

# Tonal puzzles in 3 Krumen languages (SW of Côte d'Ivoire): phonological, grammatical and historical issues <sup>1</sup>

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## Abstract

This article highlights the tonal systems of three **Krumen languages** spoken in southwestern Ivory Coast: **Tepo** [ted], **Plapo** [ktj], and **Piè** [pye]. These languages are part of the Grebo complex, which belongs to the **Western branch** of the Kru language family as opposed to the **Eastern branch**.

We pursue two objectives:

a) To present the **tone system in the Krumen language cluster** and the **various tone change rules**.

There are three tone levels in each of the three Krumen variants: high, mid, and low. There are **two low tones**: **La**, which is a **stable tone**, and **Lb**<sup>3</sup>, which is a **tone that triggers tonal changes**. The Lb tone is either linked to a tone-bearing unit, or it is not; in the latter case it is a **floating tone, marked by brackets (Lb)**. In special environments, it undergoes linking.

The two low tones **La** and **Lb** coexist at the **same tonal level**, which is indeed puzzling. However, this can be explained by comparing the La and Lb tones with the corresponding tones in the neighbouring Liberian **Southern Grebo** language [grj], where they occur at different levels.

b) To provide new insights into the discussion regarding the expression of the **perfective aspect**, i.e. the **use of a low tone on the verb stem or a bare verb stem**. Low tone on the verb stem to mark the perfective aspect has been considered to be a distinctive characteristic of Eastern Kru, whereas in Western Kru, the perfective aspect has been believed to be expressed by a bare verb stem.

However, this study reveals that the **perfective aspect is also expressed by a low tone** affecting verb stems **in the Krumen cluster**, which belongs to **Western Kru**. This fact has remained unknown because this low tone often remains hidden and only surfaces in specific environments. This perfective low tone is actually the **Lb** low tone as described under a) above, which **partially affects the verb stem in various ways** depending on the following factors: the **verb tone class**, the **specific tone change rule applied** as described under a), and the **language** (Tepo, Plapo or Piè).

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Cf. Chapters on tone in: Thalmann, 1987:14s., 61ss., 2026 revised.

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<sup>3</sup> We use the symbols **La** and **Lb** instead of the conventional form **L<sub>a</sub>** and **L<sub>b</sub>** for easier readability.

# 1 Introduction

This study of tone in three languages of the **Krumen cluster** builds upon the findings presented in the tonology section of *Éléments de grammaire kroumen tépo* (Thalmann, 1987:14ss.), while expanding the scope to include Krumen **Plapo** and Krumen **Piè**.

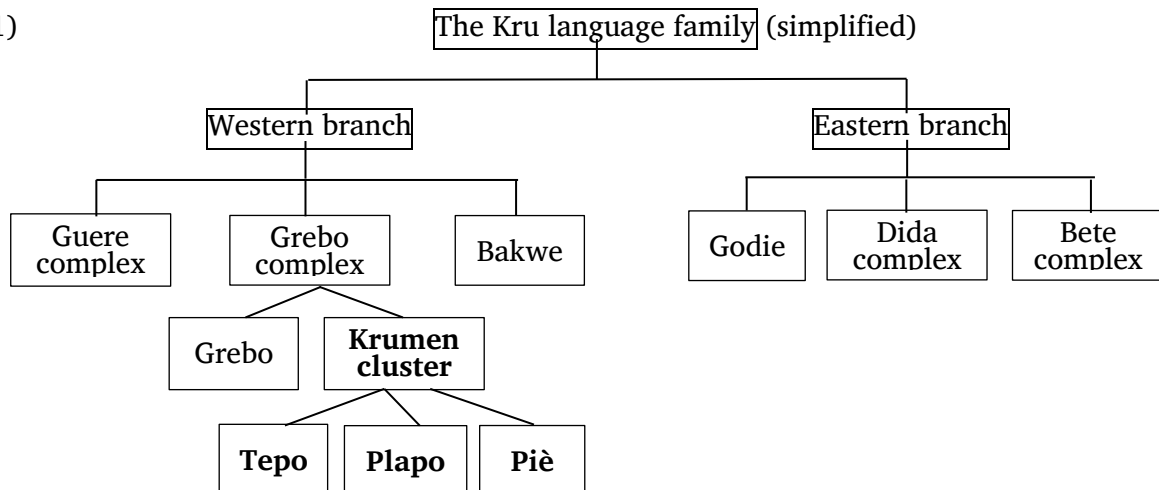
Our intention is to present this paper in a way that is accessible also to readers who do not have specialized linguistic skills. For those unfamiliar with the concept of *tone languages*, we recommend starting with section 2.1 **Tone inventory**.

## 1.1 Linguistic classification

**Krumen** (French spelling: **kroumen**<sup>4</sup>) is a cluster of languages or language variants found in the **Western branch** of the Kru language family, as opposed to the **Eastern branch**. See map 6.2.1 **THE KRU LANGUAGE FAMILY**. Its exact placement within the larger Niger Congo phylum is still debated till today (Marchese, 1983, 1989). Williamson and Blench (2000:11-42) have recently suggested that Kru is part of West Volta-Congo, alongside Gur-Adamawa. In **Western Kru**, there appear to be at least two main divisions: the **Wè/Guere complex** (Guere, Wobe, Glaro, Krah) and a **Kru cluster**, the internal divisions of which are not yet well understood (Marchese, 1983).

Within this **Kru cluster**, we find the **Grebo complex**, which contains the **Krumen language cluster**, located in **southwestern Côte d'Ivoire**. It includes **Tepo** [ted], **Plapo** [ktj] and **Piè** [pye]<sup>5</sup>. See map 6.2.2 **THE KRUMEN CLUSTER**, #8, #9. Tepo, Plapo and Piè are the most prominent language variants within this cluster.

(1)



## 1.2 Objective

In this article, we pursue **two aims**, the second being the main one.

a) To show some aspects of **tonal change in the Krumen language cluster**.<sup>6</sup>

As will be shown in section 2.2, there are **two low tones**, a **stable low tone**, which we refer to as **La**, and a **tone, which triggers tonal changes**, referred to as **Lb**<sup>7</sup>. The latter is either linked to a tone bearing unit, or it is not, in which case it is a **floating tone, marked by brackets (Lb)**. As a floating tone, it undergoes linking in specific environments.

The coexistence of two low tones **La** and **Lb** is indeed a puzzling fact, which can however be explained through comparison with the neighbouring **Southern Grebo** language [grj] (referred to as *Grebo* in this article), spoken across the border in southeastern Liberia (see Innes: 1966). The **Krumen languages** and **Grebo** are all **part of the Grebo complex**.

<sup>4</sup> also “krou”

<sup>5</sup> The language codes in square brackets are quoted from the Ethnologue <https://www.ethnologue.com/>

<sup>6</sup> Boxes are used to highlight important issues, allowing a rapid read-through of the paper.

<sup>7</sup> We use the symbols **La** and **Lb** instead of the conventional form  $L_a$  and  $L_b$  for easier readability.

For comparison between the two tone systems see (19) and 6.1 Tone systems in Southern Grebo and Tepo Krumen.

In the Krumen cluster, which is part of the Grebo complex, the tone system is governed by a number of tone change rules (see section 3), whereas in Bete, an eastern Kru language (cf. 6.2.1, #17), the tones are mostly stable; Wehrle & Gbalehi (1976:184ss.) only describe tone lowering in associative constructions in Bete – similar to (44) in the languages of the Krumen cluster.

Our study of three variants of Krumen reveals that going from west to east (Tepo – Plapo – Piè), the number and importance of tone changes decreases.

**b)** To contribute new insights to the discussion on the expression of the **perfective aspect**. In terms of verbal aspect, Marchese (1979, 1983:30ss., 1986:29ss.) posits for proto-Kru the **distinction perfective – imperfective**.<sup>8</sup>

This is also the basic aspectual distinction in Krumen Tepo, Plapo and Piè.

Marchese (1986:34-35) further states that «in **Western Kru** the perfective aspect (also called factative, Welmers 1973:346) is expressed by a **bare verb stem**, while in **Eastern Kru**, the perfective aspect is expressed by **low tone** on the verb stem...».

Interestingly, however, evidence of **low tone perfective verb stems** are also found in **Krumen, which belongs to the Western branch**.

### ***Survey of contents***

The main body of this article is structured as follows:

- a) In **section 2 The tonal system**, we identify the tones in each of the three Krumen languages. In **section 3 Tonal changes explained by universal tone change rules**, we first give a concise overview of the tone change rules with illustrations (3.1) before showing their application in more detail (3.2).
- b) In **section 4 The low tone perfective marker**, we focus on the various ways in which the perfective aspect is expressed in each of the three Krumen languages.

## **1.3 Geographic background**

The Krumen area forms a triangle reaching from **San Pedro** to the Liberian border to the west of **Tabou**, extending north to the **Taï forest** and south to San Pedro. Its extension corresponds to that of the **Krumen language cluster, which in turn consists of three variants**:

- a) **Tepo** [ted] (tèpò-wì *Tepo-language*), spoken by an ethnic group named Tepo. The main villages are Grabo (glàgbù) (S/P) and Olodio (hlòdìù<sup>9</sup>) (S/P).
- b) **Plapo** [ktj] (plāā-wì *Plapo-language*), spoken by the Plapo people, who live around Tabou (S/P), a coastal town.
- c) **Piè** [pye] (pié), spoken by the Piè ethnic group and by various neighbouring ethnic groups, living between Grand-Béréby (S/P) and San Pédro (S/P). On the maps, Piè is referred to as *Bereby Kru*.

What is the *relationship between Tepo and Plapo* on the one hand, and *between the Tepo/Plapo*<sup>10</sup> *group and the Piè group* on the other?

With regard to the first question, we note that Tepo and Plapo might be considered dialects of the same language. But it takes some time for speakers to be able to understand each other. There are also some important differences in tone patterns, vocabulary, the verb system (especially the imperfective aspect), as well as word order.

<sup>8</sup> See [https://en.wikipedia.org/wiki/Grammatical\\_aspect](https://en.wikipedia.org/wiki/Grammatical_aspect)

<sup>9</sup> < hlò rivière du Tabou + diù village

<sup>10</sup> The morpheme **pò** ~ **pè** means *people*.

As far as Tepo/Plapo (Western Krumen) versus Piè (Eastern Krumen) is concerned, there is no intercomprehension between the two groups. One might compare the distance to that between Italian and Portuguese. For more details, see the Dialect Survey by Maire and Thalmann (1980). There is a neat language frontier along the Dodo river in the area where the SOGB society<sup>11</sup> is located.

The linguistic distance between the Tepo/Plapo group and the Piè group may be explained by the migration history of the two groups. Whereas both groups have their origin in Liberia, the Tepo/Plapo first moved north and were later pushed south by pressure from populations speaking Mandé languages, while the Piè are said to have come directly from Liberia to the Béréby area. The Piè group, although located much further away from the Liberian border than the Tepo/Plapo group, harbours a significantly larger share of English loan words in its lexicon than the latter group, although it was more directly exposed in recent times to English as spoken by next door Liberian neighbours.

As already mentioned, in all three Krumen languages, we find a **low tone perfective** (or factative, Welmers 1973:346) **marker**. In the Tepo/Plapo group, this marker shows up on mid and low tone verbs, whereas in the Piè group, it occurs with all verb tone classes: H, LH, M and L.

## 1.4 Language features

Among the salient characteristics of Kru languages let us mention the following:

- **Phonology**: There is a tendency towards monosyllabism. The preferred syllable structures are V, CV or CLV. A given syllable is either oral or nasalized and is characterized by tone (H, M, La, Lb, LbH). Tepo/Plapo have 9 vowels, Piè has 12. There is limited vowel harmony. Intervocalic consonants in Tepo/Plapo are voiced or unvoiced whereas in Piè they are always voiced. Nasal consonants are allophones of oral consonants.

- Basics of **syntax** are the same across the board:

The word order is **S V E**, i.e. Subject – Verb – Expansion (=Object or Adverbial) or **S Aux E V** (Subject – Auxiliary verb – Expansion – Verb).

As for **information structure**, topicalization and focalization occur frequently. Focalization of one of the constituents S, V, E is obligatory in clauses where there is no inherent focalization of the whole clause (through subordination, negation, etc.).

Focus on the expansion E (objet or adverbial) is marked by back or front shifting (to the end or to the beginning of the clause): S Aux V E or E S Aux V.

Focus on the verb is marked by the morpheme **nĩ** ~ **ní**, which belongs to the verbal constituent. The marker **nĩ** occurs in clauses without auxiliary: S V (E) **nĩ**, while **ní** occurs in clauses with auxiliary: S Aux (E) **ní** V. The presence of **nĩ** is obligatory in clauses of the type S-V.

- **Tense/Aspect/Mood (TAM)**: The auxiliaries are part of the TAM system, cf. Marchese, 1986, *Tense / Aspect and the Development of Auxiliaries in Kru Languages*.

The most important **distinction** within the realis mood is **between the perfective and the imperfective aspect**, while the irrealis mood is expressed by *the potential* and *the intentional*<sup>12</sup>, as well as by the *imperative/injunctive*.

In the Krumen cluster, categories of aspect and mood are expressed by auxiliaries, verb stem markers, as well as predicative markers. Tense is often left implicit or expressed by adverbial morphemes optionally inserted into the verb phrase after the verb or the auxiliary verb.

Let us present here the ways the three Krumen languages signal the **perfective/imperfective** distinction. (We use independent clauses to maintain the basic word order, either S-O-V or S-Aux-O-V.)

<sup>11</sup> Société des Caoutchoucs de Grand Béréby

<sup>12</sup> In Tepo/Plapo, the *potential* occurs in independent clauses, while the *intentional* occurs in dependent clauses.

The examples contain the words  $\bar{u}$  *they* /  $\bar{p}\bar{i}$  *to cook* /  $\bar{g}\bar{b}\bar{a}/\bar{k}\bar{p}\bar{a}$  *to take* /  $\bar{d}\bar{e}$  *something* /  $\bar{t}\bar{e}/\bar{m}\bar{o}'$  *as*<sup>13</sup> and express the meanings  
*As they cook/take something (imperfective aspect)*  
*As they cooked/took something (perfective aspect).*

(2) Aspectual distinction imperfective/perfective

|                              | Tepo                                                                                                                                          | Plapo                                                                                                                                                            | Piè                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Imperfective markers</b>  | a) auxiliary $\bar{j}\bar{n}\bar{e}/-\bar{v}$                                                                                                 | a) auxiliary $\bar{j}\bar{i}$<br>b) derivative morpheme $-\bar{e}$                                                                                               | b) der. morpheme $-\bar{e}$                                                                                                                     |
| <b>Imperfective examples</b> | $\bar{t}\bar{e} \bar{u}-\bar{v} \bar{d}\bar{e} \bar{p}\bar{i}^{14}$<br>$\bar{t}\bar{e} \bar{u}-\bar{v} \bar{d}\bar{e} \bar{g}\bar{b}\bar{a}$  | a) $\bar{t}\bar{e} \bar{u} \bar{j}\bar{i} \bar{d}\bar{e} \bar{n}\bar{i} \bar{p}\bar{i}$<br>b) $\bar{t}\bar{e} \bar{u} \bar{g}\bar{b}\bar{e}^{15} \bar{d}\bar{e}$ | $\bar{m}\bar{o}' \bar{u} \bar{p}\bar{i}\bar{e} \bar{d}\bar{e}$<br>$\bar{m}\bar{o}' \bar{u} \bar{k}\bar{p}\bar{e}^{13} \bar{d}\bar{e}$           |
|                              | <i>As they cook (pī) / take (gbā/ē, kpā/ē) something.</i>                                                                                     |                                                                                                                                                                  |                                                                                                                                                 |
| <b>Perfective marker</b>     | derivative low tone ( <b>Lb</b> ) morpheme; surfaces in specific tonological contexts, see section 4.2.2 for M tone verbs                     |                                                                                                                                                                  |                                                                                                                                                 |
| <b>Perfective examples</b>   | $\bar{t}\bar{e} \bar{u} \bar{p}\bar{i}(\text{Lb}) \bar{d}\bar{e}$<br>$\bar{t}\bar{e} \bar{u} \bar{g}\bar{b}\bar{a}(\text{Lb}) \bar{d}\bar{e}$ | $\bar{t}\bar{e} \bar{u} \bar{p}\bar{i}(\text{Lb}) \bar{d}\bar{e}$<br>$\bar{t}\bar{e} \bar{u} \bar{g}\bar{b}\bar{a}(\text{Lb}) \bar{d}\bar{e}$                    | $\bar{m}\bar{o}' \bar{u} \bar{p}\bar{i}(\text{Lb}) \bar{d}\bar{e}$<br>$\bar{m}\bar{o}' \bar{u} \bar{k}\bar{p}\bar{a}(\text{Lb}) \bar{d}\bar{e}$ |
|                              | <i>As they cooked / took something</i>                                                                                                        |                                                                                                                                                                  |                                                                                                                                                 |

The table shows that the **imperfective aspect** is marked

a) by the *auxiliary* verb  $\bar{j}\bar{n}\bar{e}/\bar{j}\bar{i}$  in Tepo/Plapo

and/or b) by the *derivative morpheme*  $-\bar{e}/\bar{e}$  in Plapo and Piè.

