted by the tonal melodies in both Kalabari and Tommo So (recall (60)), “…only the head noun/nominal (i.e. whatever serves as the head of the NP) takes on the construct form” (Michael Ahland, personal communication). While it is possible to adopt the term, there is no known segmental parallel which distinguishes several different “construct forms”. In this case one may ultimately attribute this to a quantitative, rather than qualitative difference between tonal and segmental marking. Cf. Hyman (2011: 214):

“Tone is like segmental phonology in every way — only more so!

a. Quantitatively more so: tone does certain things more frequently, to a greater extent, or more obviously (i.e. in a more straightforward fashion) than segmental phonology.

b. Qualitatively more so: tone can do everything segments and non-tonal prosodies can do, but segments and non-tonal prosodies cannot do everything tone can do.”
Although it has not been our intention to provide a formal implementation of the above facts from Kalabari, let us conclude by briefly asking the question of how such phenomena should be analyzed. While Hayes’ (1990) “precompiled phrasal phonology” seems related, it would be quite complex to apply it to the Kalabari case. In Hayes’ framework certain rules apply lexically but come with a specific syntactic frame in which the derived forms must be lexically inserted. One might therefore be tempted, for example, to propose a morphological HLH tonal override which requires that the word be inserted after a possessive pronoun, e.g. /pulo/ ‘oil’ → pú↓ló / ]_POSSPRO __. Recall, however, from (12) that this HLH melody is distributed over as many words as follows the possessive pronoun. In such cases it would seem counter-intuitive to apply separate lexical tone rules to each of these words. Rather, the assignment of the melody and its mapping are clearly phrasal.

Also seemingly related, and although applying at the phrase level, the above phenomena have all of the properties of lexical “co-phonologies” (see Inkelas 2011 and references therein). Setting up a set of constraints that have different rankings seems particularly appropriate in the Bumo, Yagaria, and Urarina cases, where different lexical items determine where a H tone is placed or a drop to L begins on the lexical head. One might therefore attempt to do the same with different constructions in conflict, each of which has its own “preferences” for how the phrasal tones should surface.

For us, what is interesting is how tone, more than any other phonological property, provides the linguistic glue holding together the various parts of the grammar. There is a wide range of tonal phenomena which seem related to morphology, which is why agreement, case, and construct state have been proposed as analogues to the Kalabari melodies (but not, presumably, to the lexical classes in §7). This presumably has to do with the medium (pitch), syntagmatic aspects of which speakers can and do package in a wider range of ways than any other phonological property. As seen above, this results in rather impressive phrase-level tonology, only some of which has been described, let alone analyzed at the present time.

Notes
* Our thanks to Sharon Inkelas for suggesting the connection to construction morphology (Booij 2010). Earlier versions of this paper were presented at the University of California, Berkeley (Feb. 27, 2012), the Fifth Conference on Tone and Intonation in Europe (TIE5), Oxford University (Sept. 8, 2012), the Laboratoire de Phonétique et Phonologie, Université Paris 3 (Oct. 19, 2012), the Universität Zürich (Nov. 2, 2012), and the University of Pennsylvania (March 28, 2013). Our thanks to the audiences at these presentations for their comments and suggestions, especially Laura McPherson, Mark Van de Velde, Balthasar Bickel, and Jeff Heinz. The first
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1. All of the data presented in this study are from the Asari dialect of Kalabari, as spoken by the first author. For further information on the grammar of Kalabari see especially Jenewari (1977).

2. In these and all examples an acute (´) accent marks H(igh) tone, while a grave accent marks L(ow) tone. The raised descending arrow (↓) indicates a following downstepped H tone, a pitch level intermediate between H and L, which derives from an unlinked “floating” L tone wedged between two H tone syllables, e.g. /sá`kí/ → sá↓kí ‘begin’ in (1b). Kalabari has a system of nine vowels, eight of which are distinguished by their Advanced Tongue Root feature: /i, e, u, o/ are [+ATR], while /ɪ, ɛ, ʊ, ɔ/ are [−ATR]. Due to a system of ATR vowel harmony which affects roots, affixes, and proclitics, vowels from the two sets generally do not co-occur. The vowel /a/, however, can occur with either set, hence sá↓kí ‘begin’ vs. pákɪ̀ ɪ̀rɪ́ ‘answer’. For more on the nature and areal distribution of African ATR systems see Casali (2003) and Clements & Rialland (2000); for more on Kalabari, see Jenewari (1977) and Akinlabi (1997).

