

## Tonal Variation Across Emakhuwa Dialects

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### 0. Introduction.

In this paper, we propose to show that differences in the ranking of a small set of universal tone constraints (motivated on the basis of the study of a variety of other Bantu tonal systems) explains the sometimes subtle, sometimes striking differences observed among dialects of the Emakhuwa language. It is intended as a contribution both to the study of Bantu tonology and as supporting evidence for the Optimality Theory approach to the study of phonology.

Emakhuwa (including Elomwe, which is sometimes regarded as a different language but without any specific linguistic justification that we are aware of) is a major Bantu language spoken in northern Mozambique and adjacent areas in Tanzania and Malawi. We have no accurate statistics available to us covering all three countries, but there would appear to be more than six million speakers. The language as a whole is certainly one of the most understudied major Bantu languages. In particular, there has been essentially no dialectal work (notwithstanding the title of the missionary-linguist Prata's (1960) *Gramática da lingua Macua e seus dialectos*).

The present paper is the first systematic exploration of any aspect of Emakhuwa dialectology. Since it deals exclusively with the tonal system of Emakhuwa, it will be of some use to give a very brief account of the *general* nature of that system (as opposed to the specifically phonological matters dealt with in the core of the paper). In the general region where Emakhuwa is spoken, there are a number of Bantu languages that have (apparently) lost any trace of the proto-Bantu tone system and are non-tonal. Kiswahili, in its better known forms, is a clear example. Other languages, e.g. Sena, appear to belong in this category, but there is a general lack of detailed descriptions and analyses from linguistically-trained researchers and thus caution is always in order. But besides these languages that have lost tone, there are a number of others that retain tone as a significant component of the system, but lack lexical tonal contrasts to some significant degree. Odden (1989) refers to these languages as having *predictable tone systems*. Emakhuwa falls solidly into this type.

When a Bantu language is said to have a predictable tone system (as compared with what we may refer to as the *prototypical tone system* of most Bantu languages), the following is meant:

- It shares with prototypical systems the property that (a) there is essentially just a contrast between moras with a High tone and moras without a H tone (so-called toneless moras), and (b) in the phonology of the language, it is only the H tone that is active.
- While prototypical languages distinguish lexically between H and toneless verb stems, a predictable tone language has no tonal contrast in the verb stem.
- While prototypical languages permit each mora of a noun stem to be either H or toneless (sometimes with major gaps), a predictable tone language radically restricts the range of contrasts or eliminates contrasts altogether.

- Affixes in a predictable tone system may be specified for H tone, just as in prototypical Bantu languages.
- Verb stems in a predictable tone system are *assigned* one or more H tones on the basis of the morphological structure in which they appear and on the basis of the moraic structure of the stem, just as is the case in prototypical languages. However, predictable systems do not show reflexes of a lexical tone on the verb stem in addition to such a *grammatical tone*, as prototypical languages may.

In this paper we will not be concerned with the morphological principles whereby certain moras in the verb stem are specified as H-toned. We will be entirely concerned with the *phonological implementation* of H-tone specifications. Let us introduce a bit of terminology. We will use the term *H-sponsor* to refer to moras that are specified with a H tone in the input to the phonology. As we shall see, in some dialects H-sponsors may uniformly be pronounced on a H tone; in other dialects, there are situations where the sponsor does not realize H tone or realizes it in some diminished phonetic form. Throughout this paper we shall underline these sponsors as a visual reminder of their status. Whether a mora is pronounced on a H tone will be indicated by an acute mark over the mora.

With this much background, let us turn our attention to the theoretical framework that we shall employ and the proposed universal constraints on tone.

### **1. Optimal Domains Theory and the universal constraint set.**

In this paper we adopt the major features of Optimality Theory and assume the reader's familiarity with OT (see Prince and Smolensky 1993, McCarthy and Prince 1993, 1995 and much subsequent literature). We will discuss here, but only very briefly, the single point of divergence between our approach and the more usual instantiations of OT.

We make critical use of the notion of a *feature domain*, more specifically, a *High (Tone) Domain* [=HD], rather than the notion of *autosegmental representations* characteristic of generative phonology, a derivational model of phonology. OT, on the other hand, has largely assumed autosegmental representations without argument (and, we think, without justification). It is not our intention here to dwell on either the limitations of autosegmental representations in the context of OT or on the precise differences between feature domains and autosegmental representations. There are some respects in which they are notational equivalents, other respects in which they are not. For a detailed and explicit development of the notion of feature domain with respect to tone, see Cassimjee and Kisseberth (1998) and Cassimjee (1998); for several somewhat more schematic applications of the notion to harmony systems, see Cole and Kisseberth (1995a,b,c; 1997). We use the term *Optimal Domains Theory* [=ODT] to refer to an OT approach to phonology that incorporates the notion of feature domains. We wish to stress that this is not a different theory from OT; simply an instantiation of that theory employing a particular concept that does however have a significant effect on certain aspects of the theory.

What is the leading idea behind feature domains? The idea is simply this. In the phonological input, certain elements (segments, moras, whatever) are specified for a phonological feature. We assume, however, that a feature can be phonetically expressed on an element only by virtue of that element being included with a domain for that

feature. A domain is a unit of structure, just like a syllable or a foot. Furthermore, we assume that while it is optimal for the elements inside an F-domain to be pronounced with the feature F, they are not *necessarily* so pronounced. Being inside an F-domain means that it is possible for an element to be pronounced with the feature, but not that it is so pronounced. Whether an element is pronounced with the relevant feature is at the mercy of the interplay between the preference that it be so pronounced and the possibility of constraints barring it from being pronounced. The critical element in all this is simple: F-domain structure and the pronunciation are connected but independent.

A HD will be indicated in this paper by placing phonological material inside parentheses. Moras are assumed to be the only elements that can bear tone. For simplicity's sake, we will align HD's with syllables even though we take the presence of a consonant in the domain to be irrelevant. As noted above, the actual pronunciation of a mora is indicated by a tone mark over the mora. For example, a transcription such as the following: **o-(khómá)(áí)hana** 'to strengthen one another' has two High Domains; both moras in each domain are pronounced with a H tone. The underlined moras represent the sponsors of H tone.

In Cassimjee and Kisseberth (1998) and Cassimjee (1998), the following universal tone constraints were introduced and used to explicate a range of tonal data from a variety of Bantu languages, but with especial focus on Isixhosa and Shingazidja. (In some cases we have condensed two constraints into one or otherwise modified the constraint so as to allow a more perspicuous presentation here. In all such cases, however, the reader should be able to readily correlate the constraints listed here with the constraints presented in the works cited above.)

We first list the constraints directly pertaining to *domains*:

- Faithfulness: this constraint says that every H-sponsor must be organized inside its own unique High Domain.
- Basic Alignment: there are two subcomponents to this constraint: Basic Alignment Left (=BAL) says that the left edge of a sponsor is aligned with the left edge of a HD; and Basic Alignment Right (=BAR) says that the right edge of a sponsor is aligned with the right edge of a HD. If the only HD's in an output are ones that represent a response to Faithfulness, then the consequence of Basic Alignment is that a HD will consist just of the sponsor.
- No Monomoraic HD: a HD should not consist of a single mora.
- Align R (HD, EdgePC): align the right edge of a HD with the right edge of a prosodic category (e.g. prosodic word, prosodic phrase, or intonational phrase).
- Nonfinality (IP): the right edge of a HD should not be located at the right edge of an intonational phrase.
- No Adjacent Edges: an "OCP" constraint banning HD's from being adjacent.

In addition to constraints related to domains, there are also constraints related to the *realization* of H tone.

- Express Head: the head of a HD must be H. (This constraint assumes that High Domains are *headed* and that in Bantu typically the rightmost mora in the domain is the head.)

- Express: every mora in a HD should be pronounced with a H tone.
- \*(H, nonhead): moras that are not domain-heads should not be pronounced on a H tone.
- No Rise: a syllable should not be pronounced with a Rising tone.
- No Fall: a syllable should not be pronounced with a Falling tone.
- Plateau: the mora sequence H-Toneless-H is ill-formed.

In the remainder of this paper, we will show how these constraints, along with a new constraint not developed in the earlier work on Optimal Domains Theory, form the basis for understanding variation in tone across Emakhuwa dialects.

In order to have a coherent set of data to use to bring out the essential features of the tone pattern of each dialect, we will concentrate as much as possible on the infinitive form of the verb in Emakhuwa. All but one of the Emakhuwa dialects discussed here have the following distribution of primary H tones in the infinitive. (We place a hyphen between the infinitive prefix and the stem. The infinitive prefix varies dialectally between /u/ and /o/.)