In Plapo, strategy a) is used with verbs containing a front vowel, while strategy b) is used with verbs containing central and back vowels.

In Piè, sentences that contain mid or low tone verbs ending in  $-\bar{e} / -\bar{e} / -\bar{o}$  are ambiguous as to the distinction between perfective and imperfective aspect,

e.g.  $\bar{m}\bar{o}' \bar{u} \bar{k}\bar{l}\bar{e} \bar{d}\bar{e} \bar{l}\bar{e}$  (... , to carry, thing, head) has two meanings

*as they carried sth on their heads (perfective) /*

*as they are carrying/carry sth on their heads (imperfective)*

and  $\bar{m}\bar{o}' \bar{u} \bar{b}\bar{r}\bar{o}$  is either *as they sang* or *as they are singing/as they sing*.

The **perfective aspect** is marked by the **low tone derivative morpheme (Lb)**<sup>16</sup>. It often remains hidden as a floating tone, as in the above examples. It surfaces in specific tonological contexts, as will be explained in section 4 **The low tone perfective marker** according to tone class and language. That subject is a main point of this paper.

<sup>13</sup>  $\bar{m}\bar{o}' > \bar{o}' =$  L tone followed by an unlowered H tone in contrast to  $\bar{m}\bar{o} =$  L tone followed by a lowered H tone, see section 2.1.

<sup>14</sup> Example with  $\bar{j}\bar{n}\bar{e}$ :  $\bar{t}\bar{e} \bar{u}-\bar{v} \bar{g}\bar{b}\bar{l}\bar{a} \bar{p}\bar{i}$  *as they cook rice* >  $\bar{t}\bar{e} \bar{u} \bar{j}\bar{n}\bar{o} \bar{p}\bar{i}$  *as they cook it* ( $\bar{j}\bar{n}\bar{o} < \bar{j}\bar{n}\bar{e} + \bar{o}$ )

<sup>15</sup>  $\bar{g}\bar{b}\bar{a} + \bar{e} > \bar{g}\bar{b}\bar{e} / \bar{k}\bar{p}\bar{a} + \bar{e} > \bar{k}\bar{p}\bar{e}$

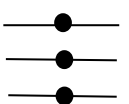
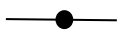
<sup>16</sup> Emmanuel-Moselly Makasso reports about the perfective derivative morpheme in Bassa [bsq] (Liberia) in <https://journals.co.za/doi/epdf/10.5774/62-0-892>

## 2 The tonal system

### 2.1 Tone inventory: four tonemes (H, M, La, Lb) on three levels

The Krumen languages are tone languages, like many other languages in all the continents of the world. The words differ not only by **consonants** and **vowels**, but also by **tones** (like pitches in music)<sup>17</sup>.

In the *Atlas Linguistique Kru* (1983:148), Marchese notes that all Kru languages studied have either four or three tone levels.<sup>18</sup> The Krumen cluster – Tepo, Plapo and Piè – fits the general picture of the Kru languages: All three languages are characterized by a **three-level** tone system – high / mid / low:

- (3)  high level > **H** tone  
 mid level > **M** tone  
 low level > **L**: **La** tone and **Lb** tone  **LbH** tone sequence

As will be shown in sections 2.2 and 6.1, there are two distinct tonemes, both placed on the low level: **La** and **Lb**.

Each syllable of a given word is a potential tone bearing unit TBU; e.g. the vowel « a » is a carrier of one of the **four level tones**: **H** (á), **M** (ā), **La** (à) and **Lb** (ǎ).

In addition, we find the **tone sequence** of a Lb low tone followed by a high tone: **LbH** (ǎ), which is realized as a low tone with a slight rise.

If the **Lb** tone is a floating tone, i.e. without being attached to a vowel, it is put into brackets > (**Lb**).

Falling and rising tones (HL, ML, LH, LM) are found as a result of the application of tone change rules; see 3.1 The tone change rules (TR) – an overview.

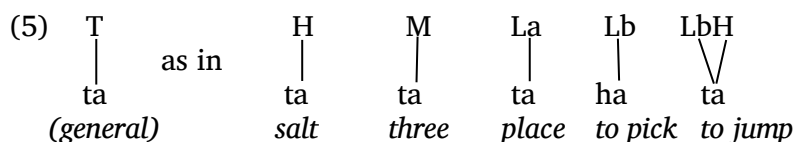
In this paper, we use two ways of marking tone:

- By **accents** on the vowels as seen in the subject pronouns above and in the examples below; see (4): *acute* (H), *macron* (M), *gravis* (La and Lb) and *caron*, an inverted circumflex (LbH).

(4)

| <b>H</b>    | <b>M</b>     | <b>La</b>    | <b>Lb</b>      | <b>LbH</b>     |
|-------------|--------------|--------------|----------------|----------------|
| tá          | tā           | tà           | hà             | tǎ             |
| <i>salt</i> | <i>three</i> | <i>place</i> | <i>to pick</i> | <i>to jump</i> |

- By the **autosegmental representation**. In *Autosegmental Phonology*<sup>19</sup> (proposed by John Goldsmith, 1976), tone (T) is viewed as a so called autosegment, placed on a different level than the segments (consonants and vowels) and linked to the tone bearing unit (TBN) by a connecting line. We use the following simplified representation:

- (5)  as in
- (general)      salt      three      place      to pick      to jump

In the case of the sequence LbH, the H is realized as a tone slightly below the level of M, because of vertical assimilation.

Note that Tepo Krumen is different from other variants in that the **H** tone has two realizations: cf. (77) ss.:

- a) a rising high, which is symbolized as H<sup>+</sup>, and b) a level high, which is marked as H<sup>-</sup>

<sup>17</sup> See the article Tone (linguistics), [https://en.wikipedia.org/wiki/Tone\\_\(linguistics\)](https://en.wikipedia.org/wiki/Tone_(linguistics))

<sup>18</sup> Bearth & Link (1980:164) identified even five levels in Wobe.

<sup>19</sup> See [https://en.wikipedia.org/wiki/Autosegmental\\_phonology](https://en.wikipedia.org/wiki/Autosegmental_phonology), <https://dspace.mit.edu/handle/1721.1/16388>

The following phonetic rule<sup>20</sup> describes the conditions of the two realizations:

- (6) /H/ [H<sup>-</sup>] / \_\_\_\_\_ H < a H tone followed by another H tone  
[H<sup>+</sup>] / elsewhere < a H tone followed by a M or L tone
- (7) /ū pí nié/ [M H<sup>-</sup> H<sup>+</sup>] *They drew water* (word order S V O).  
they draw water
- /ū dé nié pí [M H<sup>-</sup> H<sup>-</sup> H<sup>+</sup>] *They did not draw water* (word order S AUX O V).  
they PERFNEG ...  
*PERFNEG = negative perfective auxiliary*

The same behavior was reported for the very high tone (tone 1) in Wobe by Bearth and Link (1980:164).

In this section, we have stated that a given vowel or tone bearing unit can carry one of the four melodies H, M, L, LbH.

Further investigation is needed for the **L tone** (see 2.2) and for the **M tone** (see 2.3).

## 2.2 Two low tones: La and Lb

In this section, we give evidence to the fact that in Krumen there are **two low tones** that have the same pitch but contrast by their different behaviours– see (13): one is stable, we call it **La**, the second causes tone changes, we call it **Lb** (see footnote 7).

This latter one also appears as a **floating** tone, without being attached to a tone bearing unit. In that case, it is put into **brackets** > (**Lb**).

Consider **Tepo Krumen** examples (8) to (12) with the two low tone verbs **tò** *to buy* and **hà** *to pick* in the imperative / injunctive.

- (8)    /[t̥ ð bũbuē]/ *Buy an orange.*  
         L  
        buy orange
- /[hà bũbuē]/ *Pick an orange.*  
         L  
        pick orange

The verbs in the sentence pair contain each a **low tone on the same level** (without any difference in perception).

In the following pair, the verb phrase is expanded by the adverbial morpheme **kē** *today*, which is an element of the verb phrase. The verbs are the same, but they behave differently:

- (9) /[tò kē      būbuē]/ *Buy an orange today.*  
       L M  
       buy today orange  
 /hà kē būbuē/ [hà kè būbuē] *Pick an orange today.*  
       L M                    L L  
       pick today orange

Here is another sentence pair, where the verb phrase is expanded by the locative pronoun **lé** *there*:

- (10) /[hì lé]/    *Pass there.*  
           L    H  
       pass there
- /hḥḥ lé    mú/    [hḥḥ lè mú]    *Leave there (Go away).*  
           L    H                    L    L  
       leave there PP                                    PP = *postposition*

**First observation:** The low tone of **hà** *to pick* (9)b) and **hǎ** *to leave* (10)b) **causes tone spreading**, i.e. it **spreads to the following element of the verb phrase**: **kē** > **kè**; **lé** > **lè**. This is not the case of the low tone or the verbs **tǎ** *to buy* (9)a) and **hì** *to pass* (10)a): there is no low tone spreading to the right.

<sup>20</sup> **Phonemic forms** are marked by slashes /.../, **phonetic forms** by square braquets [...].

As for the concepts of **phonetics** / **phonemics**, see <https://pronunciationstudio.com/phonemics-phonetics/>

Now consider the tonal behavior of the same two low tone verbs **tò** to buy and **hà** to pick in the following sentences:

(11) /bū tò būbuē/ [bū tò ...] *They should buy an orange.*  
M L

that-they buy orange

/bū hà būbuē/ [bū hā` ...] *They should pick an orange.*  
M L M ML

that-they pick orange

(12) /bǒ tò būbuē/ [bǒ tò ...] *I should buy an orange. (bǒ LH = that I)*  
LH L

that-I ...

/bǒ hà būbuē/ [bǒ hā` ...] *I should pick an orange.*  
LH L L HL

**Second observation:** The low tone of the verb **hà** to pick causes tone spreading, i.e. it attracts the tone to the left: **hà** > **hā`** (11)b) / **hā`** (12)b). This is not the case of the low tone in the verb **tò** to buy (11)a) and (12)a).

These different tonal behaviors of **tò** / **hì** versus **hà** / **hǒ** lead us to **conclude** that we need to **posit two low tones** (tonemes):

- a) the tone of **tò** to buy, **hì** to pass, which we label **La**, and
- b) the tone of **hà** to pick, **hǒ** to leave, which we mark **Lb**.

(13) Summary of the characteristics of the two tones **La** and **Lb** as illustrated in the **Tepo Krumen** examples above:

- The tone **La** remains stable – no tone assimilation/spreading).
- The low tone **Lb** causes tone spreading:
  - 1) it spreads to the right (within the verb phrase), see (9)b) and (10)b),
  - 2) it attracts the tone on the left, cf. (11)b) and (12)b).

As specified below in (15), 1) is valid in Tepo and Plapo Krumen, 2) only in Tepo.

Note that the two tones **La** and **Lb** exist in all three Krumen languages as will be seen below. However, as far as the class of low tone verbs is concerned, only in Tepo Krumen do we find **La** and **Lb** tone verbs, while in Plapo and Piè Krumen, all low tone verbs carry the stable **La** tone.

However, in the class of the **pronouns**, the **Lb** low tone is found in Tepo, Plapo and Piè Krumen. It marks 2<sup>nd</sup> person singular and 1<sup>st</sup> person plural of the *personal pronouns*, the *relative pronouns* and some *emphatic pronouns*. Note the following subject pronouns:

(14) 2<sup>nd</sup> person singular **ñ** / **Lb** (carried by the first verb syllable or Aux) **you (sg.)**  
1<sup>st</sup> person plural: **Lb** ton > **à we**, **bà that-we** (used e.g. in the injunctive)

The examples below reveal the characteristics of the **Lb** tone in each of the Krumen languages. The following words are used:

**bā** that-you pl. (injunctive) / **ā** you pl. / **à** we / **mó** intentional auxiliary INT / **dī** (lé) to come / **mū** to go, to leave.

In the clause **ā mó mū**, no tonal changes take place.

/[ M H M ]/

you INT go,leave *You will leave.*

But when the subject pronoun carries a **Lb** tone as in the case of **à we**, there are tonal changes in Tepo and Plapo. These changes are not grammatically triggered, but solely by the tonal environment:



| (15)                               | Tepo                                                                             | Plapo                                                                      | Piè                                                          |
|------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------|
| We will leave.                     |                                                                                  |                                                                            |                                                              |
|                                    | /à  mó mū/<br>[ à  mò mū]<br>[ <b>Lb</b> <b>L</b> M]                             | /à  mó mū/<br>[ à  mò mū]<br>[ <b>Lb</b> <b>L</b> M]                       | /à  mó mū/<br>= [à  mó mū]<br>[Lb  H  M]                     |
| tone spreading to the right        |                                                                                  |                                                                            | no tone spreading                                            |
| Come (pl.), we will leave.         |                                                                                  |                                                                            |                                                              |
|                                    | /bā dī lé  à  mó mū/<br>[bā dī lé <b>á</b> mò mū]<br>[... <b>H H</b> <b>L</b> M] | /bā dī  à  mó mū/<br>[bā dī <b>à</b> mò mū<br>[... <b>M Lb</b> <b>L</b> M] | /bā dī  à  mó mū/<br>= [bā dī  à  mó mū]<br>[... M Lb  H  M] |
| tone attraction from left to right |                                                                                  | no tone attraction from the left                                           |                                                              |

This summary shows the **characteristics of the Lb tone** in the three Krumen languages:

| (16)                                      | Tepo | Plapo | Piè |
|-------------------------------------------|------|-------|-----|
| spreading to the right ; see (24) TR 1a   | +    | +     | Ø   |
| attraction from the left ; see (25) TR 1b | +    | Ø     | Ø   |

The examples in (15) may suggest that there is no reason for positing a Lb tone in the case of the pronoun *à we* in Piè. But as will be seen in (111), this pronoun does indeed carry a Lb tone.

In the Tepo examples (8) to (12) above, we presented the verbs *tò to buy* (representing the La verb tone class) and *hà to pick* (of the Lb verb tone class) in the imperative and injunctive mood.

Compare the behavior of the same verbs in the **positive perfective aspect** in Tepo Krumen:

|      |                               |             |                               |             |
|------|-------------------------------|-------------|-------------------------------|-------------|
| (17) | /ō tò būbuē/                  | [ō tō` ...] | /ō hà būbuē/                  | [ō hā` ...] |
|      | <b>Lb</b>                     | <b>MLb</b>  | <b>Lb</b>                     | <b>MLb</b>  |
|      | they buy orange               |             | pick                          |             |
|      | <i>They bought an orange.</i> |             | <i>They picked an orange.</i> |             |

In this case, both verbs *tò* and *hà* have the same tone patterns: The tone of the verb *tò to buy* is no longer **La** but **Lb**. In other words, we have TWO verb stems, a **neutral** verb stem *tò La* and a modified **perfective verb stem tò Lb**. The **Lb** tone has superseded the **La** tone at the derivational level in the process of suffixation, prior to the construction of the clause, to form the perfective verb stem *tò Lb*. See (36) ss.

We analyse this **Lb tone** as a **perfective aspect marker**<sup>16</sup>. It is suffixed to the neutral verb stem *tò La* and has therefore the status of a **derivative** morpheme. This applies to all La low tone verbs.

The **negative perfective aspect** is expressed by the auxiliary **dé** (clause structure: S AUX O V):

|      |                                    |                                     |                 |
|------|------------------------------------|-------------------------------------|-----------------|
| (18) | /[ō dé būbuē tò]/                  | /[ō dé būbuē hà/                    | [ō dé būbuē hā] |
|      | <b>La</b>                          | <b>Lb</b>                           | <b>M</b>        |
|      | they PERF-NEG orange buy           | ...                                 | pick            |
|      | <i>They did not buy an orange.</i> | <i>They did not pick an orange.</i> |                 |

Surprisingly, we find here the **neutral** verb stem in *tò*, carrying the inherent **La** tone (and in *hà*, carrying the inherent **Lb** tone).

We conclude that the *tò Lb* stem is only used in the **positive perfective** clause; see (17). Thus, redundant marking is avoided since the aspect is already marked by the auxiliary **dé negative perfective**.