3. Evidence for the logical separation of the two steps will be seen in §5, where verb tones are deleted after a direct object without a specific melody being assigned.

4. When N2 is modified, the result is of course non-ambiguous. Thus, féní wárɪ̀ can mean ‘bird’s house’ or ‘nest’ (lit. ‘birdhouse’), while féní ṭọ́pù wárɪ̀ ‘bird’s big house’ is unambiguously phrasal.

5. For the sake of simplicity we will generally avoid examples where the N2 is monosyllabic or vowel-initial, which sometimes affect how the tonal melodies are mapped. For example, when the HL melody is assigned to a monosyllabic noun, either the L is not realized, or the vowel lengthens to accommodate it: /tòbò/ ‘child’ + /sò́/ ‘sky, heaven, destiny’ → tòbò sò ~ tòbò sòò ‘child’s destiny’. Similar realizations are observed when the second noun has the shape VCV: /ákò/ ‘bee’ + /ásò́/ ‘odor’ → ákò ásò ~ ákò ásòò ‘bee odor’. The expected form ákò ásò with HL assigned to the N2 by underlying syllable can be heard only in very careful, perhaps unnatural speech. Similarly, melodies are assigned starting with the first CV of longer V-initial nouns: /tòbò́/ ‘child’ + /òbìrì/ ‘dog’ → tòbò́ òbìrì ‘child’s dog’. We also ignore the fact that the first vowel of V+V sequences is normally elided. None of these minor complications affects the basic issues being discussed here, namely the assignment of tonal melodies by construction. For more discussion, see Harry (2004).

6. Differing slightly from the HL melody (note 6), HLH requires that the vowel of a monosyllabic or VCV noun lengthens: /sò́/ ‘sky, heaven’ → i só↓ó ‘my destiny’; /ìlā́/ ‘intestines’ → iyè ìlā̀á ‘my intestines’. The HLH melody skips over the initial vowel of longer V-initial nouns: /òbìrì/ ‘dog’ → iyè òbì́rì ‘my dog’. As seen in the last two examples, longer pronominal allomorphs are used before V-initial words. This does not affect the tonal assignments.

7. We have no explanation for this other than to note that it is as if the L tone V pronoun forms a prosodic constituent with the first syllable of the noun, i.e. i + námà → (1 na) (ma), with the /HLH/ melody then being assigned to the remaining syllable (ma).

8. There is one exception to this statement. The possessive pronoun ànì ‘its’, which was seen in (9), has a second function as a distal demonstrative. Thus, ànì ná₄₄má can mean ‘its animal’ or
‘that animal’ (Harry 2004:67). Despite its innovative demonstrative function, âni still assigns the possessive /HLH/ melody.

9. In order not to interfere with the tone marking, nasalization is transcribed by a tilde under the vowel, e.g. tɔ́wá ‘many’.

10. Certain higher numbers and bébé ‘whole’ also assign HL and are also presumably nouns: sí fɛnì ‘twenty birds’, bébé sàní ‘whole pepper’, etc.

11. We of course cannot distinguish between L tone spreading vs. default L assignment. Minimally, we have to say that the preceding H of ‘your’ spreads onto these nouns.

12. These categories are Factative (FACT), Progressive (PROG), Future (FUT), and Perfect (PERF). That the factative has a floating H that creates a HL melody directly supports the diachronic origin of HL that we propose in §6. It may not however always be present: another variant of ‘bad animal’ is si nàmá, where the noun is realized all L.

13. Another modifier which exceptionally does not affect the base tone of the following noun is jé ‘another’: jé fɛnì ‘another bird’, jé fɛnì ‘another fire’, jé bélè ‘another light’, jé gài ‘another garri’, jé wàrì ‘another house’. However, since jé occurs in absolute initial position and is mutually exclusive with both demonstratives and possessive pronouns, we consider that it is not an adjective, but rather a specifier within the DP (cf. (23a)).