- (1) one mora stem:  $\underline{u}$ -Ca or u-C $\underline{a}$  (depending on the acceptability of final H)  
two mora stem: u-C $\underline{V}$ Ca  
three mora stem: u-C $\underline{V}$ C $\underline{V}$ Ca / u-C $\underline{V}$ V $\underline{C}$ a  
four mora stem: u-C $\underline{V}$ C $\underline{V}$ C $\underline{V}$ Ca / u-C $\underline{V}$ V $\underline{C}$ V $\underline{C}$ a / u-C $\underline{V}$ C $\underline{V}$ V $\underline{C}$ a  
five mora stem: u-C $\underline{V}$ C $\underline{V}$ C $\underline{V}$ C $\underline{V}$ Ca / u-C $\underline{V}$ V $\underline{C}$ V $\underline{C}$ V $\underline{C}$ a / C $\underline{V}$ V $\underline{C}$ V $\underline{C}$ a /  
C $\underline{V}$ C $\underline{V}$ V $\underline{C}$ Ca / C $\underline{V}$ C $\underline{V}$ C $\underline{V}$ CV  
etc.

We shall refer to this as the “first/third” mora pattern of tone assignment. Stems with three or fewer moras, have just a H on the first stem mora (possibly retracted, in the case where the stem has only one mora). Stems with four or more moras, have both a H on the first stem mora and on the third.

## 2. Emakhuwa Central.

There are some Emakhuwa speech varieties that, with respect to the present paper, are essentially uninteresting due to the fact that the H-sponsors are simply realized on a High tone and nothing more happens. Speech varieties of this type are found, e.g., in Nampula city, the capital of Nampula province, and throughout the central region of this province. This area of northern Mozambique represents the heartland of the Amakhuwa people. We shall refer to these speech varieties as ‘Emakhuwa Central’, without of course implying thereby that other dialects are ‘marginal’ or that there are no variations inside Emakhuwa Central. Unlike many other Emakhuwa dialects that have specific distinctive names by which speakers label their language (e.g. Imetto, Esaaka, Enlai and so on), speakers of Emakhuwa Central seem to simply call their language Emakhuwa.

Some examples of the infinitive in Emakhuwa Central are given in (2). The pronunciations cited are the same whether the verb is at the end of an Intonational Phrase or medial in such a phrase. (We perhaps should note that all Emakhuwa dialects contrast monomoraic and bimoraic vowels. There is no penultimate lengthening as is found in many Bantu languages.)

(2) o-(lyá) ‘to eat’, o-(khwá) ‘to die’, o-(wá) ‘to come’

o-(lí)ma ‘to cultivate’, o-(hí)ta ‘to slaughter’, o-(sá)ra ‘to be full’  
 o-(ló)vola ‘to transport’, o-(rú)kula ‘to pick fruit’, o-(tú)miha ‘to sell’  
 o-(má)ala ‘to be quiet’, o-(hó)ola ‘to go in front’, o-(té)exa ‘to pick up’

o-(tú)mi(hé)ra ‘to sell to’, w-u(ú)pu(wé)la ‘to remember’  
 o-(ná)na(rí)ha ‘to make dirty’, o-(hó)o(lí)ha ‘to make go in front’  
 o-(rú)ku(nú)xa ‘to turn s.t. over’, o-(rú)ku(nú)xela ‘to turn s.t. over for’

Emakhuwa Central tolerates word-final H-tone sponsors, unlike the dialects explored below. As a result, a monomoraic stem like /lya/ surfaces with a H tone in Emakhuwa Central. The data in (2) is unambiguous with respect to showing the “first-third” infinitive tone pattern: there is a H on the first mora, and if the stem contains four or more moras, there is also a H on the third mora. There are no High-toned moras except those that sponsor a High tone.

In ODT terms, Emakhuwa Central is a dialect that is *faithful* to the H tones that occur lexically or by assignment. This means, among other things, that the constraint in section 1 labeled “Faithfulness,” which requires each H-sponsor to be located inside its own unique HD, is undominated. Every H-sponsor must be inside its own HD if an output is to be optimal. Furthermore, the faithfulness constraint Basic Alignment is undominated; there is no optimal output in which a non-sponsor is inside a HD. Finally, the constraints Express and Express Head are undominated; i.e. the (head) mora in each HD must be realized with a H tone.

There are several constraints that, in order to be satisfied, might well lead to the inclusion of a non-sponsor in a HD. For example, the constraint No Monomoraic HD prefers HD’s that are not monomoraic. One way to satisfy such a constraint would be to include a non-sponsor in a HD, thereby making it bimoraic. Similarly, the constraint Align R (HD, EdgePC) wants a HD to be as close to the right edge of some prosodic category (such as the Prosodic Word) as possible; again, this constraint in some cases could be satisfied by including non-sponsors in the HD. Violation of a realization constraint such as Plateau, which dislikes H0H, could be avoided by making a toneless mora H-toned. But to do this would necessitate locating the toneless mora inside a HD, thus violating Basic Alignment. In Emakhuwa Central, *none* of the constraints that might require a non-sponsor to be in a HD are satisfied; they cannot be, since Basic Alignment is undominated.

The following tableau illustrates the selection of the optimal output in Emakhuwa Central.

(3)

| Candidates            | Faithfulness | Basic Alignment | Express   | No Mono HD |
|-----------------------|--------------|-----------------|-----------|------------|
| o- <u>l</u> ovola     | * (fatal)    | ok              |           | ok         |
| o-( <u>l</u> óvó)la   | ok           | * (fatal)       |           | ok         |
| o-( <u>l</u> o)vola   | ok           | ok              | * (fatal) | ok         |
| K o-( <u>l</u> ó)vola | ok           | ok              |           | *          |

### 3. Ikorovere.

While Emakhuwa Central (and the varieties of Elomwe that we have so far explored) are perfectly faithful (all and only sponsors are pronounced on a H tone), there are other dialects which are unfaithful to some extent. One such dialect is Ikorovere, spoken in Tunduru district in southern Tanzania. It is clear that the origins of the Amakhuwa people are in the north part of Mozambique; Ikorovere thus represents an expansion of the Amakhuwa across the Ruvuma river into Tanzania, probably sometime during the past century.

In a series of papers, Cheng and Kisseberth (1979, 1980, 1981, 1982) described the tone pattern of Ikorovere in some detail. They argued that the fundamental tone “rule” in Ikorovere is High tone doubling. In other words, the moras that we term sponsors are realized on a High tone and that High tone induces a H tone on the following mora as well. The following infinitive data illustrate the existence of this doubling phenomenon, as well as some restrictions on it. In the examples, we cite both the case where the infinitive verb is at the end of an intonational phrase (=IP) and the case where it is in medial position. Medial position is indicated by a series of dots after the verb.

|     |                                    |                                       |                 |
|-----|------------------------------------|---------------------------------------|-----------------|
| (4) | ( <u>ú</u> )-lya                   | ( <u>ú</u> -lyá)...                   | ‘to eat’        |
|     | u-(th <u>ú</u> )ma                 | u-(th <u>ú</u> má)...                 | ‘to buy’        |
|     | u-(th <u>ú</u> mé)la               | u-(th <u>ú</u> mé)la...               | ‘to buy for’    |
|     | u-(m <u>á</u> )ala                 | u-(m <u>á</u> á)la...                 | ‘to be quiet’   |
|     | u-(m <u>á</u> á)(lí)ha             | u-(m <u>á</u> á)(líhá)...             | ‘to make quiet’ |
|     | u-(kh <u>ó</u> má)( <u>á</u> lí)ha | u-(kh <u>ó</u> má)( <u>á</u> lí)ha... | ‘to strengthen’ |

Examination of the data in (4) reveals that in Ikorovere, the H-sponsor (the underlined vowel) is always pronounced on a H tone. We attribute this to Faithfulness and Express/Express Head being undominated in Ikorovere (as in Emakhuwa Central). Furthermore, in many cases, the immediately following vowel is also pronounced on a High tone. There are, however, contexts in which the following vowel is not High-toned.