This fact echoes the situation in Eastern Kru languages, where the perfective verb stem is clearly marked by a low tone. Marchese (1983:238) quotes several *Eastern* Kru examples, e.g. **jī** M versus **jì** L *to come* in Godié (Dakpadou), **pā** versus **pà** *to run* in Koyo, stating that this feature is *typical of Eastern* Kru.

So, it is surprising to find that in Krumen, which belongs to the **Western** Kru language group, there are two separate stems – non-perfective and perfective. See more details in the section 4 The low tone perfective marker.

Regarding the **two low tones La and Lb**, a look at **Grebo [grj]** across the western linguistic border allows for additional insights. The GREBO-ENGLISH dictionary by Gordon Innes (1969) reveals interesting **parallels between Grebo and the Krumen cluster**. Innes identifies a phonetic four-level tone system: 1 high, 2 mid, 3 low, 4 very low. (Tone 4 is not relevant for the comparison.) Among the low tones, he identifies a rising low 3-2 tone and a level low 3.

(19) Parallels between Grebo and Tepo:

|                | Grebo             | Tepo  |
|----------------|-------------------|-------|
| <i>to buy</i>  | tĩ <sup>3-2</sup> | tò La |
| <i>to pass</i> | hĩ <sup>3-2</sup> | hì La |
| <i>to pick</i> | ha <sup>3</sup>   | hà Lb |
| <i>we</i>      | a <sup>3</sup>    | à Lb  |

Note that the **Grebo 3-2** tone corresponds to the **Tepo La** tone, while the **Grebo 3** tone echoes the **Tepo Lb** tone. These parallels are found not only with verbs, but also with other word classes. As stated above, the **Krumen La** and **Lb** tones are phonetically and perceptibly on the same level. For a more detailed comparison, see 6.1 Tone systems in Southern Grebo and Tepo Krumen.

### 2.3 Two mid tones? – the case of Tepo Krumen

In this section, we give evidence to the fact that in Tepo Krumen, there are two sub-classes of mid tone verbs. The majority carry a **M** tone, while a few verbs carry a **M** tone, accompanied by a **(Lb)** floating low tone > **M(Lb)** – interpreted as a **feature** of some **M** tone verbs<sup>23</sup>.

Compare the two **M** tone verbs **mū** *to go/to leave* and **nā** *to walk*<sup>21</sup>; there is no tonal difference, both verbs carry a **M** tone:

- |                                                                              |                                                                             |                                                                           |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| (20) a) /[v̄ <b>mū</b> nī]/<br><b>M</b><br>they go FOCv<br><i>They left.</i> | b) /[v̄ <b>nā</b> nī]/<br><b>M</b><br>they walk FOCv<br><i>They walked.</i> | ( <b>nī/ní</b> = obligatory verb<br>focalisation morpheme <sup>22</sup> ) |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|

But the tonal behavior of these two **M** tone verbs is different in the following sentences. We also add a sentence containing the verb **hà Lb** *to pick*:

- (21) a) / $\bar{v}$  dī ní mū/  
[ $\bar{v}$  dī ní mū]  
**M**  
they POT FOCv go  
*They will leave.*
- b) / $\bar{v}$  dī ní nā/  
[ $\bar{v}$  dī ní ná]  
**H**  
they POT FOCv walk  
*They will walk*
- c) / $\bar{v}$  diē ní hà/  
[ $\bar{v}$  diē ní há]  
**H**  
they POT-PR FOCv pick *They will pick it.*

<sup>21</sup> In these sentences, both verbs contain the (Lb) perfective suffix > mū-(Lb), nā-(Lb), but in this environment, they do not link to the vowel of the verb. See 4.2.2 Perfective M tone verbs for the details.

<sup>22</sup> Verb focalisation morpheme: *nī* M (following the verb); *ní* H (preceding the verb), see 1.4 Language features.

Now, let us consider the next examples with the particle **m̄** (EMPH) marking general emphasis, placed after the prefinal pause #, to which a Lb tone is attached:

- (22) a) /v̄ dī ní mū # mō/  
[v̄ dī ní mū # mō]  
H M  
*They will leave.*
- b) /v̄ dī ní nā # mō/  
[v̄ dī ní nā # mō]  
H HL  
*They will walk.*
- c) /v̄ diē ní hà # mō/  
[v̄ diē ní hâ # mō]  
H HL  
*They will pick it.*

In (21) and (22) above, we note the following: The **M** tone on the verb **mũ** *to leave* remains unchanged, whereas the verb **nā** *to walk* carries either a **H** or a **HL** tone, which is identical to the **H** and the **HL** tone on **hà** *to pick* whose intrinsic tone is **Lb**. The verb tone of **nā** attracts the **H** of **ní** to the left. That is a characteristic of the **Lb** tone, according to (13).

We hypothesize that the intrinsic tone pattern of the verb **nā** *to walk* is a **M** tone accompanied by a **floating (Lb) tone** > **M(Lb)**. The presence of the **Lb** tone linked to the pause # triggers the process by which the **(Lb)** tone of **nā** **M(Lb)** is attached to the vowel, replacing the **M** tone and thus acts like the **Lb** tone of the verb **hà**.

We analyse the attached tone to the pre-final pause # as a **Lb** tone because of its capacity to bring about tonal change; see (13) and (40) for the autosegmental representation.

We conclude that the category of the **M** tone verbs comprises two sub-classes:

- a) **mū M** to go/leave and  
b) **nā M(Lb)** to walk. We consider this **(Lb)** tone as a **feature** of some **M** tone verbs<sup>23</sup>.  
Note that the mid tone sub-class **M(Lb)** only exists in Tepo Krumen, not in Plapo nor in Piè.

So far, we can state that the **tone inventory of Tepo Krumen** contains the following tones: **Four level tones H, M, La, Lb** (La and Lb are perceived as being on the same level) **and a sequence of two tones LbH**. On their basis, noun and verb classes are established.

The four tones can be identified with the features [HIGH] [LOW] [FLEXIBLE]<sup>24</sup>:

|      |       |    |      |     |          |
|------|-------|----|------|-----|----------|
| (23) |       |    | HIGH | LOW | FLEXIBLE |
|      | high  | H  | +    | –   | –        |
|      | mid   | M  | –    | –   | –        |
|      | low a | La | –    | +   | –        |
|      | low b | Lb | –    | +   | +        |

<sup>23</sup> This sub-class b) **M(Lb)** is relatively small. It contains verbs like **jā** *to bring*, **lē** *to tell*, **ɣmō** *to sleep*, **hvia** *to breathe*, **nī** *to crawl*, **nī** *to be (there)* etc.

<sup>24</sup> indicating that the **Lb** tone triggers tone changes.

### 3 Tonal changes explained by universal tone change rules

In this section, we are first going to give a **brief overview** of the **inventory of tone change rules** – with short examples – found in the Krumen cluster (3.1) before giving more complex examples of their application in Tepo, Plapo and Piè Krumen (3.2).

We will then focus on tonal change in the perfective aspect (section 4).

In Tepo Krumen, we find **four basic tone rules** (TR) describing the following processes:

1) **association**, 2) **dissociation**, 3) **low tone insertion**, and 4) **tone lowering**.

#### 3.1 The tone change rules (TR) – an overview

To explain tonal change within the Krumen cluster, we follow the autosegmental approach.

In this section, we give a concise overview of the rules applied in the Krumen languages.

In the descriptions, we use the following symbols:

T = any tone, H = high tone, M = mid tone, LH (in fact **LbH**) = low rising tone,

L = low tone, which is either **La** = stable low tone, or **Lb** = flexible low tone

with the characteristics spelled out in (13). **The Lb tone triggers the tonal changes.**

V = vowel, Tone Bearing Unit (TBU) / V1 in first syllable, V2 in second syllable.

##### 3.1.1 TR 1 (association) & TR 2 (dissociation)

###### **TR 1** Tone association

According to the conclusion in (13), the association process happens in the presence of a **Lb tone**, mostly **within a grammatical constituent** (verbal or nominal), in contexts to be specified later.

The process **TR 1** involves

TR 1a: spreading of **Lb** to the **right**,

TR 1b: attraction by **Lb** of the tone to the **left**,

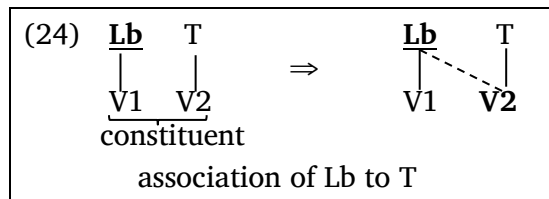
TR 1c: association of a floating (**Lb**) tone to the **right**,

TR 1d: association of a floating (**Lb**) tone to the **left**.

As will be seen later, the application or non-application of these rules varies between Tepo, Plapo and Piè Krumen; e.g. TR 1b is only valid in Tepo Krumen; see (13). These variations will all be noted below.

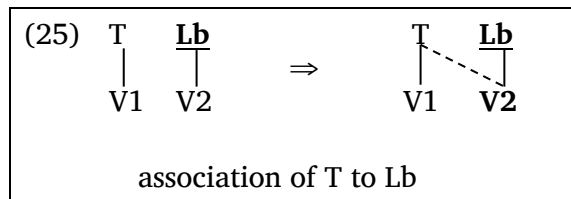
###### **TR 1a** Association: spreading to the right

Tepo, Plapo

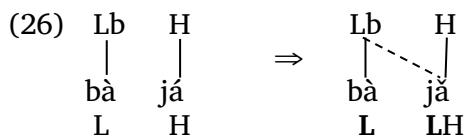


###### **TR 1b** Association: attraction from the left

Tepo only; see (13)

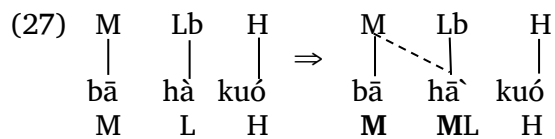


Examples:



that-we go-up  
Let's go up.

See also (51) to (53).

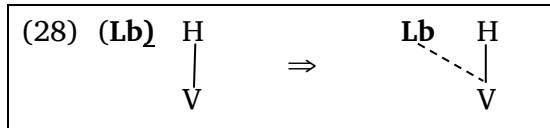


that-you pick fruit  
Pick some fruit.

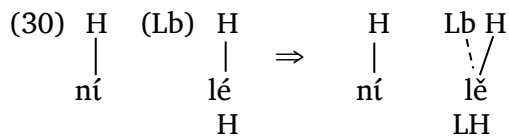
See also (52), (53), (57) to (59), (67), (91).

Note that if a tone is floating, it is put into brackets > (Lb), while it is without brackets when it is being attached > Lb.

**TR 1c Association of (Lb) to the right**



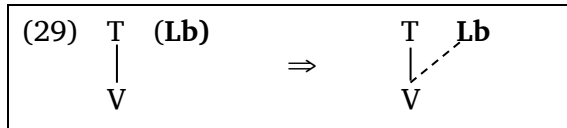
Example:



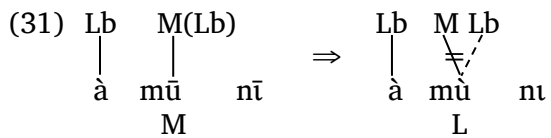
negative perfective morpheme  
(a **lexicalized** item)

See also (89), (92).

**TR 1d Association of (Lb) to the left**



Example:



we leave FOCv<sup>25</sup> We left.

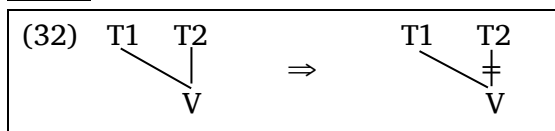
This is part of a complex example;  
see (38) to (41), (60).

**TR 2 Tone dissociation**

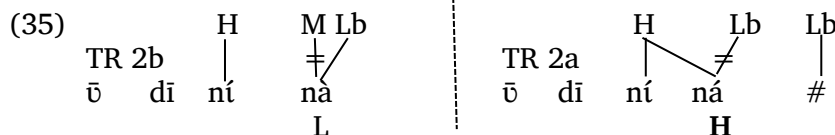
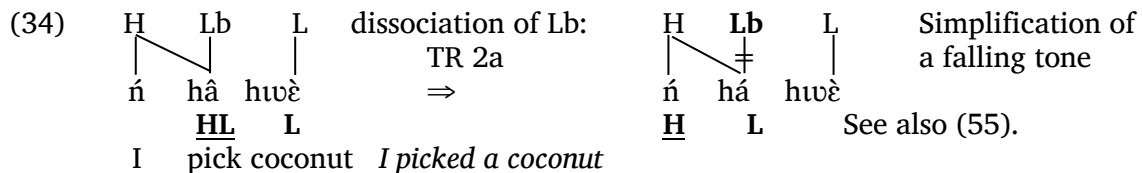
*Dissociation* is also called *delinking*. It is the opposite of association: A tone undergoes delinking from the tone bearing unit.

This leads to **tone simplification**: a contour tone melody becomes a level tone.

**TR 2a Dissociation of T2 (2<sup>nd</sup> element)**



Examples:



they will FOCv walk They will walk.

This is part of a complex example, see (84).

**TR 1 + TR 2 Tone replacement = association + dissociation**

**Tone association** and **dissociation** combined describe the process of **replacing** one tone with another. For instance, the floating low tone (Lb) of the **perfective aspect marker** **replaces the tone of the verb stem**.

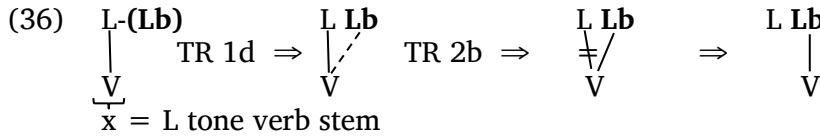
We distinguish two cases of (Lb) tone replacement:

- L tone verbs** – occurring at the *derivational* level
- M tone verbs** – occurring at *sentence* level

<sup>25</sup> A morpheme indicating verbal focalisation.

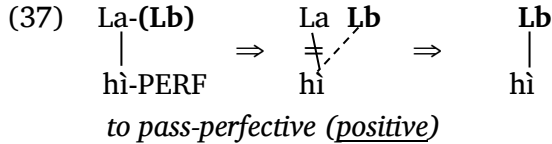
ad a) The perfective (Lb) tone replaces the original L tone of the verb.

**TR 1d + TR 2b** This tonal change occurs at the *derivational level*



TR 1d (29): Association of the suffixed perfective morpheme (Lb) and TR 2b (33): Dissociation of L, i.e. La and Lb

Example:



See also (60).

This process represents the derivation of the **positive** perfective L tone verb stem. For the negative perfective, the neutral verb stem (La or Lb in Tepo) is used; see (17), (18).

This tone replacement takes place at the *derivational level*, before the insertion of the verb into the clause.

As a result of the replacement in Tepo Krumen, in the perfective aspect, the verbs of both the **La** tone and the **Lb** tone classes carry the **Lb** tone. As stated before, these two sub-classes only exist in Tepo, whereas in Plapo and Piè, all L tone verbs carry the stable **La** tone.

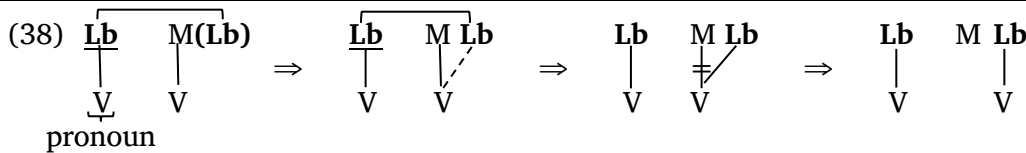
ad b) The perfective floating (Lb) tone replaces the original M tone of the verb.

The same tone rules TR 1d and TR 2b bring about this tone replacement. But for TR 1d to be **triggered** in the **linking process**, the **presence of another Lb tone** – floating or non-floating – is necessary.

The suffixation of (Lb) to the M tone verbs occurs *at the clause construction level*.

**TR 1d + TR 2b** The (Lb) tone replaces the original verbal M tone.

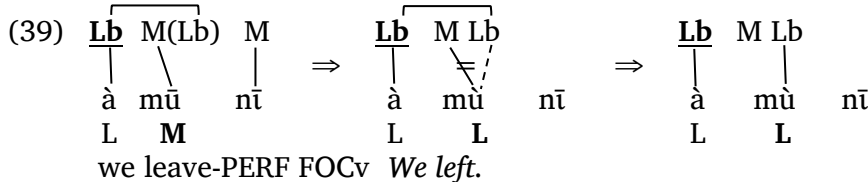
Influenced by a *preceding* Lb tone, the perfective (Lb) is associated with the verb stem.



Association of (Lb), triggered by a **Lb** tone to the left.