14. In (11) and (12) we already saw that the HL melody assigned by the possessive pronoun overrides the HL melody that an N1 would have assigned to an N2. Thus /ì + fénì + námà/ ‘my bird’s meat’ is realized ì fèní nàmá and not *ì fé ènì námà, where the pronoun assigns HLH to the N1 ‘bird’, and ‘bird’ assigns HL to the N2 ‘meat’.

15. Although we have seen the HL melody to be associated with a N1 + N2 construction, the HL variants in (25) are the first indication that HL may be in the process of becoming an alternative default assignment in complex constructions. Re (25b), recall that the longer allomorphs of the possessive pronouns are required before a vowel, a detail of the language which has no effect on the assignment of melodies (cf. note 6).

16. Note that the phrases in (30) and (31) can in fact end with a final H% boundary tone, which marks emphasis on utterances that end with either underlying or derived L. Thus compare also the normal realization of the numeral L melody in sɔ́nà ìbì wàrì ‘five good houses’ with emphatic sɔ́nà ìbì wàrì. Perhaps related to this is that imperatives also end H, e.g. yé ènì wà dërì ‘let’s laugh!’ (‘dërì/ ‘laugh’). We ignore emphatic final H% in this study.

17. Higher numbers might also appear to be exceptions, e.g. fɛnì má sì ‘forty birds’ (< /fɛnì + mà + sì/; lit. ‘birds two twenties’; cf. si fɛnì ‘twenty birds’), fɛnì mákpà ‘four hundred birds’ (< /fɛnì + mà + âkpà/). However, in these cases the head noun /fɛnì/ acts as the modifier on the numerals, assigning them a HL melody, as expected.

18. Curiously, downstep insertion does not apply in N1 + N2 constructions. Thus recall èkpé námá ‘he-goat’s meat’ from (5d). While downstep insertion is a very unusual rule whose history is not completely understood, we speculate that it has to do with protecting the H of word-final L-H, since a L-H-H sequence has a tendency to become L-L-H (Hyman & Schuh 1974:98). This in fact does optionally occur in N1 + N2, hence the variant èkpé námá.
19. If the assimilation is interpreted as autosegmental spreading, this would mean that the L inserted by rule (34) would have to split up the multilinked H. This and similar such phenomena are discussed by Hyman (2014).

20. The full TAM forms are in fact found only in main clause affirmative declaratives, i.e. not in negative, interrogative, copular, or relative clauses.

21. Also like N₁ + N₂ + N₃, there is some flexibility in assigning the HL melody. Thus, the factative and perfect forms can also be realized dëri pìrì nàmà bë and dëri të pìrì nàmà bë with the HL melody assigned to the first noun of the compound. This supports our claim in (28) that the two mappings of HL have nothing to do with left- vs. right-branching.

22. Although not discussed here for reasons of space, the final definite marker can condition the same H + ↑H sequence in relative clauses seen above in §4: pùlò fùrù tòbè ~ pùlò fùrù tòbè tòbè 'the child that stole the oil'. What this potentially means is that there is a competition between the HL melody coming from the TAM marker vs. the LH that definiteness would like to impose. The downstep is from rule (34).

23. Unfortunately, Ford does not give enough information to determine if all unstable adjectives are L-H, or what the tonal possibilities are of stable adjectives. Neither of the two which he gives has L-H tone, as seen in (65a).

24. Among the languages not mentioned thus far, Haya nouns and verbs lose their H tones when followed by certain modifiers/complements (Hyman & Byarushengo 1984), while the Barasana and N. Mao phenomena are presented below in (72) and (74), respectively.

25. Concerning Ijo in general, Williamson (1988) analyzes tonal classes such as Izon’s A-D as having different floating tones to assign to the rest of the noun phrase (often with OCP violations). For an interesting parallel analysis in San Marcos Zacatepec Eastern Chatino (Otomanguean, Mexico), see Woodbury (2012).

26. The tilde ~ marks a nasal prosody on the whole morpheme.

References


**Corresponding author’s address**

Larry M. Hyman
Department of Linguistics
University of California, Berkeley
1203 Dwinelle MC 2650
Berkeley, CA 94708
USA
hyman@berkeley.edu