Let us construct an account of these data in terms of the universal constraints proposed in section 1. Since in Ikorovere a H-sponsor is *sometimes* followed by a High tone on the next mora (which is not itself a H-sponsor), this means that the constraint Basic Alignment is sometimes violated. If a constraint *C* is violated, this means that there is some other constraint *D* ranked higher than *C* that must be satisfied even if to do so means *C* will be violated. So, in the present example: what is the constraint that requires High tone doubling to occur in Ikorovere? The answer is straightforward: No Monomoraic HD. No Monomoraic HD bans a HD that has a single mora; this ill-formed structure may be avoided by extending the HD to include an additional mora. Of course, there is another way (besides extending a HD) to make certain that there are no monomoraic HD's. Specifically, one could fail to form a HD at all. We assume that this option is not available since Faithfulness dominates No Monomoraic HD. We thus have the following constraint rankings:

- (5) Faithfulness, Express, Express Head: undominated  
 No Monomoraic HD: dominated by Faithfulness  
 Basic Alignment: dominated by No Monomoraic HD

The tableau in (6) illustrates

(6)

| Candidates                     | Faithfulness | No Monomoraic HD | Basic Alignment |
|--------------------------------|--------------|------------------|-----------------|
| o $\dot{\text{l}}$ ima...      | * (fatal)    | ok               | ok              |
| o(l $\dot{\text{i}}$ )ma...    | ok           | * (fatal)        | ok              |
| K o-(l $\dot{\text{i}}$ má)... | ok           | ok               | *               |

We should note that an output candidate like **o-(l $\dot{\text{i}}$ ma)**..., where there are no surface H tones, also satisfies Faithfulness and No Monomoraic HD and violates Basic Alignment once, just like **o-(l $\dot{\text{i}}$ má)**... Similarly, an output candidate like **o-(l $\dot{\text{i}}$ má)**..., where there is a H tone on the head of the HD but not on the first, nonhead mora, also satisfies Faithfulness and No Monomoraic HD and violates Basic Alignment once. We can choose **o-(l $\dot{\text{i}}$ má)**... as optimal by simply making Express an undominated constraint. In particular, it is ranked above the constraint \*(H, nonhead), which requires that non-head moras be toneless.

(7)

| Candidates                     | Express     | *(H, nonhead) |
|--------------------------------|-------------|---------------|
| o-(l $\dot{\text{i}}$ ma)...   | * (fatal) * | ok            |
| o-(l $\dot{\text{i}}$ má)...   | * (fatal)   | ok            |
| K o-(l $\dot{\text{i}}$ má)... | ok          | *             |

The following constraint set is required for the (small amount) of Ikorovere data so far considered:

- (8) Faithfulness, Express Head, Express: undominated  
 No Monomoraic HD: dominated by Faithfulness  
 Basic Alignment: dominated by No Monomoraic HD  
 \*(H, nonhead): dominated by Express

However, since in Ikorovere there is never a case where an element in the HD fails to be pronounced on a H tone, we omit any further discussion of Express, Express Head, and \*(H, nonhead) in this section. We do return to them when we discuss subsequent dialects.

Actually, there is yet one more problem with respect to **o-(l $\dot{\text{i}}$ má)**... Doubling in Emakhuwa is always to the right. But doubling to the left, yielding **(ó-l $\dot{\text{i}}$ )ma**..., would also satisfy No Monomoraic HD. How do we guarantee doubling to the right rather than the left?

Recall that Basic Alignment actually consists of two constraints: BAL and BAR. We can explain the failure of a HD to extend leftwards by saying that BAL dominates No Monomoraic HD, while No Monomoraic HD dominates BAR.

(9)

| Candidates    | BAL       | NoMonomoraic HD | BAR |
|---------------|-----------|-----------------|-----|
| o-(l̥)ma...   | ok        | * (fatal)       | ok  |
| (ó-l̥)ma...   | * (fatal) | ok              | ok  |
| K o-(l̥má)... | ok        | ok              | *   |

The Ikorovere constraint system up to this point is as in (10):

- (10) Faithfulness, Express Head, Express, BAL: undominated  
 No Monomoraic HD: Faithfulness  
 BAR: dominated by No Monomoraic HD  
 \*(H, nonhead): dominated by Express

We have seen that No Monomoraic HD is dominated by Faithfulness. Are there any other constraints that must dominate No Monomoraic HD? There must be. If there weren't, then there would be no cases where the HD is not bimoraic. An examination of the data in (4) shows, however, that there are many instances of monomoraic HD's. The existence of such HD's needs to be explained. There must be a constraint that dominates No Monomoraic HD and thus forces such domains to exist so that this more highly ranked constraint may be satisfied. We propose that one relevant constraint dominating No Monomoraic HD is Nonfinality. Nonfinality bans HD's from being aligned with the right edge of an IP.

Consider an example like **u-(l̥)ma**. This optimal form violates No Monomoraic HD; if it tried to satisfy No Monomoraic HD by having the following pronunciation, **u-(l̥má)**, it would violate Nonfinality. **u-(l̥)ma** is the best pronunciation since it satisfies the more highly ranked Nonfinality and violates the less highly ranked No Monomoraic HD. Notice that in medial position, **u-(l̥má)...** is the best pronunciation. The reason is that this form satisfies both Nonfinality *and* No Monomoraic HD.

(11)

| Possibilities | Nonfinality | No Mono HD | BAR |
|---------------|-------------|------------|-----|
| o-(l̥má)      | * (fatal)   | ok         | *   |
| K o-(l̥)ma    | ok          | *          | ok  |

| Possibilities | Nonfinality | No Mono HD | BAR |
|---------------|-------------|------------|-----|
| K o-(l̥má)... | ok          | ok         | *   |
| o-(l̥)ma...   | ok          | * (fatal)  | ok  |

The constraint set for Ikorovere as so far determined:

- (12) Faithfulness, Express, Express Head, Nonfinality, BAL: undominated  
 No Monomoraic HD: dominated by Faithfulness, Nonfinality  
 BAR: dominated by No Monomoraic HD  
 \*(H, nonhead): dominated by Express

We should note that in (11) we indicated that Nonfinality is undominated. In general, Ikorovere structures its H-sponsors so that they never occur on the final mora of a word



that could be IP-final. As a consequence, there is no means to test whether Faithfulness would over-ride Nonfinality in Ikorovere.

There is only one other major point about the phonology of Ikorovere tone that we have not covered. Notice the pronunciation **u-(má)ala**. Why isn't it better to have the pronunciation **u-(máá)la**? None of the constraints proposed in section 1 explain this. For some reason, a H-sponsor does not double onto the following mora when (a) the H-sponsor is on the first mora of a bimoraic syllable and (b) the bimoraic syllable is penult in the IP. This is not the place to undertake full-scale discussion of all the cases from Bantu that bear upon this aspect of Emakhuwa tone. We will simply note two very general facts: there is a clear cross-linguistic preference for pitch to descend at the right edge of an intonational phrase. In many Bantu languages (and especially the various Emakhuwa dialects), there is a clear suggestion that descent is not restricted to the *final* syllable: it may be observed to encroach back to the penult. We know of no cases where it is manifested further forward in the intonational phrase – for example, the antepenult. Languages that reflect a desire for tone to fall on IP-penult bimoraic vowels include Ruciga (spoken in Uganda), Ciyao (spoken contiguous to or overlapping with Emakhuwa), Sotho languages in South Africa and Botswana. Chichewa, in Malawi and Mozambique, has a doubling phenomenon, but excludes doubling onto a IP-penult monomoraic syllable.

Much more research is required with respect to how to formulate the constraint at work here. Very tentatively, we propose (13):

(13) Penults are Bad HD Edges

Do not align the R edge of a HD with the R edge of an IP- penult syllable.

Penults are Bad HD Edges is not quite right for Ikorovere, however, since it would predict that **u-(lí)mela** is more optimal than **u-(lí)mé)la**. As we shall see, there is some evidence in other Emakhuwa varieties for a very general constraint like (13). But in Ikorovere only bimoraic IP-penults don't like to be aligned with a HD.

We will assume that Penults are Bad HD Edges is actually a family of constraints:

(14) Bimoraic Penults are Bad HD Edges

Do not align the R edge of a HD with the R edge of a bimoraic IP-penult syllable.

Penults are Bad HD Edges

Do not align the R edge of a HD with the R edge of a an IP-penult syllable.

Now, if Bimoraic Penults are Bad HD Edges dominates No Monomoraic HD in Ikorovere, but No Monomoraic HD dominates Penults are Bad HD Edges, then we correctly predict the Ikorovere data.