The (Lb) tone represents the **perfective derivational suffix**.

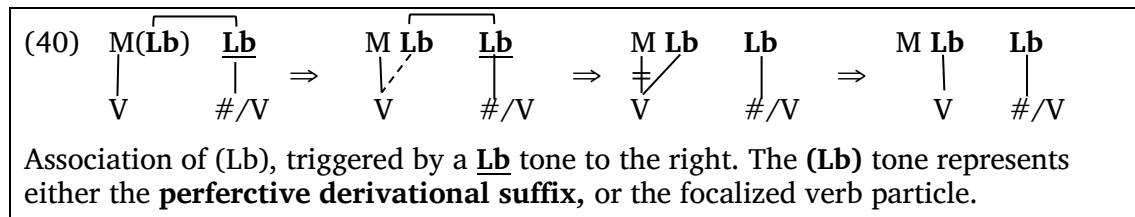
Example:



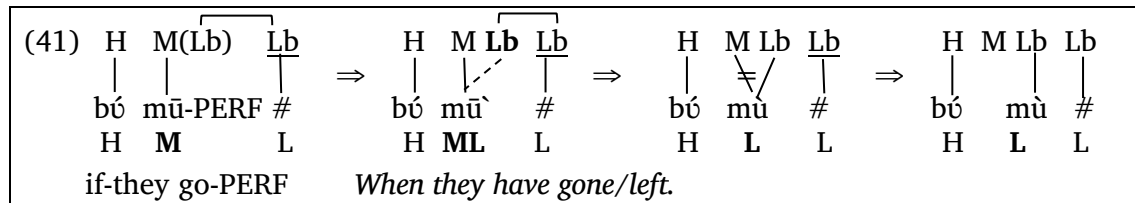
The **Lb low tone subject pronoun** to the left **triggers** the **association of the (Lb)** perfective suffix.

This process applies to Tepo, Plapo and Piè. In **Piè**, this is the **final** stage. See also (61)s.

**TR 1d + TR2b** The (Lb) tone replaces the original M tone of verbs and verb particles. Under the influence of a *following* Lb tone, the (Lb) is associated with the verb stem.



Example:

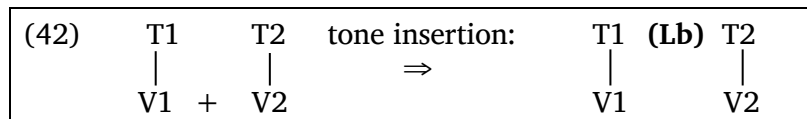


There are further changes in Tepo - see (63) and (64). See also (83)ss, (90)s.

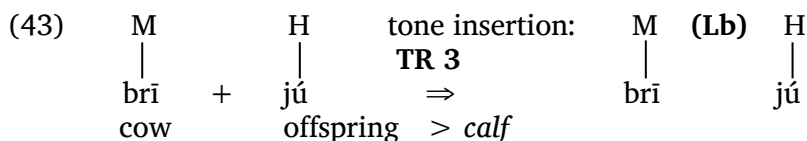
### 3.1.2 TR 3 (tone insertion) & TR 4 (tone lowering)

TR 3 describes the insertion of a **floating low tone (Lb)** within a specific grammatical and/or phonological environment. This phenomenon occurs mostly in the realm of word formation, e.g. in the formation of compounds, where the (Lb) tone functions as an associative marker. This process finds its parallel in languages like English or German. We refer to the noun phrase “a black bird” as opposed to the compound “a blackbird”, where the second element is characterised by a low tone: bláckbīrd. Likewise, we find a lowering of the tone on **jú** in the example (43) **jú** > **jū**, due to the presence of a floating tone, inserted between the first and the second element of the compound. We identify this low tone as **Lb** tone because of its capacity to trigger tonal change.

**TR 3** Insertion of a floating low tone (Lb)



Example:



See (44) and (45) below for the following stage.

See also (69), (74), (87), (89).

**TR 4** Tone lowering (implying TR 1 and TR 2)

Once the **low tone** has been **inserted** according to TR 3, it causes **lowering of the following tone** (TR 4a – **progressive change**), or **lowering of the preceding tone** (TR 4b – **regressive change**).

For the floating low tone to be able to cause tone lowering, it must be associated, which, according to (13), means that it must be a floating **Lb tone** (since the La tone does not spread), marked **(Lb)**.

**TR 4a** The floating (Lb) causes tone lowering of the following H – progressing change

|                                      |    |      |    |                 |    |      |    |
|--------------------------------------|----|------|----|-----------------|----|------|----|
| (44)                                 | T  | (Lb) | H  | H tone lowering | T  | Lb   | H  |
|                                      |    |      |    | ⇒               |    | └─┬─ |    |
|                                      | V1 |      | V2 |                 | V1 | M    | V2 |
| occurs in composition and derivation |    |      |    |                 |    |      |    |

Example:

|      |     |      |    |                  |             |      |   |
|------|-----|------|----|------------------|-------------|------|---|
| (45) | M   | (Lb) | H  | H tone lowering: | M           | (Lb) | H |
|      |     |      |    | <b>TR 4a</b>     |             | └─┬─ |   |
|      | brī | +    | jú | ⇒                | brī         | jū   |   |
|      | M   |      | H  |                  | M           | M    |   |
|      |     |      |    |                  | <i>calf</i> |      |   |

See (69) and (70).

|      |                               |      |             |                  |                                                         |      |   |
|------|-------------------------------|------|-------------|------------------|---------------------------------------------------------|------|---|
| (46) | H                             | (Lb) | H           | H tone lowering: | H                                                       | Lb   | H |
|      |                               |      |             | <b>TR 4a</b>     |                                                         | └─┬─ |   |
|      | lí                            | +    | lá          | ⇒                | lí                                                      | lā   |   |
|      | H                             |      | H           |                  | H                                                       | M    |   |
|      | <i>DER-DIST</i> <sup>26</sup> |      | <i>kill</i> |                  | <i>kill (distributive &gt; reciprocity, repetition)</i> |      |   |

See (74) and (75).

**TR 4b** The floating (Lb) causes tone lowering of the preceding H tone – regressive change

|                      |    |      |    |                  |                                     |        |      |
|----------------------|----|------|----|------------------|-------------------------------------|--------|------|
| (47)                 | H  | (Lb) | H  | H tone lowering: | H                                   | Lb     | H    |
|                      |    |      |    | ⇒                | └─┬─                                |        |      |
|                      | V1 |      | V2 |                  | M                                   | V1     | V2   |
| occurs in derivation |    |      |    |                  | H(Lb)                               | ⇒      | H Lb |
|                      |    |      |    |                  |                                     | └─┬─   |      |
|                      |    |      |    |                  | V-PERF                              | M (Lb) | V    |
|                      |    |      |    |                  | derivation of Piè perfect stem (49) |        |      |

|      |                              |      |             |                |                                  |      |                      |
|------|------------------------------|------|-------------|----------------|----------------------------------|------|----------------------|
| (48) | H                            | (Lb) | H           | tone lowering: | H                                | (Lb) | H                    |
|      |                              |      |             | <b>TR 4b</b>   | └─┬─                             |      |                      |
|      | lí                           | +    | lá          | ⇒              | lí                               | lá   |                      |
|      | H                            |      | H           |                | M                                | H    |                      |
|      | <i>DER-NOM</i> <sup>27</sup> |      | <i>kill</i> |                | <i>noun: the fact of killing</i> |      | See also (75), (80). |

As a **H tone** is **lowered to the M level**, features of the high and the low are selected to form a M tone: [– HIGH], [– LOW], [– FLEXIBLE]; see (81).

Tone lowering also occurs in **Piè** in the **derivation of the perfective verb stem of H and BH tone verbs**. This process occurs at the **derivational level**, similarly to the derivation of the perfective verb stem in Tepo of L tone verbs; see (36).

Example of **H tone lowering H>M** in the perfective derivation of **H and LH tone verbs** in Piè:

<sup>26</sup> distributive derivative

<sup>27</sup> nominalizer (derivative morpheme)



| H tone verb with <b>(Lb)</b> tone PERFective suffix |                     |      |      |     |
|-----------------------------------------------------|---------------------|------|------|-----|
| (49)                                                | H <b>(Lb)</b>       | H Lb | H Lb | (H) |
|                                                     | já-PERF             | jā   | jā   | jā  |
|                                                     | to go up-perfective |      |      |     |

Note that the Lb tone remains present as a suffixed floating tone. This will become evident in section 4 – see (114) s.

| LH tone verb with <b>(Lb)</b> tone PERFective suffix |                       |         |         |             |
|------------------------------------------------------|-----------------------|---------|---------|-------------|
| (50)                                                 | LbH <b>(Lb)</b>       | Lb H Lb | Lb H Lb | Lb (H) (Lb) |
|                                                      | tĩ                    | tĩ      | tĩ      | tĩ          |
|                                                      | to go down perfective | LM      | L       |             |
| Tone lowering followed by 2x tone simplification.    |                       |         |         |             |

See (116) s.

## 3.2 Tone change rules applied

After this general overview of the four tone rules, let's now see how these rules are applied in more complex examples, where several tone rules are operative in sequence.

### 3.2.1 Association/spreading (TR 1) and dissociation (TR 2)

The processes of **association** and **dissociation** are described above by the tone rules TR 1 and TR 2 – see (24)ss.

In the **Tepo** example (11)b), the Lb low tone of **hà** to pick **spreads to the right**:

|      |      |       |        |                  |      |       |        |               |      |       |        |
|------|------|-------|--------|------------------|------|-------|--------|---------------|------|-------|--------|
| (51) | Lb   | M     | M      | spreading of Lb: | Lb   | M     | M      | dissoc. of M: | Lb   | M     | M      |
|      | hà   | kē    | būbuē  | TR 1a            | hà   | kē    | būbuē  | TR 2a         | hà   | kē    | būbuē  |
|      | pick | today | orange |                  | pick | today | orange |               | pick | today | orange |

In the examples (9)b) and (10)b), the **Lb** low tone of the verb **attracts the tone to the left**:

|      |         |      |        |                 |         |      |        |
|------|---------|------|--------|-----------------|---------|------|--------|
| (52) | M       | Lb   | M      | spreading of M: | M       | Lb   | M      |
|      | b̄      | hà   | būbuē  | TR 1b           | b̄      | hā   | būbuē  |
|      | that-he | pick | orange |                 | that-he | pick | orange |

In the following **Tepo** example, the preceding syllable carries a H tone:

|      |    |    |      |                 |    |    |      |       |    |    |      |
|------|----|----|------|-----------------|----|----|------|-------|----|----|------|
| (53) | H  | Lb | L    | spreading of H: | H  | Lb | L    | TR 2a | H  | Lb | L    |
|      | n̄ | hà | huvè | TR 1a           | n̄ | hā | huvè |       | n̄ | hā | huvè |
|      |    |    |      |                 |    |    |      |       |    |    |      |

Here are the tonal changes caused by **spreading** formulated in general terms (–L = H or M):

Spreading to the right: **Lb + –L > Lb + Lb –L** see (51)

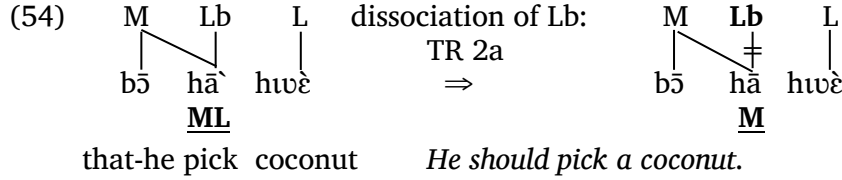
Spreading from the left: **–L + Lb > –L + –L Lb** see (52)s.

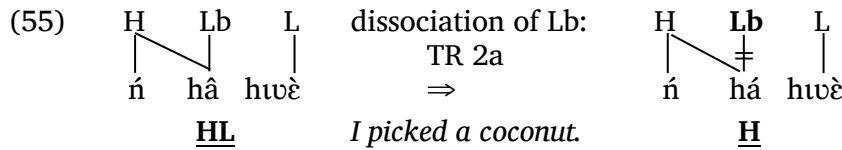
As a result of tone spreading, we find a **contour** tone melody, either rising (Lb –L) or falling (–L Lb), as seen in (51) to (53).

If a rising tone preceeds a H or M tone, or if a falling tone preceeds a L tone, tone **simplification** by **dissociation** (TR 2a) occurs: The second part of a contour tone is delinked, while the first part - a level tone - remains:

HL L > H L; ML L > M L and LH H > L H; LM M > L M, etc.

In the Tepo-Plapo-Piè cluster, **falling tones only occur in Tepo** (because the Tepo Lb tone attracts the preceding tone, which is not the case in Plapo and Piè).

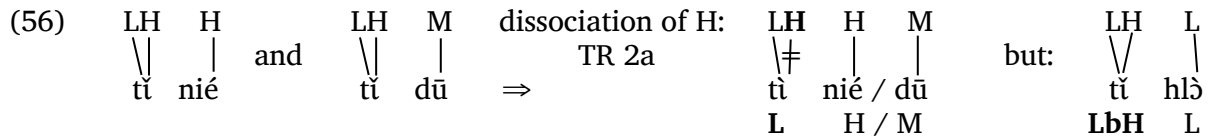
- (54)  dissociation of Lb:  
TR 2a  
⇒

- (55)  dissociation of Lb:  
TR 2a  
⇒

This change is formalized as follows: **-L Lb > -L / \_\_\_\_ L**

This process also occurs symmetrically: A rising tone LH is simplified by dissociation before M or H (i.e. -L) and becomes a level tone: LH > L. This rule only applies to Tepo and Plapo, not to Piè.

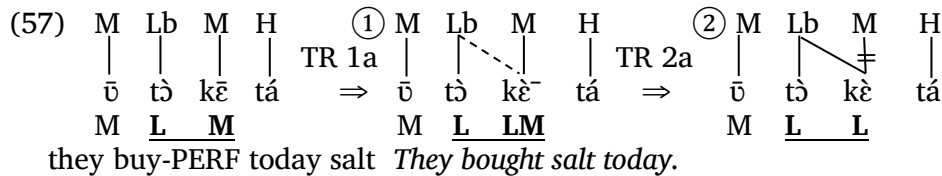
See these examples containing **tĩ** to go down / to descend, **nié** water, river, **dū** Cavally River, **hlò** Tabou River, meaning *Descend the river; the Cavally River, the Tabou River*.

- (56)  dissociation of H:  
TR 2a  
⇒

We state that there is tone simplification in **tĩ** before H and M tone, but not before L.

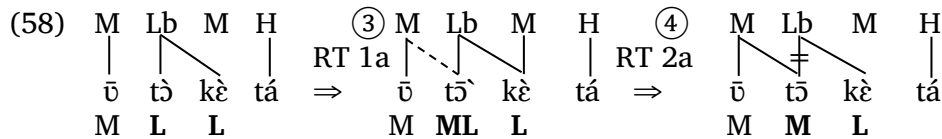
This tonal change is formulated as follows: **LH > L / \_\_\_\_\_ -L**

Here are examples of **L tone verbs** like **tò** to buy in the perfective form:

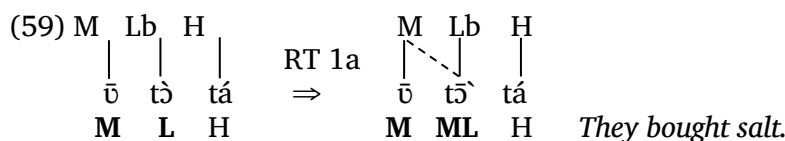
- (57)  TR 1a  
⇒

The Lb tone *spreads to the right* ① on the tense morpheme, which is part of the verbal constituent. The resulting tone LM is simplified to L ②. This represents the final stage in **Plapo**.

In **Tepo**, the Lb tone also *attracts the tone on the left* ③. The resulting falling tone is simplified ④:

- (58)  RT 1a  
⇒

If the tense morpheme **kē** is absent, the falling tone ML before a -L remains:

- (59)  RT 1a  
⇒

In **Piè**, there is no tone change in these contexts because the Lb tone does not spread.

For examples of **M tone verbs**, see 4.2.2 Perfective M tone verbs.

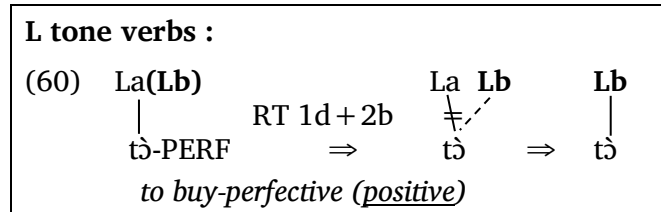
## Replacement = association + dissociation linked together

As stated above, it is the floating low tone (Lb) of the **perfective aspect marker** that **replaces the inherent tone of the verb stem**.

We distinguish two cases of tone replacement:

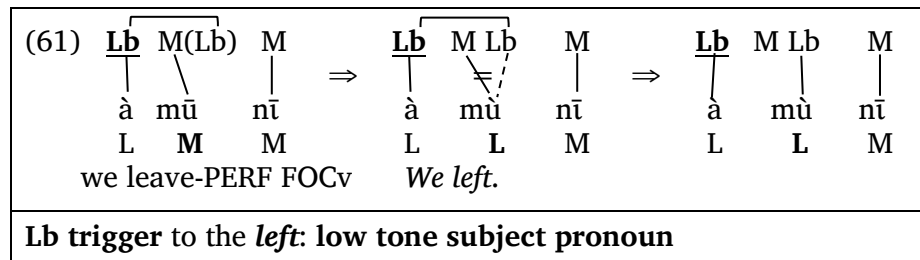
- a) **L tone verbs** – occurring at the *derivational* level
- b) **M tone verbs** – occurring at *sentence* level

**ad a)** In (36), we presented the process of the **(Lb) perfective marker suffixation** to **L tone verbs**, occurring on the *derivational* level:



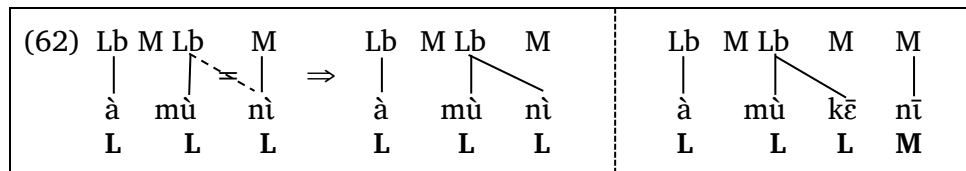
This process is valid for **Tepo** and **Plapo**, not for **Piè**. See (17), (18), (55), (56), (98) ss.

**ad b)** In (38) and (40), we presented the **(Lb) perfective marker suffixation** to **M tone verbs**, occurring on the *clause construction level* and **triggered by** the presence of **another Lb tone**, either to the *left*, or to the *right*. The following example is with the **trigger** to the *left*:

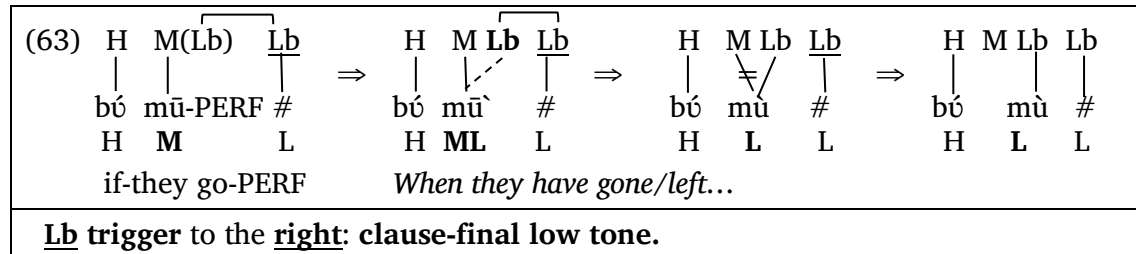


This process applies to **Tepo**, **Plapo** and **Piè**. In **Piè**, this represents the **final** stage.

In **Tepo** and **Plapo**, the Lb tone on the verb spreads to the right on next element within the verb phrase – **nī FOCv** or **kē today**:

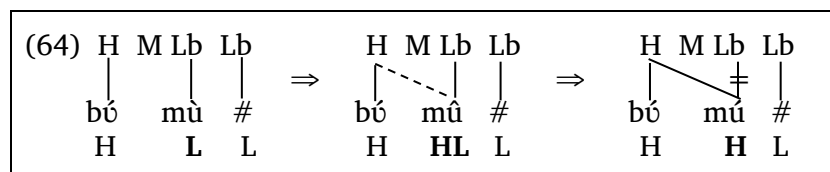


The next example is with the **trigger Lb** (linked to the clause final pause #) on the **right**:

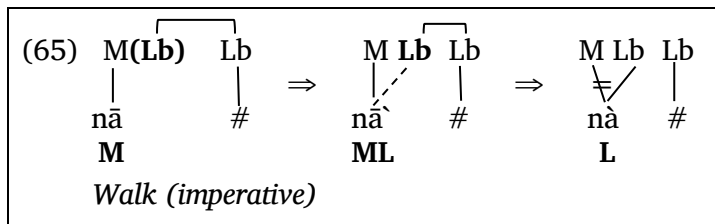


This represents the final stage in **Plapo**.

In **Tepo**, the **Lb** tone on the verb attracts the tone to the left, then the resulting falling tone **HL** is simplified to **H** before **L**:

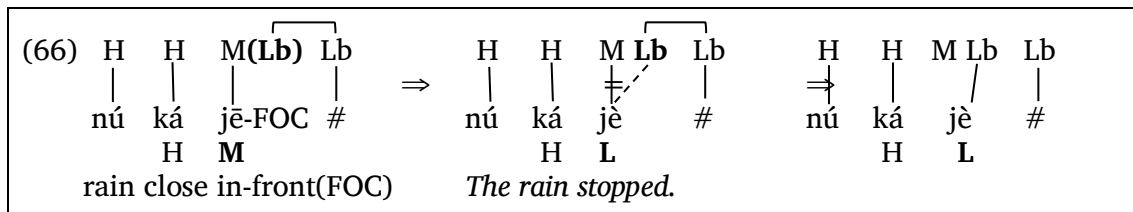


We stated above that in **Tepo** Krumen, the **mid tone verbs** are divided into two sub-classes: **M** and **M(Lb)**. In the imperative form of the M(Lb) verbs, the same tonal change occurs as in the previous example:



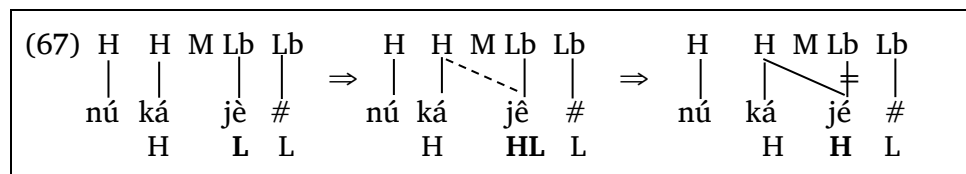
This tonal change does not occur in Plapo nor in Piè, since there is no M(Lb) tone sub-class.

In the following example, we find the **phrasal verb** **ká jē** *to stop*, consisting of the verb **ká** *to close* and the particle (postposition) **jē** *in-front*. Being placed at the end of an independent clause, this particle carries the obligatory **focus marker (Lb)**:



This **M** tone replacement is an intermediate stage.

Its tonal structure is parallel to the structure in (63) and (64) above:



The **Lb** tone on the verb particle **jē**, which has become **jè Lb**, attracts the tone to the left, then the resulting falling tone **HL** is simplified before **L**.

### 3.2.2 Tone insertion (TR 3) and tone lowering (TR 4)

These tonal changes occur in the following areas of **word formation**:

#### 3.2.2.1 Composition

#### 3.2.2.2 Derivation

#### 3.2.2.2 Derivation and composition – frozen forms

#### 3.2.2.1 Composition

Marchese (1983:162) notes that the lowering of tone in the second element of compounds seems to be a general characteristic in Kru languages, giving examples from both Western (Nyabwa, Wobe, Guere) and Eastern Kru (Bete, Godie Gbadi). In her analysis of the same type of constructions, Paradis (1984:147ss.) postulates the presence of a floating low tone between the two elements of the compound.

Interestingly, the same phenomenon of «tone lowering» in compounds can be observed in English, German and other languages. There is a difference in intonation in the phrase *a black bird* and the compound *a blackbird*: We note a lowering of intonation in the second part of the compound.

Indeed, the same tone lowering affects these same structures **throughout the Krumen cluster**, as seen in the following examples of the associative (genitive) construction and a compound with the same morphemes (*cow* + *offspring* = *calf*):

(68) cow in **Tepo** = brī / in **Plapo** = blī / in **Piè** = brē

**Tepo:** associative construction compound  
 brī ā jú (cow / CN<sup>28</sup> / offspring) *offspring of a cow* > brī-jū *calf*  
 M M H M M

As for the **Krumen cluster** (Tepo, Plapo, Piè), we postulate two processes:  
**tone insertion of a floating low tone, causing tone lowering of a H to M tone.**

This is illustrated as follows:

**TR 3** Tone insertion of a floating low (Lb) - see (42)

(69)  $\begin{array}{ccc} \text{M} & & \text{H} \\ | & & | \\ \text{brī} & + & \text{jú} \\ \text{cow} & & \text{offspring} \end{array} \xRightarrow{\text{TR 3}} \begin{array}{ccc} \text{M} & (\text{Lb}) & \text{H} \\ | & & | \\ \text{brī} & & \text{jú} \end{array}$

In the process of forming a **compound of two nouns**, a **floating low tone (Lb)** is generated between the two nouns.

Tone generated in the compound is formalized as follows:  $\emptyset > (\text{Lb}) / [\text{T} \_\_\_\_\_\_ \text{H}]_{\text{compound}}$

This process is followed by **tone lowering**:

**TR 4a** Progressive tone lowering from H to M - see (44)a)

(70)  $\begin{array}{ccc} \text{M} & (\text{Lb}) & \text{H} \\ | & & | \\ \text{brī} & + & \text{jú} \\ \text{M} & & \text{H} \end{array} \xRightarrow{\text{TR 4a}} \begin{array}{ccc} \text{M} & (\text{Lb}) & \text{H} \\ | & & | \\ \text{brī} & - & \text{jū} \\ \text{M} & & \text{M} \\ \text{calf} & & \end{array}$

In general terms, we have:

$(\text{Lb}) \text{ H} > \text{M} / [\text{T} \_\_\_\_\_\_ ]_{\text{compound}}$

As can easily be seen, the tone of the first element of the compound does not influence the tone of the second element:

(71) hāpé (*hen*) + jú > hāpé-jū *chick*; gbì (*dog*) + jú > gbì-jū *puppy*

Here is a similar example showing **tone lowering from M to L – see (44)b)**:

(72)  $\begin{array}{ccc} \text{L} & & \text{M} \\ | & & | \\ \text{hò} & + & \text{tū} \\ \text{L} & & \text{M} \\ \text{coconut} & + & \text{tree} \end{array} \xRightarrow{\text{TR 3}} \begin{array}{ccc} \text{L} & (\text{Lb}) & \text{M} \\ | & & | \\ \text{hò} & & \text{tū} \end{array} \xRightarrow{\text{TR 1a}} \begin{array}{ccc} \text{L} & \text{Lb} & \text{M} \\ | & & | \\ \text{hò} & & \text{tù} \end{array}$   
 dissociation  $\begin{array}{ccc} \text{L} & \text{Lb} & \text{M} \\ | & \diagdown & | \\ \text{hò} & & \text{tù} \\ \text{L} & & \text{L} \\ \text{coconut} & & \text{tree} \end{array} \xRightarrow{\text{TR 2a}}$

The **L** tone of the first element of the compound triggers the attachment of the **(Lb)** tone to the second element of which it replaces the inherent **M** tone.

<sup>28</sup> CN = connective or associative marker

### 3.2.2.2 Derivation

The following examples show that tone insertion causing tonal change also takes place in the **derivational process of reduplication** of a **H or M tone verb stem** that results either in another **verb stem** ( $V \rightarrow V$  *distributive*) or a **noun stem** ( $V \rightarrow N$  *verbal noun*).

a) Here is an example of **H tone verb redublication**:

- (73) lá *tuer* > lá-lá > lí-lá = *preliminary form*, which is lí (**Lb**) lá  
 >  $V \rightarrow V$ : lí-lá > lí-lā (Piè: lí-rā) *kill each other, kill here and there*  
 Tepo, Plapo, Piè: H H H M  
 >  $V \rightarrow N$ : lí-lá  
 Piè: H H (no tone lowering)  
 Tepo, Plapo: lí-lá > lī-lá *the act of killing*  
H H > M H

In this process of reduplication, two levels must be distinguished: segments and tone. Regarding the segments, lá > lá-lá > lí-lá (vowel raising in the prefixed derivative morpheme).

It is very interesting to see that in the  $V \rightarrow V$  **derivation**, the floating low tone (Lb) causes the **lowering of the following tone** – **partial progressive assimilation**; as in the compound bri-jū (70), whereas in the  $V \rightarrow N$  **derivation**, the floating low tone causes the **lowering of the preceding tone** – **partial regressive assimilation**; see (73).

There is one **exception**: Piè has **no tone lowering in the  $V \rightarrow N$  derivation**.

Here is the autosegmental representation of these examples:

**TR 3** **Tone insertion of (Lb)** in the reduplication process of a **H of M (non-low -L)** tone verb:

- (74)  $\begin{array}{ccc} \text{-L} & & \text{-L} \\ | & & | \\ \text{lá} & + & \text{lá} \\ >\text{lí} & + & \text{lá} \\ \text{DER}^{29} & & \text{kill} \end{array} \quad \begin{array}{c} \text{tone insertion:} \\ \text{TR 3} \\ \Rightarrow \end{array} \quad \begin{array}{ccc} \text{-L} & (\text{Lb}) & \text{-L} \\ | & & | \\ \text{lí} & & \text{lá} \end{array}$   
 (generalization:  $V \rightarrow V / V \rightarrow N$  derivation)

This process can be formalized as follows:

$\emptyset > (\text{Lb}) / [-\text{L} \text{ } \_\_\_\_\_\_ -\text{L}]$  verb reduplication

Then, in the case of an H tone verb, tone lowering occurs, in two ways:

*First*: In the case of  $V \rightarrow V$  derivation, it is the second H tone that is lowered (TR 4a), and the first syllable is interpreted as prefixed verbal distributive derivative. The result is the verb lí-lā *to kill one another*:

**TR 4a** **Progressive tone lowering**

- (75)  $\begin{array}{ccc} \text{H} & (\text{Lb}) & \text{H} \\ | & & | \\ \text{lí} & + & \text{lá} \\ \text{DER-DIST}^{30} & & \text{kill} \end{array} \quad \begin{array}{c} \text{H tone lowering:} \\ \text{TR 4a} \\ \Rightarrow \end{array} \quad \begin{array}{ccc} \text{H} & & \text{Lb} \quad \text{H} \\ | & & \diagdown \quad / \\ & & \text{M} \\ & & | \\ & & \text{lā} \end{array}$   
 kill (*distributive > reciprocity, repetition*)

Tone lowering according to TR 4a in duplicated H tone verbs applies to Krumen Tepo, Plapo and Piè.

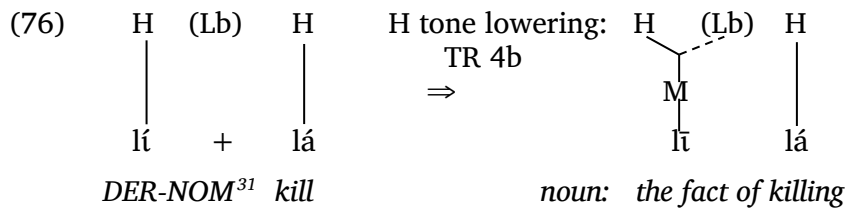
In general terms, we have: **Lb H > M** / **[H \_\_\_\_\_]**  $V \rightarrow V$  derivation, verb stem

<sup>29</sup> derivative morpheme (meaning: *nominal and verbal generalization*)

<sup>30</sup> distributive derivative

*Second:* In the case of V→N derivation, it is the first H tone that is lowered, and the first syllable is interpreted as prefixed nominalizing derivative (nominalizer):

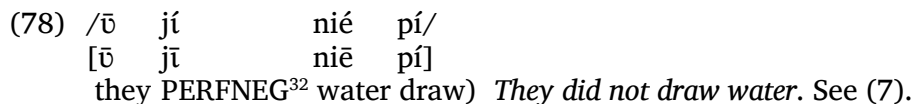
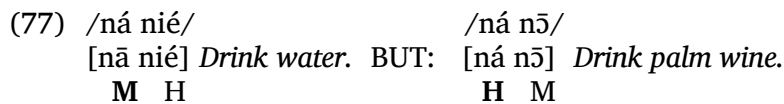
**TR 4b** *Regressive tone lowering*



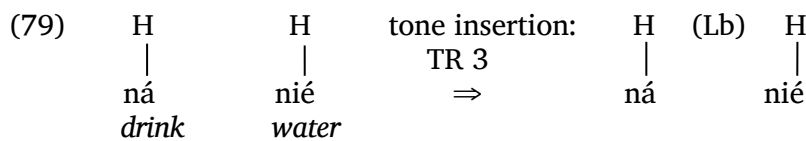
Tone lowering according to TR 4b in duplicated H tone nouns applies to Krumen Tepo and Plapo, *but not to Piè*.