(15)

| Candidates  | BP are Bad HD Edges | No Monomoraic HD | P are Bad HD Edges |
|-------------|---------------------|------------------|--------------------|
| o-(máá)la   | * (fatal)           | ok               | *                  |
| K o-(má)ala | ok                  | *                | ok                 |



- (18) Ikorovere system:  
 Faithfulness, Express, Express Head, Nonfinality, BAL: undominated  
 Bimoraic Penults are Bad HD Edges: dominated by Faithfulness, Nonfinality  
 No Monomoraic HD: dominated by Faithfulness, Nonfinality, Bimoraic Penults  
 are Bad HD Edges  
 BAR: dominated by No Monomoraic HD  
 Penults are Bad HD Edges: dominated by Faithfulness, Nonfinality, No  
 Monomoraic HD  
 \*(H, nonhead): dominated by Express

#### 4. Eerati.

The dialect studied in this section, Eerati, introduces yet another dimension into the story of Emakhuwa dialect variation. When we examine the infinitive in Eerati, we find some immediate evidence that it may have exactly the same distribution of sponsors of High tone as Ikorovere and many other Emakhuwa varieties. For instance, stems with one mora or two moras have the same tone pattern as in Ikorovere when they are IP-final. We indicate Eerati examples with [E] and Ikorovere examples with [K].

- (19) (ó)-lya [E], (ú)-lya [K] ‘to eat’                      (ó)-khwa [E], (ú)-khwa [K] ‘to die’  
 o-(lí)ma [E], u-(lí)ma [K] ‘to cultivate’    o-(thú)ma [E], u-(thú)ma [K] ‘to buy’

Furthermore, stems that have two syllables where the first one is bimoraic are also identical in the two dialects:

- (20) o-(má)ala [E], u-(má)ala [K] ‘to be quiet’  
 o-(hó)ola [E], u-(hó)ola [K] ‘to precede’

And trisyllabic stems with a bimoraic first syllable are also identical:

- (21) o-(máá)(lí)ha [E], u-(máá)(lí)ha [K] ‘to be quiet’

However, stems with other moraic structures differ (at least superficially) from Ikorovere. For example,

- (22) o-(thumê)la, o-(thumé)la... [E] ‘to buy for’  
 u-(thúmé)la, u-(thúmé)la... [K]

o-(hukû)la, o-(hukú)la... [E] ‘to brew traditional beer’  
 u-(húkú)la, u-(húkú)la... [K]

o-(lupâ)ttha, o-(lupá)ttha... [E] ‘to hunt’  
 u-(lúpá)ttha, u-(lúpá)ttha... [K]

o-(rukú)(nú)sa, o-(rukú)(nú)sa... [E] ‘to turn s.t. around, over’  
 u-(rúkú)(nú)xa, u-(rúkú)(nú)xa... [K]

Furthermore, even the one and two mora stems cited in (19) diverge from Ikorovere when these stems are placed in IP-medial position. In (23), we give medial pronunciations in Eerati in comparison with Ikorovere.

- (23) (o-lyá)... [E], (ú-lyá)... [K]                      (o-khwá)... [E], (ú-khwá)... [K]  
 o-(límá)... [E], u-(límá)... [K]                      o-(thumá)... [E], u-(thumá)... [K]

Our analysis is that the pattern of High-sponsors in the infinitive is the same in Eerati as in Ikorovere and that the essential difference between the two dialects has to do with the phonology of the tone. In a number of cases above (but not all), we find the following basic difference: whereas Ikorovere pronounces both the sponsor and the following mora on a High tone, in Eerati the sponsor is pronounced without a H tone and only the next mora is actually realized on a High tone. Examples reflecting this generalization include: (o-lyá)... in Eerati but (ú-lyá)... in Ikorovere; o-(límá)... in Eerati but u-(límá)... in Ikorovere; o-(thumé)la in Eerati but u-(thumé)la in Ikorovere; and o-(rukú)(nú)sa in Eerati but u-(rukú)(nú)xa in Ikorovere.

On the basis of this observation, in a derivational model of phonology one might be tempted to simply categorize Eerati as a “tone shifting” rather than a “tone doubling” language. The term “tone shift” refers to languages where an underlying H appears not on the mora that bears it, but rather on some mora to the right, often the immediately following mora. From the analytical point of view, it has never been obvious that tone shifting and tone doubling are ultimately different phenomena; shifting could be assumed to involve first doubling and then the removal of the H tone from the mora that underlying bears the H tone. In a non-derivational model such as OT, where phonological *actions* (shifting, doubling) are not part of the grammatical system but rather consequences of the system, the only issue is: what constraint prevents the sponsor from realizing H tone in Eerati but does not prevent it from realizing H tone in Ikorovere?

The constraint set listed in section 3 approaches the problem of the difference between tone doubling and tone shift as follows. Both phenomena involve a violation of BAR in the interest of satisfying No Monomoraic HD. It is important to emphasize one point however: No Monomoraic HD is satisfied if the domain includes more than one mora; its satisfaction does *not* depend on how the moras in the HD are actually pronounced. Where the two phenomena differ has to do with the realization of tone in the domain. Is H tone realized throughout the domain, or is it only realized at the right edge of the domain?

The universal constraint Express is satisfied when all the (tone-bearing) elements of the domain realize the feature High tone. A second universal constraint, \*(H, nonhead) appeals to the idea that tonal domains are *headed* and that in (most) Bantu languages they are right-headed. The constraint says that non-heads should not be H-toned. In a doubling language like Ikorovere, Express dominates \*(H, nonhead). In a shifting language, \*(H, nonhead) dominates Express.

On the basis of the examples (o-lyá)..., o-(límá)..., o-(thumé)la, and o-(rukú)(nú)sa, it is clear that in Eerati, \*(H, nonhead) dominates Express. It is better to not pronounce a nonhead on a H tone than it is to satisfy Express. Having established a critical difference between Eerati and Ikorovere, let us turn to the examples where surface forms are similar. Recall the IP-final form of monomoraic and bimoraic stems:

- (24) (ó)-khwa ‘to die’      (ó)-wa ‘to come’      (ó)-nya ‘to defecate’  
 o-(vá)ha ‘to give’      o-(lí)ma ‘to cultivate’      o-(pwé)sa ‘to break’

These examples show that in Eerati, Nonfinality dominates No Monomoraic HD, just as in Ikorovere.

Also recall the IP-final form of a trimoraic stem with a bimoraic penult syllable.

- (25) o-(má)ala ‘to be quiet’      o-(wí)iha ‘to bring’  
 o-(hó)ola ‘to go in front’      o-(té)esa ‘to carry’

These examples indicate that Bimoraic Penults are Bad Edges dominates No Monomoraic HD in Eerati just as in Ikorovere. However, when we examine the IP-medial form of these verbs we notice a new problem.

- (26) o-(máá)la... [E], u-(máá)la... [K]      o-(hóó)la [E], u-(hóó)la... [K]  
 o-(téé)sa...      o-(wíí)ha...

What we see is that both moras of the penult syllable are H-toned in Eerati *just as in Ikorovere*. This appears to contradict the analysis whereby the constraint \*(H, nonhead) dominates Express. We do not get the pronunciation \*o-(máá)la... as expected.

One might try to finesse this class of examples by regarding the entire syllable at the right edge of a HD as the head. But since there is so little direct evidence for the notion *head* in the present context, we prefer to not look for more or less arbitrary solutions to problems. We are going to suggest a different interpretation, one which seems to be supported in a variety of ways in Bantu tonology. We propose that is the universal principle, No Rise, which is at work. No Rise bars syllables with rising tones.

There are various examples in the literature which indicate that contour tones in general and rising tones in particular are *marked* configurations that tend to be avoided. In some languages, No Rise violations are avoided by making a potentially Rising-toned syllable level H. In other languages, Rising tones are avoided by removing the H tone from the second mora.

Assuming then the existence of No Rise in the constraint set, the data in (26) can be explained by ranking No Rise above \*(H, nonhead). As a result of this ranking, a Rising tone will be avoided even if to do so violates \*(H, nonhead). We should note, of course, that there are other possible ways of avoiding a No Rise violation than letting both moras in the HD be pronounced H. For one thing, if no domain is formed at all, then there can be no H tone and therefore no rising tone. We assume that Faithfulness dominates No Rise and therefore that option is not available. Also, No Rise could be avoided by having neither mora pronounced on a H tone: \*u-(máa)la... This violates neither No Rise nor \*(H, nonhead); it only violates Express. Indeed, since in our analysis Express is the lowest ranked constraint, it might appear that \*u-(máa)la... should be optimal rather than the correct u-(máá)la... So how do we explain the superiority of u-(máá)la...? The constraint set in section 3 actually regards Express as a family of constraints. One member of this family requires the *head* of the domain to be H. The other requires every element to be H. The incorrect form \*u-(máa)la shows that Express

Head is an undominated constraint in Eerati. As such, it guarantees that a Rising tone may not be avoided by simply not expressing H on any mora in the domain.