This process is formalized as follows:  $H \text{ Lb} > M / [ \text{_____} H ]_{V \rightarrow N \text{ derivation, noun stem}}$

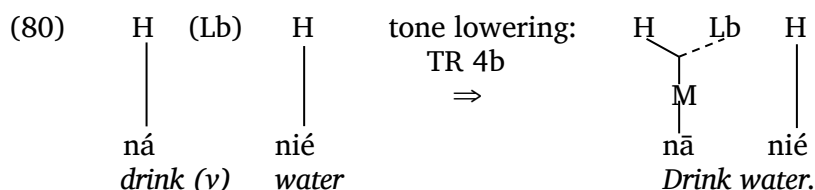
In **Plapo** Krumen, this same tone insertion followed by tone lowering, occurring in the  $V \rightarrow N$  derivation ( $H\ H > M\ H$ ), is found **in any context**, whenever a H tone is followed by another H in a series of H tones:



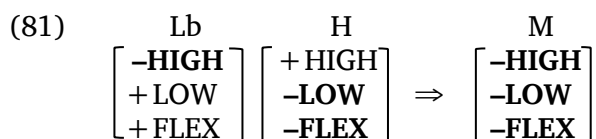
According to the autosegmental representation, we first have ...

**TR 3** Tone insertion
$$\emptyset > (\text{Lb}) / \text{H} \text{ \_\_\_\_\_\_ } \text{H}$$

... then follows TR 4b:

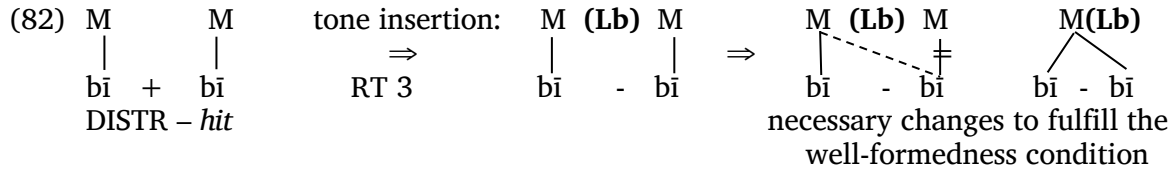
**TR 4b** Regressive tone lowering
$$H_{Lb} > M / [ \text{H} ]$$

We have seen that the floating Lb tone produces a tonal lowering in the presence of H. Through a process of fusion, Lb plus H result in M. The explanation for this is the fact that the feature [– high] of the first tone and the features [– low] and [– flexible] of the second tone are selected for the resulting M tone – see (23):

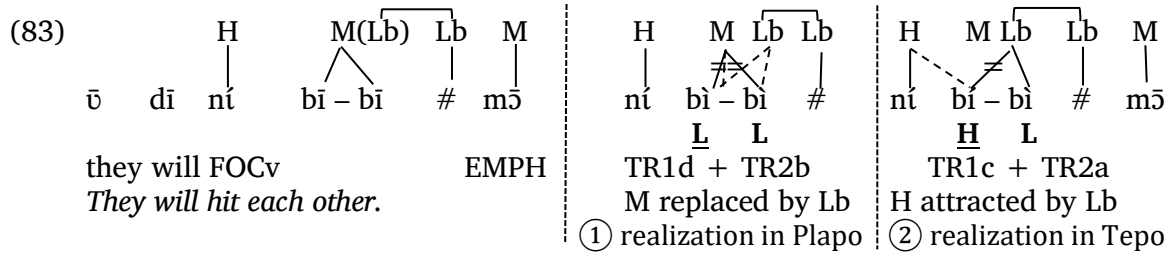
<sup>31</sup> nominalizer (derivative morpheme)

<sup>32</sup> PERFNEG = negative perfect auxiliary

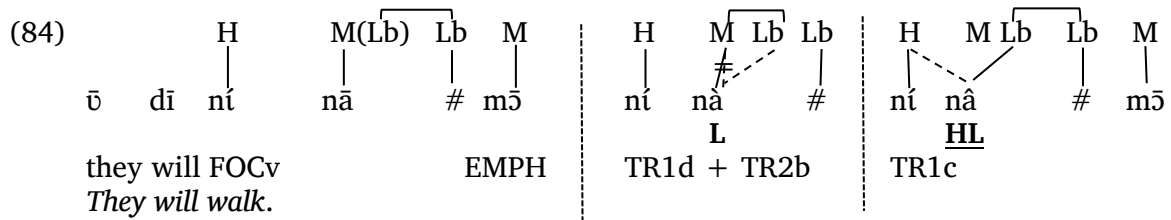
b) Similarly to the appearance of a floating low tone (Lb) in the reduplication process of H tone verbs, the same phenomenon occurs in the case of **M tone verb reduplication**. Here is an example of the verb **bī** *to hit*: > **bī-bī** verbo-nominal > 1) *to hit each other* (verb stem; distributive meaning), 2) *fact of hitting* (noun stem); with nominalizer suffix -e: **bībīē** (noun or nominal):



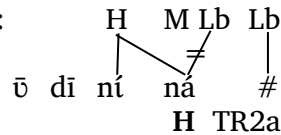
The lowering effect of the floating tone (Lb) is only triggered by the presence of the low Lb tone linked to the pre-final pause #; see (40):



Note that this verb **bī-bī M(Lb)** *to hit each other* has the same tonal structure as **nā M(Lb)** *to walk* – see (22). In the next example, we find the verb **nā M(Lb)** instead of **bībī M(Lb)**. Remember that this **M(Lb)** verb class, of which **nā** is a member, only exists in Tepo:



Without the emphatic particle mā:



These are the few fundamental rules RT 1 - 4, which explain the various tonal processes. They are more numerous in Tepo Krumen than in Krumen Plapo and Piè.

Before moving on to **sections 4 and 5**, we will have a look at some special cases of word formation.

### 3.2.2.3 Derivation and composition – frozen forms

#### a) Derivation by reduplication to form the negative imperfective marker

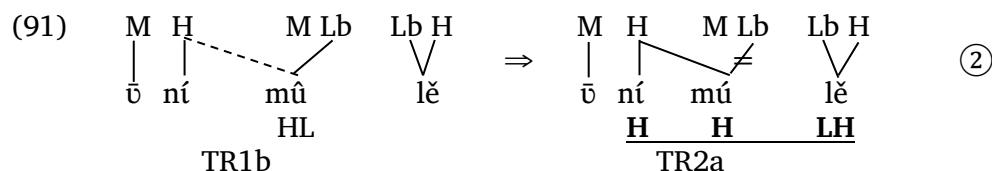
In Tepo and Plapo Krumen, this morpheme has following forms:

| grammatical context | Tepo             | Plapo           | Piè       |
|---------------------|------------------|-----------------|-----------|
| dependent clauses   | <b>níní</b>      | yé nī           | nī        |
| independant clauses | <b>ní ... lě</b> | <b>ní ... ŷ</b> | nī ... we |

We are going to concentrate on the forms in bold type, as they appear in these examples:







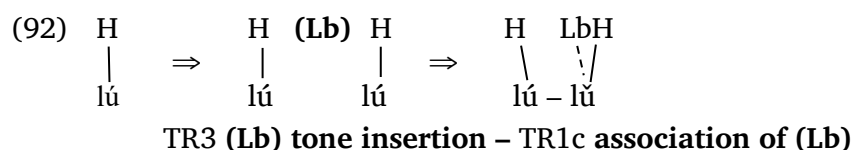
These processes do not take place with verbs of the other tone classes H, La, LH.

So, these are the final forms:

Tepo: /v̄ ní mū lě/ [v̄ ní mú lě]; Plapo: /v̄ ní mū-ǒ nī/ [v̄ ní mù-ò nī].

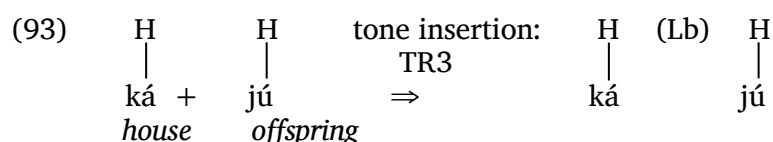
### b) Derivation by reduplication in the formation of nouns

The tone rules TR 3 and TR 1a that were involved in the formation of the negative imperfective morpheme – see (89) – are found in nouns like e.g. **lúlǔ H LH** *cord, liane*:

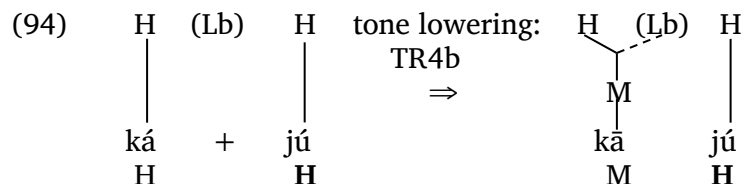


### c) Composition

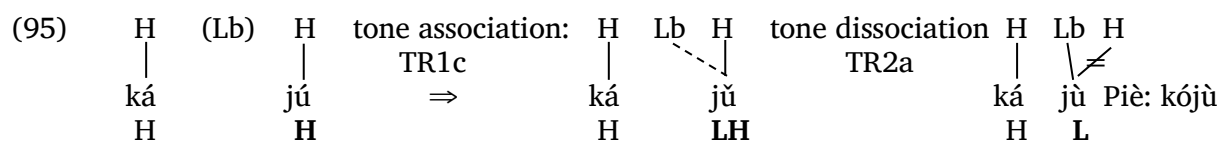
Different tone rules are applied in the formation of the word **kaju** *house* < **ká** *house* + **jú** *offspring* in Tepo, Plapo and Piè (**kó** instead of **ká**). The first stage is similar to (69):



In Tepo, the final stage involves tone lowering according to TR 4b – see (47)s.:



In Plapo and Piè, the final stage involves tone association according to TR 1c – see (28), (89) – followed by dissociation according to TR 2a (32):



## 4 The low tone perfective marker

### 4.1 The perfective aspect in Western Kru

As we pointed out in the introduction, Marchese (1986:34-35) states that «in **Western Kru** the perfective (called factative) is expressed by a **bare verb stem**, while in **Eastern Kru**, the perfective is expressed by **low tone** on the verb stem....», which is analysed as a **low tone suffix**:

(96) Examples of low tone perfective markers in Eastern Kru

|       | stem       | perfective  |                                    |
|-------|------------|-------------|------------------------------------|
| Godié | nú<br>fētē | nú`<br>fètè | <i>to hear</i><br><i>to pierce</i> |
| Vata  | nú         | nú`         | <i>to understand</i>               |
| Koyo  | mlá        | mlà         | <i>to drink</i>                    |

The statement above is followed by a double hypothesis:

In **Proto-Kru**, the **perfective aspect**

- a) was marked by **low tone** but «was subsequently **lost in all Western languages**»,
- b) was marked by a bare verb stem, and «those **Eastern** languages with **low tone perfective** would have **acquired** this marker through some innovative process».

The **Krumen** cluster is classified as belonging to **Western Kru**. Consequently, the perfect aspect would be expressed by a bare verb stem. Yet, as we are going to show, there is evidence of a **low tone perfective marker**. This marker is only partially present, though, and thus not easily detectable.

In line with the two assumptions formulated under a) and b) above, this fact could be explained as follows:

- a) the **low tone perfective marker** was **present in Proto-Kru**, but was subsequently lost – *except for the vestiges found in the Krumen cluster*, or
- b) the **low tone perfective marker** was «**acquired** through some innovative process».

Accordingly, the **Krumen tonal perfective marker (Lb)** will be considered as a **tonal derivational suffix**<sup>36</sup>.

In section 2.2 *Two low tones: La and Lb*, we discovered that in Tepo Krumen the low tones of the verbs **tò** *to buy* and **hà** *to pick* behave differently according to their tonal environment – see (8) to (12). This is evidence for the existence of **two low tones**: a stable **low tone La**, and a «flexible» **low tone Lb** – see (13) –, which causes tonal change in that it

- spreads on the following element within the verb phrase or verbal constituent (Tepo and Plapo),
- attracts the preceding tone (Tepo).

In addition, the presence of a **Lb** tone triggers the attachment of the floating (**Lb**) tone perfective marker in the context of M tone verbs in Tepo, Plapo, and Piè; see (61) and (63).

### 4.2 The perfective aspect in the Western Kru languages Tepo, Plapo and Piè Krumen

In this section, we are going to show that in all three Krumen languages, Tepo, Plapo and Piè, the perfective aspect is expressed by a **floating low tone (Lb) derivative verbal suffix**. However, its manifestation varies from language to language, as well as from tone class to tone class. The following table illustrates this. It contains the neutral (n) and the derived (d) stem (n > d) of the following verbs:

<sup>36</sup> Since this marker modifies the verb stem, we identify it as a **derivative** suffix.

H: **já/já**<sup>37</sup> to climb, BH: **tǐ** to go down, descend, M: **mū** to go, to leave, L: **hì** to pass

(97) Perfective verbal derivation marked by the floating low ton (Lb) in the Krumen cluster

| tone | Tepo                                  | Plapo                           | Piè                             |
|------|---------------------------------------|---------------------------------|---------------------------------|
| H    | já = já / > já(Lb)<br>no tonal change |                                 | H > <b>M(Lb)</b><br>já > jǎ(Lb) |
| LH   | tǐ = tǐ / > tǐ(Lb)<br>no tonal change |                                 | LH > L(Lb)<br>tǐ > tì           |
| M    |                                       | M > <b>M(Lb)</b><br>mū > mū(Lb) |                                 |
| L    |                                       | L > Lb<br>hì > hì               |                                 |

Here is how the **(Lb) perfective** marker affects the verb stem:

#### H and LH tone verbs:

In **Piè**, there is tone lowering in:

the **H** tone is lowered to **M** by the perfective (Lb), which remains floating:

H > M(Lb), e.g. já > jǎ(Lb).

The **LH** tone becomes **L**:

LH > L(Lb) or L, e.g. tǐ > tì.

In **Tepo and Plapo**, the **H and LH tone verbs** are not affected in the perfective form, i.e. the non-perfective and the perfective forms are identical. There are two possible explanations: Either the (Lb) perfective marker is present but does not surface, or it is absent.

#### M tone verbs:

In all three Krumen languages – Tepo, Plapo and Piè – the floating (Lb) perfective marker is suffixed to the verb stem M > **M(Lb)**. However, it surfaces in different ways according to the language and to the tonal environment.

#### L tone verbs:

The floating (Lb) perfective marker replaces the L tone (La/Lb) of the verb stem at the derivational level, but interestingly only in the case of the positive conjugation. We hypothesise that this is valid for all three Krumen languages, but no evidence can be found in Piè.

We are going to present evidence for all tone classes and all three languages, starting with the L tone verbs, followed by the M tone verbs, and finally by the H and LH tone verbs.

### 4.2.1 Perfective L tone verbs

The following two **Tepo/Plapo** examples in the **non-perfective** aspect contain **La** low tone neutral verb stems: **hì** to pass and **tǐ** to buy:

|      |              |    |                                     |                 |    |    |      |
|------|--------------|----|-------------------------------------|-----------------|----|----|------|
| (98) | M            | La | M                                   | M               | La | M  | H    |
|      |              |    |                                     |                 |    |    |      |
|      | bā           | hì | kē                                  | bā              | tǐ | kē | tá   |
|      | M            | L  | M                                   | M               | L  | M  |      |
|      | that-you-pl. |    | today (tense marker <sup>38</sup> ) |                 |    |    | salt |
|      | Pass today.  |    |                                     | Buy salt today. |    |    |      |

<sup>37</sup> já Tepo, já Piè

<sup>38</sup> tense markers are part of the verbal constituent

The examples (99) to (101) contain verbs in the **positive perfective aspect**. The **La** tone of the neutral verb stem has been **replaced** by the **perfective marker Lb tone**; see (36), (61):

- (99)
- |   |          |    |    |
|---|----------|----|----|
| M | Lb       | M  | M  |
|   |          |    |    |
| ā | hī       | kē | nī |
| M | <u>L</u> | L  |    |
- you-pl.  
*You passed today.*
- |   |          |    |    |
|---|----------|----|----|
| M | Lb       | M  | H  |
|   |          |    |    |
| ā | tō       | kē | tá |
| M | <u>L</u> | L  |    |
- You bought salt today.*

As was seen in (13) and (15), the **Lb** tone spreads to the right within the constituent. Thus, in both Tepo and Plapo, the **M** tone of **kē** is replaced by the preceding **Lb** tone. This corresponds to the final stage in **Plapo**.

In **Tepo**, there is an additional step because the **Lb** tone also attracts any tone placed to the left:

- (100)
- |   |          |    |    |
|---|----------|----|----|
| M | Lb       | M  | M  |
|   |          |    |    |
| ā | hī       | kē | nī |
| M | <u>M</u> | L  |    |
- |   |          |    |    |
|---|----------|----|----|
| M | Lb       | M  | H  |
|   |          |    |    |
| ā | tō       | kē | tá |
| M | <u>M</u> | L  |    |

If the tense marker **T kē** is absent, the next element in the verb constituent is affected:

- (101)
- |              |          |    |  |
|--------------|----------|----|--|
| <i>Tepo:</i> |          |    |  |
| M            | Lb       | M  |  |
|              |          |    |  |
| ā            | hī       | nī |  |
| M            | <u>M</u> | L  |  |
- |               |          |    |  |
|---------------|----------|----|--|
| <i>Plapo:</i> |          |    |  |
| M             | Lb       | M  |  |
|               |          |    |  |
| ā             | hī       | nī |  |
| M             | <u>L</u> | L  |  |

As already mentioned, the perfective (**Lb**) verb stem is only found in the positive perfective conjugation, not in the negative one. The **negative perfective** conjugation is expressed by the auxiliary **dé** (Tepo) / **yí** (Plapo) / **já** (Piè):

- (102)
- |   |    |      |    |
|---|----|------|----|
| M | H  | M    | La |
|   |    |      |    |
| ā | dé | (kē) | hī |
| M | H  | M    | L  |
- You did not pass (today).*
- |   |    |      |    |    |
|---|----|------|----|----|
| M | H  | M    | H  | La |
|   |    |      |    |    |
| ā | dé | (kē) | tá | tō |
| M | H  | M    | H  | L  |
- You did not buy salt (today).*

In Tepo, there would be tone spreading if the low tone verb stem were carrying the **Lb** low tone: \* ā dé H hī H / \* ā dé kē M hī M and \* ā dé kē tá H tō H. This is not the case, which proves that the verb stem is in the neutral form.

Since there is no tone spreading by attraction from the left in Plapo nor in Piè, it cannot be decided whether the tone of **hī** or **tō** is **La** or **Lb** in the negative perfective conjugation.

In **Piè**, there is no such morpheme as **kē**. Therefore, in this grammatical context, there is no evidence that would allow us to decide whether the **L** tone perfective verb stem is **La**, or **La(Lb)**, or **Lb**.

The following **Tepo/Plapo** examples contain **low tone subject pronouns**, the low tone being a **Lb** tone. This **Lb** tone spreads to the right, to the low tone of the verb. This does not cause any tonal change of the verb, but there is tone lowering on the following element of the verbal constituent **kē** and **nī** **M** > **L**.

Compare with example (98):

- (103)
- |    |    |    |    |
|----|----|----|----|
| Lb | Lb | M  | M  |
|    |    |    |    |
| à  | hī | kē | nī |
| L  | L  | L  | M  |
- We passed today.*
- |    |    |    |  |
|----|----|----|--|
| Lb | Lb | M  |  |
|    |    |    |  |
| à  | hī | nī |  |
| L  | L  | L  |  |
- We passed.*

As there is no tone spreading in **Piè**, the second sentence above has **nī** **M**: à hī nī L L M.

#### 4.2.2 Perfective M tone verbs

In a sentence like the following with the **M** tone verb **mū** *M to go, to leave*, the perfective floating (**Lb**) tone remains unattached:

- (104)  $\begin{array}{ccc} \text{M} & \text{M(Lb)} & \text{M} \\ | & | & | \\ \bar{a} & m\bar{u} & n\bar{i} \\ \text{You (pl.) left.} \end{array} \quad \begin{array}{ccc} \text{H} & \text{M(Lb)} & \text{M} \\ | & | & | \\ \acute{n} & m\bar{u} & n\bar{i} \\ \text{I left.} \end{array} \quad (\text{pi\`e: } \acute{i} \ m\bar{u} \ n\bar{i})$

However, in **Tepo** and **Plapo** it undergoes attachment in prepausal position. The pause # is attached to a **Lb** tone, which triggers the attachment of (**Lb**) as demonstrated in (63):

- (105)  $\begin{array}{ccc} \text{H} & \text{M(Lb)} & \text{Lb} \\ | & | & | \\ \text{t\`e} & \acute{n} & \# \\ \text{as I} & \text{leave-PERF} & \\ \text{H} & \text{M} & \end{array} \Rightarrow \text{RT 1b} \quad \begin{array}{ccc} \text{H} & \text{M} & \text{Lb} & \text{Lb} \\ | & | & | & | \\ \text{t\`e} & \acute{n} & m\bar{u} & \# \\ \text{H} & \text{ML} & & \end{array}$
- As I left, ...

This stage ① corresponds to Krumen **dapo** (number 9 on the map 6.2.2 THE KRUMEN CLUSTER).

It is followed by stages ② to ④:

- (106)  $\begin{array}{ccc} \text{H} & \text{M Lb} & \text{Lb} \\ | & | & | \\ \text{t\`e} & \acute{n} & m\bar{u} & \# \\ \text{H} & \text{L} & \end{array} \Rightarrow \text{RT 2b} \quad \begin{array}{ccc} \text{H} & \text{M Lb} & \text{Lb} \\ | & | & | \\ \text{t\`e} & \acute{n} & m\acute{u} & \# \\ \text{H} & \text{H} & \end{array} \Rightarrow \text{RT 1a} + \text{RT 2a}$
- As I left.

Stage ② corresponds to **Plapo**.

There is a further development ③ in **Tepo**, because a **Lb** tone **attracts the tone to the left**, which is not the case in **Plapo**; see (13). The last stage ④ is the result of tone simplification.

The same changes occur in both **Tepo** and **Plapo** (*jí instead of dé*) in the **negative perfective**:

- (107)  $\begin{array}{ccc} \text{H} & \text{M(Lb)} & \text{Lb} \\ | & | & | \\ \acute{n} & \acute{d}\acute{e} & \# \\ \text{I PFNEG leave-PERF} & \text{I did not leave. ...} & \end{array} \Rightarrow \text{RT 1b} \Rightarrow \begin{array}{ccc} \text{H} & \text{M} & \text{Lb} & \text{Lb} \\ | & | & | & | \\ \acute{n} & \acute{d}\acute{e} & m\bar{u} & \# \\ \text{H} & \text{ML} & & \end{array} \Rightarrow \begin{array}{ccc} \text{H} & \text{M Lb} & \text{Lb} \\ | & | & | \\ \acute{n} & \acute{d}\acute{e} & m\bar{u} & \# \\ \text{H} & \text{L} & & \end{array} \Rightarrow \begin{array}{ccc} \text{H} & \text{M Lb} & \text{Lb} \\ | & | & | \\ \acute{n} & \acute{d}\acute{e} & m\acute{u} & \# \\ \text{H} & \text{H} & & \end{array}$

**Plapo** [tè n̄ mù]; **Tepo** [tè n̄ mú]; see (105) and (106).

In **Piè**, none of these tone rules applies; the perfective mid tone verb remains unchanged: **mū** **M**:

- (108) mò' í mū As I left ...

Let us now look at **Tepo/Plapo/Piè** examples containing **low tone subject pronouns**: **bà** *that-we (injunctive)*, **à** *we*.

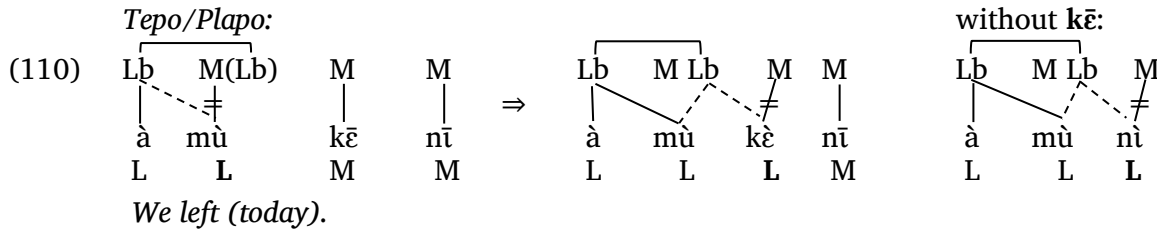
The following example contains the verb **mū** without the perfective (**Lb**) marker:

- (109)  $\begin{array}{ccc} \text{Tepo/Plapo:} & & \text{Piè:} \\ \text{Lb} & \text{M} & \text{M} \\ | & | & | \\ \text{bà} & m\bar{u} & (k\bar{e}) \\ \text{L} & \text{L} & \text{M} \end{array}$
- Let's go/leave (today).

In the **Tepo/Plapo** cluster, the **Lb** tone of the subject pronouns spreads to the right and causes tone lowering of the **M** tone verb.

But the **M** tone verb in **Piè** does not undergo lowering after the **Lb** tone subject pronoun because, as we repeatedly stated, there is no **Lb** tone spreading.

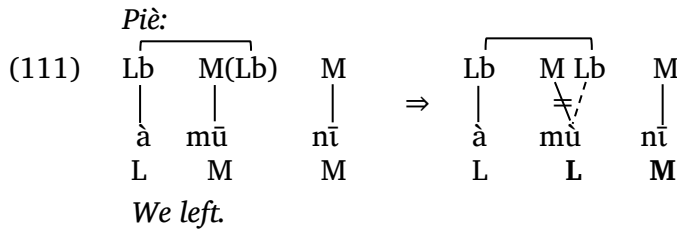
However, we get a different picture if the **verb stem** is in the **perfective form** with the suffixed (**Lb**) floating tone: **mū M(Lb)**.



In **Tepo/Plapo**, we observe three processes:

- the spreading of the **Lb** tone of the subject pronoun to the verb and
- the attachment of the floating (**Lb**) tone of the perfective suffix to the verb stem, triggered by the presence of the **Lb** tone on the subject pronoun, and
- its subsequent spreading to the following element of the verbal constituent.

In **Piè**, as we have seen elsewhere, there is no spreading of the **Lb** tone, BUT the **Lb** tone of the subject pronoun triggers the attachment of the floating (**Lb**) tone of the perfective suffix to the verb:



This tonal change reveals two important facts:

- It is the only proof that the perfective **M** tone verb stem contains the floating (**Lb**) perfective suffix. There is no other context that reveals its existence.
- It allows to determine that in (110) the perfective (**Lb**) suffix is attached to the verb stem before its spreading to the following element of the verbal constituent. It rules out the interpretation stating that the (**Lb**) suffix would be directly attached to the following verbal element.

The examples of this section reveal that the perfective **M** tone verb stem is marked by the floating low tone perfective derivative suffix (**Lb**) in all three Kru languages: **M(Lb)**. However, it surfaces in different ways, according to the language and to the tonal environment.

### 4.2.3 Perfective H and LH tone verbs

Regarding the **H** and **LH** tone verb stems, there is a great contrast between the **Tepo/Plapo** cluster and the **Piè**.

In **Tepo/Plapo**, no tonal changes occur in the perfective form. There are two possible explanations: The floating (**Lb**) perfective suffix remains unattached OR the perfective verb stems are without perfective marker.

In **Piè**, however, through a tone lowering process, **H** tone verbs become **M** tone verbs (**H > M**), and **LH** tone verbs become **L** tone verbs (**LH > L**). Let us look at the details of the tonal change rules involved:

(112) H tone verb

|                      |       |                  |            |                                                      |
|----------------------|-------|------------------|------------|------------------------------------------------------|
| Imperative:          | já    | só               | ú          |                                                      |
|                      | go_up | village          | at         | Go up to the village.                                |
| Positive perfective: | ū     | jā               | só         | ú                                                    |
|                      | they  | go_up-PERF-      |            | They went up to the village.                         |
|                      | só    | ú                | ū jā       | It is to village they went up. (front shifting of E) |
| Negative perfective: | ū     | já <sup>39</sup> | só         | ú jā                                                 |
|                      | they  | NEG-PERF         | go_up-PERF | They did not go up to the village.                   |
| Clause structure:    | S     | AUX              | E          | V                                                    |

(113) LH tone verb

|                      |             |              |    |                                        |
|----------------------|-------------|--------------|----|----------------------------------------|
| Imperative :         | tĩ          | só           | ú  |                                        |
|                      | descend ... |              |    | Descend from the village.              |
| Positive perfective: | ū           | tĩ           | só | ú                                      |
|                      | they        | descend-PERF |    | They descended from the village.       |
| Negative perfective: | ū           | jā           | só | ú tĩ                                   |
|                      | NEG-PERF    | descend-PERF |    | They did not descend from the village. |

This tone lowering is caused by the **(Lb)** floating low tone perfective marker. It occurs in any position, in the positive and in the negative. That indicates that this morpheme **cannot be a grammatical marker at the clause level** but that it is a **verbal derivative tone suffix**.

In the **H > M** change, the tone lowering rule TR 4b applies - see (47) - to both the **H** tone and the **LH** tone verbs:

**TR 4b** Tone lowering in H tone verbs

|       |        |                |      |          |        |
|-------|--------|----------------|------|----------|--------|
| (114) | H (Lb) | tone lowering: | H Lb | (H) (Lb) | (H)    |
|       | PERF   | ⇒              | M    | M        | M (Lb) |
|       | jā     |                | jā   | jā       | jā *)  |
|       | go_up  |                |      |          |        |

\*) In the perfective verb stem, the PERF marker, despite having been dissociated, remains present as a suffixed floating tone **(Lb) > jā M(Lb)**.

As a result, the perfective **H** and **M** tone verbs are identical in form: **M(Lb)**; there is neutralization between the two.

The following comparison serves as evidence for this fact:

|             |   |             |
|-------------|---|-------------|
| (115)=(111) |   | (116)       |
| Lb M(Lb) M  | ⇒ | Lb M(Lb) M  |
| à mū nī     | ⇒ | à jā nī     |
| L M M       | ⇒ | L M M       |
| We left.    |   | We went up. |

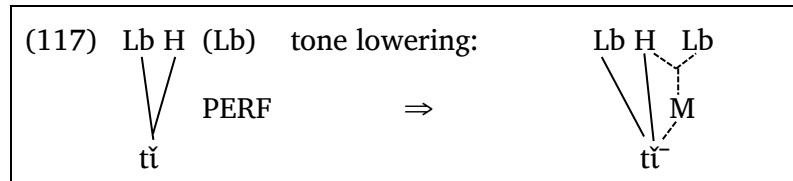
As we saw before: In both sentences, the **Lb** tone of the subject pronoun triggers the association of the **(Lb)** perfective marker.

<sup>39</sup> Negative perfective auxiliary

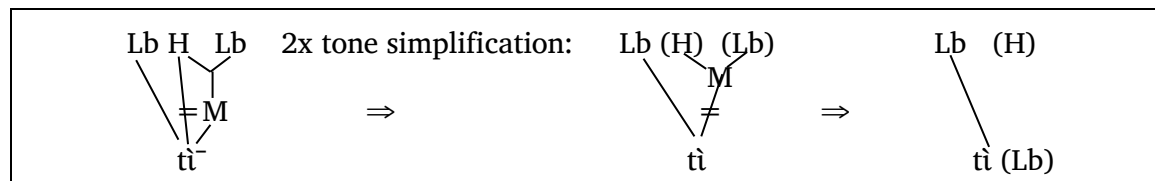


As to the **LH verbs** (in fact **LbH**) like **tĩ** *to go down / to descend*, the tonal change can be explained as follows: In a first step, tone rule TR 4b is applied. This causes the lowering of **H** to **M**.

**TR 4b** Tone lowering in LH tone verbs ...



**TR 2a** ... and subsequent dissociation (tone simplification)



There is no possibility to decide whether the perfective (Lb) has any influence in the sentence with the Lb tone subject pronoun – in any scenario, the result is the same:

|       |                      |        |    |       |               |        |    |
|-------|----------------------|--------|----|-------|---------------|--------|----|
| (118) | M                    | Lb(Lb) | M  | (119) | Lb            | Lb(Lb) | M  |
|       | ā                    | tĩ     | nĩ |       | ā             | tĩ     | nĩ |
|       | M                    | L      | M  |       | L             | L      | M  |
|       | You (pl.) went down. |        |    |       | We went down. |        |    |

In this section, we have seen that in Krumen **Piè**, the **(Lb)** perfective marker has a tone lowering effect on the H and LH tone verbs.

## 5 Conclusions

a) Re Sections 2 and 3:

This paper shows that the autosegmental model is a practical, convincing way to account for tonal change with a minimum of four simple rules.

It also shows that to solve especially difficult problems of analysis, a perspective that looks at several related languages is key to finding possible solutions.