There *are* rising tones in Eerati. For instance, when a verb stem is vowel-initial, the infinitive prefix *o* glides to *w* and compensatorily lengthens the following vowel. As a consequence, we get forms like those in (27).

- (27) w-a(á)tta ‘to beat’, w-a(á)wa ‘to do witchcraft’, w-o(ó)tha ‘to lie’  
w-u(ú)ha ‘to cut down a tree’, w-o(ó)pa ‘to beat’, w-e(é)tta ‘to go’

The first stem mora sponsors a H tone. In order to avoid a rising tone in these cases, we cannot fail to have a HD given the undominated nature of Faithfulness. We also cannot have an output like \*w-a(á)ttá, since the undominated constraint Nonfinality precludes this possibility. We cannot avoid violating No Rise by an output like \*(w-áá)tta because BAL is undominated. We cannot avoid a rising tone by not pronouncing the High tone due to the undominated nature of Express Head. There is no option, then, but to have a surface rising tone.

We have now explained one environment in which \*(H, nonhead) is counteracted in Eerati. There is another environment as well. Look at stems with four moras or more in both IP-final and IP-medial position. We again cite Ikorovere forms for comparison.

- (28) o-(rukú)(nú)sa [E], u-(rúkú)(nú)xa [K] ‘to turn s.t. around’  
o-(rukú)(nú)sa... [E], u-(rúkú)(nú)xa... [K]

o-(theré)(ké)la [E], u-(théré)(ké)la [K] ‘to cut (e.g. a board)’  
o-(theré)(ké)la... [E], u-(théré)(ké)la... [K]

o-(khómá)(á)liha [E], u-(khómá)(á)liha [K] ‘to strengthen’  
o-(khómá)(á)liha... [E], u-(khómá)(á)liha... [K]

o-(hókó)(lósê)ra [E], u-(hókó)(lóxé)ra [K] ‘to return s.t. to’  
o-(hókó)(lósê)ra... [E], u-(hókó)(lóxé)ra... [K]

o-(hókó)(lósé)rana [E], u-(hókó)(lóxé)rana [K] ‘to return s.t. to each other’  
o-(hókó)(lósé)rana... [E], u-(hókó)(lóxé)rana... [K]

In all of these examples, there is a difference between Eerati and Ikorovere in the first High Domain since Eerati pronounces the sponsor on a low tone, while Ikorovere pronounces it on a H tone. This difference is of course just the difference in the ranking of Express and \*(H, nonhead). Now in the IP-final forms like **o-(rukú)(nú)sa** and **o-(theré)(ké)la**, we do not expect there to be any difference in the second HD in the word. Nonfinality will restrict the HD to a single mora. Since the HD consists of a single mora, that mora is the head of the HD and will be realized on a H tone due to Express Head. However, when these items are in IP-medial position, we expect the HD to expand to include the final mora. Consequently, we expect \*(H, nonhead) in Eerati to yield a pronunciation like \***o-(theré)(ké)la**... But this does not happen. There is no difference in pronunciation between Eerati and Ikorovere in terms of the second HD! (This is not

entirely true, as the example **o-(hókó)(lósê)ra** [E], **u-(hókó)(lóxé)ra** [K] shows. We shall take up the falling tone on short vowels in Eerati immediately below.)

The explanation for the inappropriateness of **\*o-(theré)(kelá)**... is provided by the constraint Plateau. This constraint says that the phonetic sequence H0H is to be avoided. In derivational approaches to phonology, this sort of phenomenon has sometimes been referred to as *bridging*. It plays a crucial role in accounting for a number of very complex facts in Cassimjee's (1998) analysis of the Nguni language, Isixhosa. If we accept the existence of Plateau, then the data under consideration can be accounted for by ranking Plateau above \*(H, nonhead). In other words, if it is a choice between ending up with a H0H sequence or with a nonhead pronounced H, then it is better to make the latter choice.

We have seen that Plateau must dominate \*(H, nonheads) in Eerati. Do we know anything else about its ranking in Eerati (and indeed in Ikorovere as well)? We cannot avoid a violation of Plateau by failing to include a sponsor in a HD (and thereby guaranteeing that there is no H tone to contribute to a H0H sequence). Faithfulness must dominate Plateau. We also cannot avoid a Plateau violation by not realizing the head of the domain on a H tone (again, thereby avoiding that mora being involved in a H0H sequence). Thus Express Head must dominate Plateau.

High tone doubling itself removes possible violations of Plateau. For example, in infinitives, where there is a H-sponsor on the first and the third moras of long stems, doubling will avoid a H0H sequence. However, it is also important to note that doubling may *create* violations of Plateau – violations that remain in the optimal output.

For example, there is a complexity in the infinitive tone that we have not mentioned. We have said that these dialects have a V1-V3 pattern of H tone assignment in the infinitive. The picture gets slightly more complicated when there is an object prefix present. The object prefix behaves as though it is part of the verb stem and thus, by virtue of being V1, sponsors a H-tone. Similar kinds of behavior have led Bantu scholars to recognize a so-called *macrostem* that includes the object prefix and the verb stem proper. V1 thus refers to the macrostem. However, the *third* stem mora continues to be calculated without counting the object prefix. Thus V3 refers not to the macrostem, but to the stem proper. Some examples from Ikorovere:

- (29) u-(kí-vá)ha 'to give me'                      u-(kí-hó)oxa 'to mistreat me'  
       u-(kí-lé)ela 'to tell me'                      u-(kí-vé)le(é)la 'to see me off'  
       u-(kí-má)a(lí)ha 'to make me quiet'      u-(kí-rú)ku(nú)xa 'to turn me over'

The pattern of tone assignment is thus one that, in terms of the macrostem, has a H-sponsor of the first and the fourth mora. The doubling of the V1 High locates a surface H tone on the second mora, thereby creating a H0H sequence. And this is in fact the correct pronunciation. We find **u-(kí-má)a(lí)ha** and not **\*u-(kí-máá)(lí)ha** (where a Plateau violation is avoided by extending the first HD). The same basic facts hold in Eerati as well, though the pronunciation would reflect the effects of \*(H, nonheads): **o-(kí-má)a(lí)ha**.

There are three possible accounts of this fact about Ikorovere and Eerati. One possibility is that there is a constraint on the maximal size of a HD: namely, that a HD is maximally binary (two moras). Call this Binariness. We did not include such a constraint

among the universal constraints in section 1. However, it represents an extremely plausible constraint (either as an alternative to No Monomoraic HD or in addition to it). If Binariness is an undominated constraint, then it would not be viable to extend the first HD in **o-(kí-má)a(lí)ha**. Of course, one would also have to make certain that the second HD could not extend leftwards. But the undominated BAL accounts for this fact.

A second analysis would account for **u-(kí-má)a(lí)ha** by ranking Plateau below BAR in Ikorovere and Eerati. In other words, we can simply say that Plateau does not have a sufficient ranking to drive a violation of BAR.

A third analysis goes as follows. There is considerable evidence for a universal constraint No Adjacent Edges (this constraint is roughly equivalent to the Obligatory Contour Principle of autosegmental phonology). No Adjacent Edges bans High Domains from abutting one another. Ikorovere and Esaaka clearly violate this constraint in order to satisfy No Monomoraic HD. But suppose that while No Monomoraic HD dominates No Adjacent Edges, No Adjacent Edges dominates Plateau. Given this scenario, Plateau will not be able to force an expansion of the HD's in (28) since to do so would result in a violation of No Adjacent Edges. Under this scenario, the ranking of Plateau with respect to BAR is indeterminate. We shall return later to the choice among these alternatives.

We have now almost finished our account of the purely phonological aspects of Eerati tone. The last point requiring discussion is the falling tone that we have occasionally seen in IP-final forms. We repeat the relevant material here.

- (30) o-(thumê)la, but: o-(thumé)la... 'to buy for'  
 o-(hokó)(lósê)ra, but: o-(hokó)(lósé)ra... 'to return s.t. to'.