It is interesting to note that the presence of a low tone with association capacity triggers a variety of tone change rules, which are applied differently according to the language, explaining a great deal of variety in realization.

Comparisons between these three different languages reveal that languages show varying degrees of tonal complexity, and most notably, there is a decreasing complexity of tonal change starting in Tepo in the west, passing through Plapo and going on to Piè in the east.

The complexity of changes in Tepo is due to the characteristics of a Lb low tone that causes associations from the left.

b) Re Section 4:

This study also shows that the **low tone perfective marker (Lb)** is well present in the Krumen cluster, classified among the *Western Kru* languages. This comes as a surprise, since this marker has been thought to be a feature of *Eastern Kru* only. In the Krumen languages, this marker is less prominent than it is in Eastern Kru. So, we conclude that the Krumen languages are more closely related to Eastern Kru than previously believed.

## 6 Appendices

### 6.1 Tone systems in Southern Grebo and Tepo Krumen

Here is a comparison between the Tepo Krumen [ted] and the Grebo [grj] tone systems. It is an expansion of section 2 The tonal system.

Innes (1966:12) states that *Grebo has a system of four tone levels .... Gliding tones are marked with a combination of two ... numerals joined by a hyphen*. In the Krumen languages on the other hand, there are only three levels. From a historical perspective, this suggests that the Grebo four-tone system was reduced to a three-tone system in Krumen.

A brief comparison between the following two-word lists of nouns and verbs reveals amazing parallels between Grebo and Tepo Krumen.

(120) NOUN, PRONOUN and VERB TONAL correspondances GREBO - TEPO

| nouns and <u>pronouns</u>                                   |                     |                     | tone <sup>40</sup> |             | verbs                                |          |          |
|-------------------------------------------------------------|---------------------|---------------------|--------------------|-------------|--------------------------------------|----------|----------|
|                                                             | Grebo               | Tepo                | Grebo              | Tepo        |                                      | Grebo    | Tepo     |
| <i>salt</i><br><i>spirit</i>                                | ta<br>ku            | tá<br>kú            | 2-1                | H           | <i>to climb</i><br><i>to fish</i>    | ja<br>pa | já<br>pá |
| <i>heap</i><br><i>time</i>                                  | du<br>ti            | dū<br>tī            | 2                  | M           | <i>to go</i><br><i>to come</i>       | mu<br>di | mū<br>dī |
| <i>shame</i><br><i>neck</i>                                 | tvĩ<br>plv          | tvì<br>plv̀         | 3-2                | La          | <i>to pass</i><br><i>to finish</i>   | hĩ<br>wε | hì<br>wè |
| <i>affair</i><br><i>ten</i><br><i>you, sg.</i><br><i>we</i> | tu<br>pu<br>mɔ<br>a | tì<br>pù<br>mò<br>à | 3                  | Lb          | <i>to pick,</i><br><i>to remove</i>  | ha       | hà       |
| <i>canoe</i><br><i>rice</i><br><i>Object PR</i>             | tu<br>bla<br>nɛ     | tũ<br>gblã<br>nẽ    | 4                  | LH<br>= LbH | <i>to descend</i><br><i>to swell</i> | tu<br>pũ | tĩ<br>pũ |

Innes (1966:12 and 1969) also gives the example of a tone 1: kĩ *king, chief*. As can be seen in the table below, this word corresponds to the two syllable Tepo and Plapo word kũ̃ (short variant: kĩ̃ /H M/) or /H (M)/.

(121) GREBO TONE [1] correspondances in TEPO

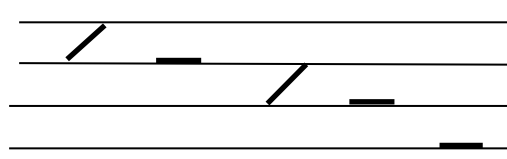
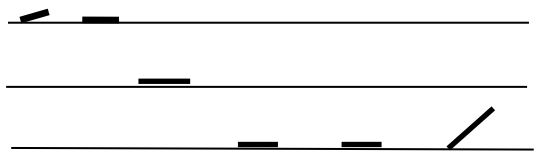
| nouns                                                 |                |                   | tone  |      | grammatical marker     |       |             |
|-------------------------------------------------------|----------------|-------------------|-------|------|------------------------|-------|-------------|
| English                                               | Grebo          | Tepo              | Grebo | Tepo |                        | Grebo | Tepo        |
| <i>king, chief</i><br><i>store</i><br><i>saw n.f.</i> | kĩ<br>to<br>sɔ | kũ̃<br>tóō<br>sɔ̃ | 1     | H M  | permansive<br>morpheme | tí    | tíē (plapo) |
| <i>piece</i><br><i>plank</i>                          | pisi<br>plãĩ   | písĩ<br>plãĩ̃     | 1 3   | H M  |                        |       |             |

It is evident that English loan words evoke a specific tone pattern, which disqualifies them as evidence for the existence of a tone 1 in Grebo.

<sup>40</sup> The tone indications refers to the pronunciation in isolation

This is how the tonal systems of Grebo and Tepo compare:

(122) This is how the tonal systems of Grebo and Tepo compare:

| Grebo                                                                             |       |      |      |         | Tepo                                                                               |       |      |      |         |
|-----------------------------------------------------------------------------------|-------|------|------|---------|------------------------------------------------------------------------------------|-------|------|------|---------|
|  |       |      |      |         |  |       |      |      |         |
| 2-1                                                                               | 2     | 3-2  | 3    | 4       | H                                                                                  | M     | La   | Lb   | LH      |
| na                                                                                | du    | hĩ   | ha   | ti      | ná                                                                                 | dū    | hì   | hà   | tĩ      |
| drink                                                                             | pound | pass | pick | descend | drink                                                                              | pound | pass | pick | descend |

At this point, the following **conclusions** can be drawn:

- The levels 3 and 4 in Grebo correspond to the one low level in Tepo, where we find the two lows La and Lb as noted in section 2 The tonal system.
- Comparing the Grebo and Tepo tones provides further evidence that there are actually four underlying tones in Tepo: H, M, La and Lb:

The four Tepo tones      H      M      La      Lb      and the sequence LbH parallel  
the Grebo tones      [2-1]      [2]      [3-2]      [3]      and tone [4].

- In the light of the Tepo tone system, Grebo tone [4] could be analyzed as a sequence of two underlying tonemes, i.e. tone 3 followed by 2-1, which surface as a level low tone 4.
- On the other hand, each of the Grebo contour tones [2-1] and [3-2] represent only one underlying toneme (and not a sequence of two tones). In a sentence, tone [2-1] is often realized as a level tone [1]. This is the case of the pronoun of the 1<sup>st</sup> person singular **ni**. See e.g. Innes (1966:55):

(123) ni du bla [1 1 4] (I / PERF<sup>41</sup>-pound/rice) I pounded rice. (base form of pound:du 2)

This analysis is in line with the statement of Paul Newman in *Contour Tones as Phonemic Primes in Grebo* (1986:175): «The normal (and usually correct) practice in African linguistics is to treat contour tones as sequences of level tones... In Grebo, on the other hand, ... a careful study leads to the analysis that recognizes two contour tones as primes along with the level tones.» The same analysis is found in Bearth and Link (1980) for the tones in Wobe.

- The Grebo CV words carrying tone [1], like kĩ [1] - see (121) above -, are mostly English loan words, which are paralleled in Tepo by CV.V two syllable words, like kũĩ, carrying the tone pattern H M.

In Tepo, a CV.V word like kũĩ H M corresponds to CV.CV or CV<sub>1</sub>V<sub>2</sub> words like písĩ / plãĩ H M, which in Grebo is pisi / plãĩ [1 3].

Consequently, the interpretation of Grebo words like kĩ [1] may be the following:

They go back to CV<sub>1</sub>.V<sub>1</sub> kũ [1 3], which then were shortened to CV kĩ [1].

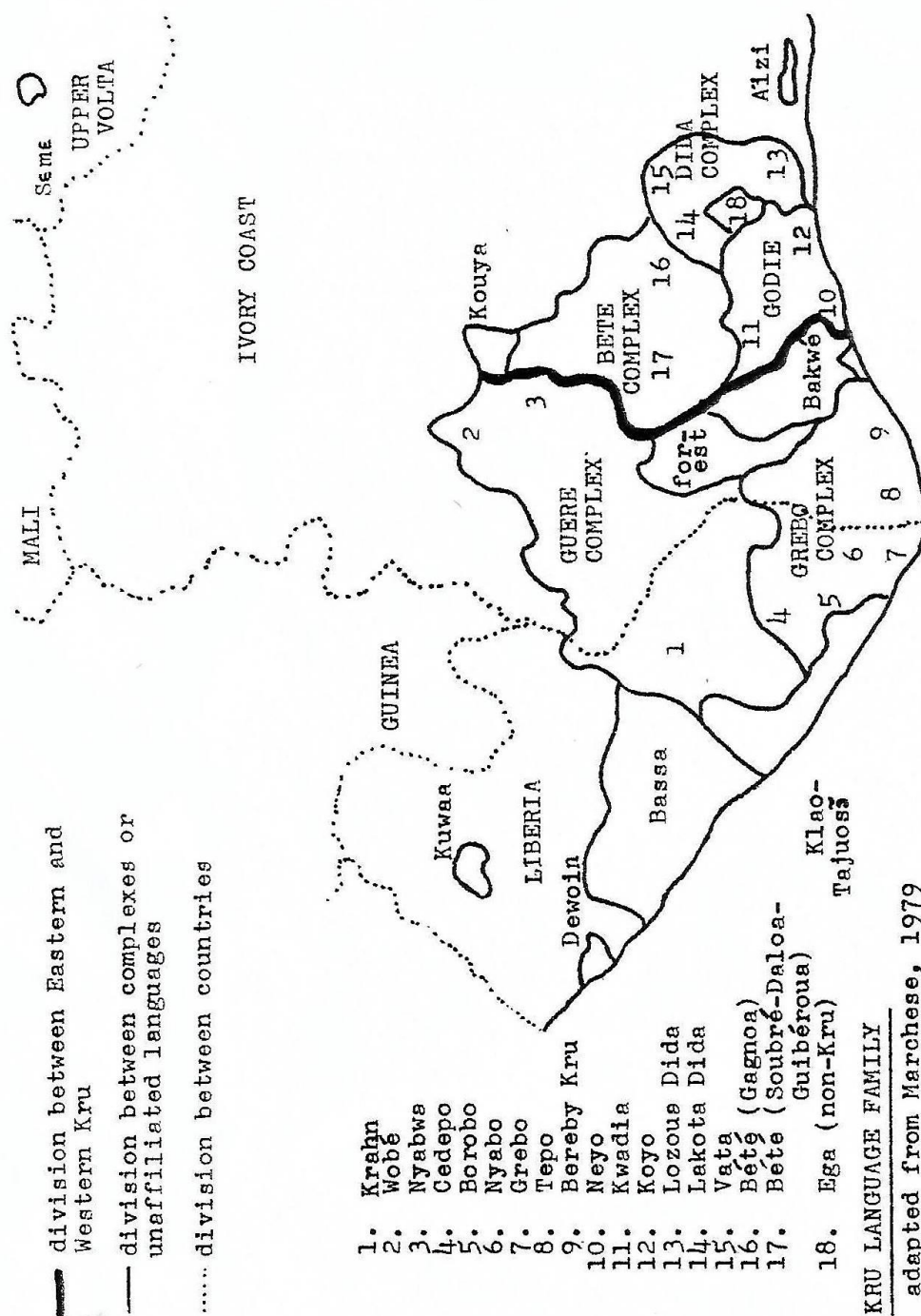
- The Grebo tone [4] corresponds to the Tepo sequence LbH, which is realized as a rising low [L+]. The rising part /H/ does not reach the top level. In Wlopo, close to Tepo, it is often just [L]. Hence it is very likely that in the case of Grebo, tone [4] has lost the second tone (by dissociation or assimilation).

The most important benefit of comparing the tone systems of the Grebo and of Tepo languages is that it enables us to explain why there are two low tones in the Tepo language.

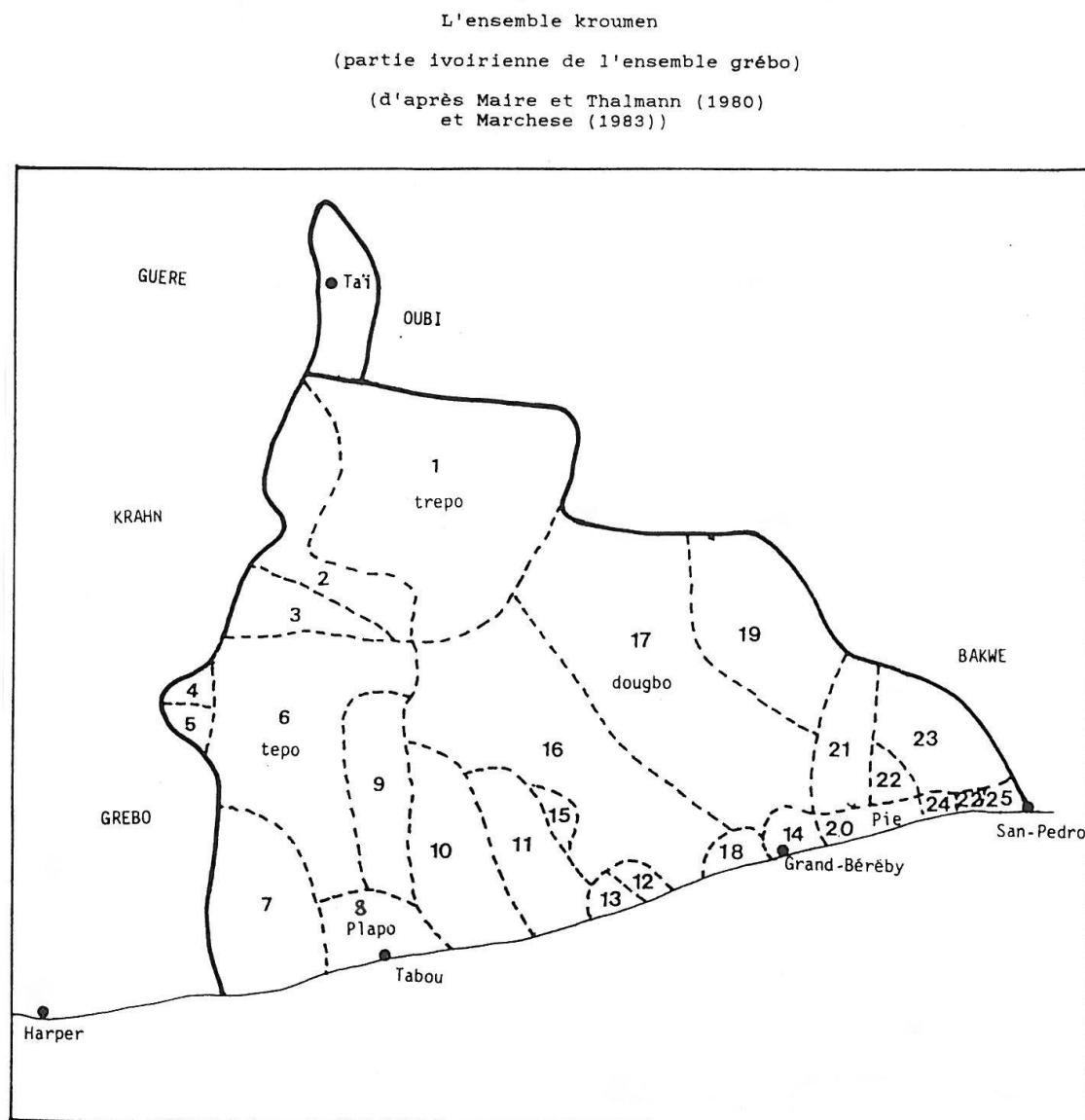
<sup>41</sup> PERF = perfective

## 6.2 Maps

### 6.2.1 THE KRU LANGUAGE FAMILY



## 6.2.2 THE KRUMEN CLUSTER



Groupes ethniques:

|          |             |            |
|----------|-------------|------------|
| 1 Trêpo  | 9 Dapo      | 17 Dougbo  |
| 2 Glawlo | 10 Hompo    | 18 Yrêwé   |
| 3 Yrêpo  | 11 Touoyouo | 19 Yapo    |
| 4 Kapo   | 12 Wlouwé   | 20 Pié     |
| 5 Wlopo  | 13 Hawlo    | 21 Pli     |
| 6 Tépo   | 14 Gbowé    | 22 Mahon   |
| 7 Bapo   | 15 Hna      | 23 Kouisi  |
| 8 Plapo  | 16 Wlépo    | 24 Gblapo  |
|          |             | 25 Hènékwé |

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