The medial forms present no problem: they simply reflect the fact that Eerati ranks \*(H, nonhead) above Express. The IP-final forms show an additional difference: although the penult syllable is monomoraic, it has a clear falling pitch. What is the distribution of this falling pitch? Do all IP-penult heads display this fall? No. There is no fall in examples like **o-(lí)ma**, **o-(thú)ma**, **o-(rukú)(nú)sa**. The fall occurs only when the head of the HD is penult in the IP and moreover is the second element in the HD (i.e. not the sponsor).

We would like to suggest that in essence the phenomenon observed here is an attempt to satisfy the constraint Penults are Bad HD Edges. In order to avoid aligning the right edge of a HD with the right edge of a penult syllable, one solution would be to avoid the penult completely. A second way to avoid a violation would be to fail to align the HD *crisply* with the syllable edge. This solution assumes that while there may be a general preference to align HD edges and syllable (more precisely, mora) edges crisply, such a constraint (like other OT constraints) is violable. We do not develop here a formal account of this notion.

The analysis, then, goes as follows. No Monomoraic HD outranks Crisp HD Edges. In other words, a monomoraic HD will be avoided even if the only way it can be avoided is by noncrisply aligning with the penult edge. Penults are Bad HD Edges also outranks Crisp HD Edges. In other words, a violation of the former will be avoided even if to do so requires a non-crisp alignment. No critical ranking between No Monomoraic HD and Penults are Bad HD Edges exists.



The following tableau illustrates. For convenience, we will use a raised vowel symbol to represent a half-mora (assuming two phonological choices: alignment with the first half of the mora, and alignment with the full mora).

(31)

| Candidates                               | No Monomoraic HD | Penults are Bad HD Edges | Crisp HD Edges |
|--|------------------|--------------------------|----------------|
| o-(thú) <sup>e</sup> m <sup>e</sup> la   | * (fatal)        | ok                       | ok             |
| o-(thum <sup>e</sup> ) <sup>e</sup> la   | ok               | * (fatal)                | ok             |
| K o-(thum <sup>e</sup> ) <sup>e</sup> la | ok               | ok                       | *              |

OT recognizes that gradient, nondiscrete phenomena are part and parcel of phonology. Up until this juncture, they have not been incorporated in any systematic way into accounts of tone. If, however, falling tones are to be understood as a *sequence* of H and toneless (or Low) on a single tone-bearing unit, and if monomoraic vowels can display falling tone, then there is considerable reason for Optimal Domains Theory to recognize that there may be misalignment between a domain and a mora. In any case, we believe we are justified in seeing the short falling tone of Eerati as being a response to the constraint Penults are Bad HD Edges.

Now, we must explain why all IP-penults do not violate Crisp HD Edges. Specifically, why is **o-(thú)ma** preferred to **\*o-(th<sup>u</sup>)<sup>u</sup>ma**? This seems to be simply a consequence of the undominated Faithfulness constraint, which demands that the sponsoring mora be inside its HD. If Faithfulness is more important than Penults are Bad HD Edges, then a fully faithful output is required.

One last point. We have explained examples such as **u-(má)ala** in Ikorovere as being the consequence of Bimoraic Penults are Bad HD Edges dominating No Monomoraic HD. We propose to retain this ranking in Eerati as well. In other words, we rank the Bimoraic Penults are Bad HD Edges above No Monomoraic HD and No Monomoraic HD above the general Penults are Bad HD Edges. One would not need this difference in ranking if one wanted to claim that the proper output for verbs of this type in Eerati is **o(má<sup>a</sup>)<sup>a</sup>la**. However, since we can perceive no difference in pronunciation on this score between Ikorovere and Eerati, we prefer to leave the analysis of such forms identical in the two dialects.

One last point. We assume that in Ikorovere, Crisp HD Edges is an undominated constraint. Consequently, in Ikorovere, Penults are Bad HD Edges will be violated not only due to Faithfulness but also due to No Monomoraic HD.

The Eerati constraint system is given as (32).

(32) The Eerati constraint system:

Faithfulness, Express Head, Nonfinality, BAL, [Binarity]: undominated  
 Bimoraic Penults are Bad HDEdges: dominated by Faithfulness, Nonfinality  
 No Monomoraic HD: dominated by Faithfulness, Nonfinality, Bimoraic Penults are Bad HD Edges  
 [No Adjacent Edges: dominated by No Monomoraic HD]  
 BAR: dominated by No Monomoraic HD

Plateau: dominated by Faithfulness, Express Head, BAL, and one of the following: BAR or No Adjacent Edges or Binariness  
 No Rise: dominated by Faithfulness, Express Head, Nonfinality, BAL  
 Penults are Bad HD Edges: dominated by Faithfulness, Nonfinality, No Monomoraic HD  
 \*(H, nonhead): dominated by Plateau, No Rise  
 Express: dominated by \*(H, nonheads)  
 Crisp HD Edges: dominated by No Monomoraic HD, Penults are Bad HD Edges

### 5. *Imithupi*.

There is another dialect that is largely identical to Eerati, but where there is *phonetic gradience* with respect to whether \*(H, nonhead) is respected or not. This dialect, Imithupi, is spoken in Masasi district in Tanzania and is one for which we have especially full documentation. We shall continue our practice of using the infinitive as a convenient point of comparison. We should observe, however, that Imithupi departs from other Emakhuwa dialects with respect to the way that primary High tones are assigned in the infinitive. Most dialects have the “first/third” pattern discussed above. Imithupi has a “first/penult” pattern instead. In order for this difference to be visible, a stem must have five or more moras. We do not comment further on this difference, as it is not material to the matters dealt with here.

All the forms cited in (33) are from Imithupi except those from Eerati, labeled [E], cited by way of comparison. Note that a mora with an “umlaut” mark above it is one that is regularly *lower* in pitch than the following High tone, sometimes to the point of not being clearly observable, but generally of a mid pitch level.

- (33) (ú)-lya, (ü-lyá)... cf. (ó)-lya, (o-lyá)... [E]  
 (ú)-khwa, (ükhwá)... ‘to die’  
 (ú)-wa, (üwá)... ‘to come’  
 u-(thú)ma, u-(thü má)... ‘to buy’ cf. o-(thú)ma, o-(thü má)... [E]  
 u-(tthá)wa, u-(tthāwá)... ‘to run (from)’  
 u-(lé)la, u-(lēlá)... ‘to raise (a child)’  
 u-(ryá)a, u-(ryáá)... ‘to set a trap’  
 u-m(á)ala, u-(máá)la... ‘to be quiet’ cf. o-(má)ala, but: o-(máá)la... [E]  
 u-(né)ela, u-(néé)la... ‘to sink’  
 u-(cú)ula, u-(cúú)la... ‘to cry (of women, children, animals)’  
 u-(vé)cha, u-(véé)ha... ‘to belittle’  
  
 u-(tthükú)la, u-(tthükú)la... ‘to untie’ cf. o-(tthükú)la, o-(tthükú)la... [E]  
 u-(phārê)la, u-(phārê)la... ‘to burn’  
 u-(rāmû)sa, u-(rāmú)sa... ‘to greet’  
 u-(vëwû)la, u-(vëwú)la... ‘to despise’  
  
 u-(rükú)(nú)sa, u-(rükú)(nú)sa... cf. o-(rükú)(nú)sa, o-(rükú)(nú)sa... [E]  
 ‘to turn s.t. around’  
 u-(tthüké)(lé)la, u-(tthüké)(lēlá)... ‘to tie s.t. on s.t.’

u-(l<sup>o</sup>wó)(l<sup>e</sup>)la, u-(l<sup>o</sup>wó)(l<sup>e</sup>lá)... ‘to transport to’  
 u-(c<sup>a</sup>rí)(h<sup>e</sup>)la, u-(c<sup>a</sup>rí)(h<sup>e</sup>lá)... ‘to fill with’

u-(kh<sup>o</sup>má)a(lí)ha, u-(kh<sup>o</sup>má)a(líhá)... cf. o-(kh<sup>o</sup>má)(á)liha, o-(kh<sup>o</sup>má)(á)liha.. [E]  
 ‘to strengthen’  
 u-(th<sup>o</sup>tó)ka(ní)ha, u-(th<sup>o</sup>tó)ka(níhá)... ‘to gather’  
 u-(k<sup>u</sup>má)a(ní)ha, u-(k<sup>u</sup>má)a(níhá)... ‘to join together’  
 u-(k<sup>o</sup>ró)mee(lí)ha, u-(k<sup>o</sup>ró)mee(líhá)... ‘to get s.t. stuck up in (e.g. a tree)’

If we set aside the issue of the location of the second H-sponsor, there is exactly one difference between Imithupi and Eerati. In both dialects, \*(H, nonhead) dominates Express. In both dialects, Plateau and No Rise counteract the effects of the ranking of \*(H, nonhead) over Express. They differ in the degree to which \*(H, nonhead) is respected. While it is *absolutely* respected in Eerati (the nonhead is consistently without any element of H), in Imithupi it is *relatively* respected: the pitch is not H, though it is not consistently low either. We do not here deal with providing a formal account of how a relative lowering of pitch can count as satisfaction of \*(H, nonhead). We only emphasize that the difference between Eerati and Imithupi is not in the constraint system as such, but in whether an absolutely lower pitch level or a relatively lower pitch level is needed to satisfy \*(H, nonhead).

## 6. Enlai.

The next system that we shall examine in this paper is that of Enlai, spoken in the Angoche district of Nampula. This variety, while not itself at the southernmost boundary of Emakhuwa, appears to be part of a dialect cluster (including Emarovoni and Enamphamela) that does extend along the coast to the southern edge of Emakhuwa (where it runs into Echuabo, a language with Emakhuwa-like features but clearly a different language).

When one examines the infinitive in Enlai, one is in part reminded of Eerati; at the same time, it is evident that there is a crucial difference between not only Enlai and Eerati, but in fact Enlai and all the other Emakhuwa varieties so far examined. The data:

- |      |                                       |  |                                     |
|------|---------------------------------------|--|-------------------------------------|
| (34) | o-(l <sup>i</sup> má) ‘to cultivate’  | o-(m <sup>a</sup> ná) ‘to beat’        | o-(th <sup>u</sup> má) ‘to buy’     |
|      | o-(r <sup>a</sup> pá) ‘to bathe’      | o-(kh <sup>u</sup> lá) ‘to unplug’     | o-(v <sup>a</sup> há) ‘to give’     |
|      | o-(p <sup>w</sup> akúl)a ‘to slap’    | o-(l <sup>o</sup> vó)la ‘to transport’ | o-(kh <sup>a</sup> lí)ha ‘to help’  |
|      | o-(r <sup>u</sup> kú)la ‘to pick off’ | o-(k <sup>u</sup> rú)sa ‘to put down’  | o-(w <sup>a</sup> lé)la ‘to pen up’ |

The data in (34) have an immediate interpretation: Enlai is a language where \*(H, nonhead) dominates Express (thus paralleling Eerati and Imithupi), but where Nonfinality is dominated by No Monomoraic HD. The following tableau illustrates how these rankings will account for the data in (34).

(35)

| Candidates | * (H, nonhead) | No Monomor HD | Nonfinality | Express |
|------------|----------------|---------------|-------------|---------|
| o-(lí)ma   | ok             | * (fatal)     | ok          | ok      |
| o-(lí)ma   | * (fatal)      | ok            | *           | ok      |
| K o-(lí)ma | ok             | ok            | *           | *       |

Examine next the data in (36):

(36) o-(máá)la ‘to be quiet’ o-(úú)a ‘to take out of water’ o-(khúú)ra ‘to chew’

These data show that No Rise must dominate \*(H, nonhead), just as in Eerati and Imithupi; otherwise, it would be better to satisfy the relatively high-ranked \*(H, nonhead). No Monomoraic HD’s must dominate Bimoraic Penults are Bad HD Edges; otherwise, it would be better to avoid a penult syllable at the edge of a HD even if to do so would leave a monomoraic HD.

(37)

| Candidates  | No Rise   | No Monomor HD | * (H, nonhead) | BiPenults are Bad HD Edges | Express |
|-------------|-----------|---------------|----------------|----------------------------|---------|
| o-(má)ala   | ok        | * (fatal)     | ok             | ok                         | ok      |
| o-(má)la    | * (fatal) | ok            | ok             | *                          | *       |
| K o-(máá)la | ok        | ok            | *              | *                          | ok      |

There is an interesting question that needs to be addressed. In Enlai, High tone doubling goes onto an IP-final mora, unlike in all the other dialects examined earlier. Also, High tone doubling goes onto the second mora of a bimoraic IP-penult syllable, again unlike in all the other dialects examined. And of course, High tone doubling goes onto a short IP-penult syllable as a level H tone, a pattern it shares with Ikorovere but not Eerati and Imithupi. Enlai does not respect either Nonfinality nor (Bimoraic) Penults are Bad HD Edges. One wonders whether this is accidental. Could there be a dialect that respects (Bimoraic) Penults are Bad HD Edges but not Nonfinality? We have not encountered such a dialect yet. It seems appropriate to at least explore the issue of whether there is an implicational relationship between these two IP-sensitive constraints and why. But that is beyond the scope of this paper.

Next consider the data in (38).

(38) o-(máá)(lí)há ‘to make quiet’                      o-(khá)lí)(hé)ryá ‘to put s.t. in the right way’  
o-(lémé)(é)lá ‘to get used to’                      o-(píkí)(rís)á ‘to make roll’  
o-(rukú)(ń)śá ‘to turn over’                      o-(velé)(é)lá ‘to see off’  
o-(velá)(v)élá ‘to be troubled’                      o-(tutú)(r)úsá ‘to frighten’  
o-(pwakú)(l)áná ‘to slap one another’

o-(pwakú)(lí)há)na ‘to cause to slap e.o.’                      o-(rukú)(n)é)la ‘to play with’  
o-(lémé)(é)lí)ha ‘to make get used to’                      o-(khomá)(á)lí)ha ‘to strengthen’

These data reveal that, just as in Eerati and Imitthupi, Plateau dominates \*(H, nonhead). Consider, for example, **o-(máá)(lǐhá)**. The first H-sponsor is pronounced on a H tone due to the effects of No Rise. But why is the second H-sponsor also pronounced on a H tone? Clearly, the relevant consideration is that there is an immediately preceding H tone. A pronunciation which obeyed \*(H, nonhead), \***o-(máá)(lǐhá)** would violate Plateau. In an example such as **o-(velé)(éǎ)**, the second H-sponsor must be pronounced with a H tone for two reasons: to do otherwise would violate both No Rise and Plateau.

That Plateau is at work in Enlai can also be seen from examples like those in (39), where an object prefix is present. Remember that the object prefix takes the V1 H-tone.

- (39) o-(m-má)a(lǐhá) ‘to make [cl. 1] quiet’  
 o-(m-vé)le(eǎ) ‘to see [cl. 1] off’  
 o-(n-tú)tu(rsá) ‘to frighten [cl. 1]’

Since object prefix bears V1, while the third stem mora bears V3, the V3 position is necessarily preceded by a toneless mora. Plateau cannot play any role.

The Enlai constraint system is identical to that of Eerati, with the sole exception that No Monomoraic HD dominates both Nonfinality and (Bimoraic) Penults are Bad HD Edges.

### 7. *Esaaka.*

In this section, we conclude our survey of Emakhuwa dialects by examining a tone pattern that seems to be shared by several major varieties of Emakhuwa (in particular, Imetto, Esaaka, and Enahara). We will cite examples from Esaaka.

When one starts to elicit infinitive data in Esaaka, one is immediately struck that there is a difference between Esaaka and, say, Ikorovere. But, at first blush, one is likely to be misled into thinking that the difference resides in Esaaka having a significant role for the constraint Penults are Bad High Edges.

If we examine IP-final monomoraic and bimoraic stems, Esaaka looks just like Ikorovere.

- (40) (ó)-lya ‘to eat’, (ó)-wa ‘to come’, (ó)-khwa ‘to die’  
 o-(lí)ma ‘to cultivate’, w-o(ó)na ‘to see’, o-(thú)ma ‘to buy’

Bisyllabic stems that have a bimoraic initial syllable also look just like Ikorovere.

- (41) o-(má)ala ‘to be quiet’, o-(thá)ǎla ‘to choose’, o-(rú)ula ‘to take out of water’

The first difference that emerges is in trimoraic stems that are trisyllabic:

- (42) o-(rú)kula ‘to pick off’, o-(ló)vola ‘to transport’, o-(thó)kola ‘to sharpen’  
 o-(má)liha ‘to complete’

The penult syllable in these words is not high, nor even falling (in the way that they are in Eerati and Imitthupi). There is simply a rapid movement of the pitch downwards on this syllable. When confronted with these data, one is immediately tempted to see them as

being the consequence of Penults are Bad HD Edges. In other words, while Eerati and Imithupi extend the HD but fail to align it crisply with the IP-penult mora, Eesaka simply does not extend the HD at all rather than have a violation of Penults are Bad HD Edges. As we shall see immediately below, this analysis, though attractive, is not correct.

Longer stems again seem to suggest that Esaaka is basically like Ikorovere. Consider the examples in (43).

- (43) o-(rúkú)(nú)sa ‘to turn s.t. over’, o-(vélé)(é)la ‘to see off; hand to’  
o-(ttótó)(pé)la ‘to congratulate’, o-(hókó)(ló)sa ‘to return’

These data are identical to Ikorovere and thus seem to lead us to the conclusion that there is no significant difference between Esaaka and Ikorovere, setting aside the apparent effect of Penults are Bad HD Edges. However, when one examines stems with five or more moras, then a different story begins to emerge.

- (44) o-(thúkú)(mé)lihaca ‘to shake’, o-(rúkú)(nú)wiheranaca ‘to turn pl. towards e.o.’

In each of these examples, the second H-sponsor fails to double, *even though the next mora is not in penult position!* Clearly, the failure of this H-sponsor to double has nothing to do with Penults are Bad HD Edges.

Setting aside the fact that the first H-sponsor in (43 and (44) has doubled, the data seem to suggest that there is not in fact no *general* doubling. In other words, it appears that No Monomoraic HD is not the driving force behind the occurrence of doubling in this dialect, in contrast to Ikorovere.

This point of view is supported by the IP-medial form of the infinitives given in (40-43). In each of these examples we see that the last H-sponsor in the verb (whether it is the only sponsor or the second sponsor) never doubles onto the following mora, even though that mora is not IP-penult. Notice, incidentally, that the final vowel of the verb and a prefixal vowel in the nominal coalesce into a single mora. This will be important later. Also note that the nominal prefix *n-* is moraic.

- (45) (ó)-wa n-(cá)na ‘to come yesterday’  
o-(mí)rya n-(ré)tte ‘to swallow medicine’  
o-(rú)kul’ e-(pá)phaya ‘to pick pff a papaya’  
o-(ló)vola m-íri ‘to transport trees’  
o-(thó)kola n-(thá)le ‘to sharpen a bamboo stalk’  
o-(rúkú)(nú)sa n-(tá)ta ‘to turn the hand over’  
o-(khómá)(á)lih’ e-(pwí)iri ‘to make sure the peas are well planted’  
o-(lólwá)(á)niha n-(té)ko ‘to do the job well’  
o-(thúkú)(mé)lihaca (m-ú)ru ‘to shake the head’  
o-(rúkú)(nú)wiheranaca n-(tá)ta ‘to turn the hands toward one another’

These data show that H-tone sponsors do not necessarily double. Thus it becomes imperative to identify when they *do* double and why.

In the data examined so far, we have just seen one situation where doubling occurs: **o-(rúkú)(nú)sa**, **o-(ttótó)(pé)la**, etc. It is fairly straightforward to locate the

relevant context: the mora in between two H-sponsors is also H. And it is also a straightforward matter when it comes to identifying the relevant constraint since we have seen it at work in Eerati and Imitthupi: Plateau. Avoid H0H; in this case, avoid a H0H sequence by extending the HD.

There is further evidence supporting the claim that the H0H configuration is a relevant one for identifying where doubling occurs. Consider the examples in (46):

- (46) (ó-ly' é)-(sí)ma 'to eat stiff porridge' (cf. e-(sí)ma 'stiff porridge')  
 o-(lí'm' é)-(má)tta 'to cultivate the field' (cf. e-(má)tta 'field(s)')  
 o-(thúm' é)-(ní)ka 'to buy bananas' (cf. e-(ní)ka 'banana(s)')  
 o-(ttóttó)(pél' é)-(nú)pa 'to praise the house' (cf. e-(nú)pa 'house(s)')  
 o-(hókó)(lós' é)-(thó)kwa 'to bring the bamboo sifter back' (cf. e-(thó)kwa  
 'bamboo sifter')  
 o-(vélé)(él' é)-(hí)pa 'to send the hoe back' (cf. e-(hí)pa 'hoe')  
 o-(máá)(líh' é)-(kó)ma 'to silence the drums' (cf. e-(kó)ma 'drum')

On the basis of the data in (45), we would not expect the last H-sponsor in the verb to double. But in fact it does double. However, in every one of these cases the mora that receives the double is followed by a H-tone sponsor (as a consequence of vowel coalescence). We thus have strong confirmation that doubling is linked to the environment where Plateau would be violated were there no doubling.

We suggest the following account of the preceding material. We propose that in fact Esaaka shares with Emakhuwa Central one significant characteristic: both BAL and BAR dominate No Monomoraic HD. This proposal says that there will be no doubling in Esaaka as a consequence of No Monomoraic HD; there will be doubling only if *there is some other constraint that requires it*. Next, we propose that Plateau is ranked above BAR. This ranking guarantees that a non-sponsor will be incorporated into a HD so that a H plateau may be achieved.

We illustrate in (47) how this configuration of constraints will choose **o-(rúku)(nú)sa** as optimal rather than, say, **\*o-(rú)ku(nú)sa**.

(47)

| Candidates       | Plateau   | BAR | No Monomoraic HD |
|------------------|-----------|-----|------------------|
| o-(rú)ku(nú)sa   | * (fatal) | ok  | **               |
| K o-(rúku)(nú)sa | ok        | *   | *                |

There is a second environment in which doubling occurs in Esaaka. This can be seen, for example, in (48) where we have located verb stems of the shape CVVCV in IP-medial position.

- (48) o-(rúú)l' e-(ná)ma 'to remove the meat from water'  
 o-(núú)la ma-(áci) 'to suck in water'  
 o-(thán)la n-(có)ro 'to choose the rice'

In these examples, if there were no doubling, then we would have a Falling-toned bimoraic syllable in IP-medial position. This is not allowed in Esaaka.

Evidence supporting this ban on IP-medial Falling tones is provided by data from verb tenses where the second stem mora sponsors a H tone. (49) cites data from one such verb tense.

(49) negative perfect tense: second stem mora is H-sponsor

a-ki-lya(á)le ‘I have not eaten’  
 a-ki-li(má)le ‘I have not cultivated’  
 a-ki-ru(kú)lale ‘I have not picked off’  
 a-ki-ma(á)lale ‘I have not been quiet’  
 a-ki-ru(kú)nusale ‘I have not turned s.t. over’

but note:

a-ki-ve(léé)lale ‘I have not seen off, sent back’  
 a-ki-kho(máá)lihale ‘I have not strengthened’  
 a-ki-lo(lwáá)nihale ‘I have not asserted’

This tense shows clearly that there is no general doubling in Esaaka. Since there is only one H-sponsor in these words, the environment does not exist for Plateau to induce doubling. However, examples such as **a-ki-ve(léé)lale** show once again that if the H-sponsor is on the first mora of a (pre-penult) bimoraic syllable, then both moras will surface with a H tone.

There is reason to believe that all contour tones are dispreferred (cf. No Rise and No Fall in the constraint set listed in section 1). We have seen how No Rise counteracts \*(H, nonhead) in Eerati, Imitthupi, and Enlai. Now, in Esaaka, we must explain why we have bimoraic level High tones rather than Falling tones. It seems reasonable to look for the answer in terms of the constraint No Fall. Specifically, if No Fall dominates BAR in Esaaka, a non-sponsor will be included into the HD to avoid a Falling-toned syllable. According to this scenario, High tone doubling in Esaaka results from the fact that two constraints, Plateau and No Fall, dominate BAR.

However, it is not always the case that Falling tones are avoided in Esaaka. Like all other Emakhuwa varieties considered here with the exception of Enlai, Bimoraic Penults are Bad HD Edges is respected. A Falling tone occurs in **o-(má)ala**, **o-(hó)ola**, etc. This means that we must have the constraint rankings: (Bimoraic) Penults are Bad HD Edges dominates No Fall, while No Fall dominates BAR.

We should note that in extending a HD to avoid a Falling tone, Esaaka may set up a situation where H0H would occur. Esaaka does not further extend the HD in order to avoid this Plateau violation. (50) illustrates this point.

(50) o-(ká-á)pe(é)la ‘to cook for me’ (from: /o-ki-apeela/)  
 (w-ó-ó)pu(wé)la ‘to remember [cl. 2]’ (from: /o-a-upuwela/)

Recall that earlier we argued that in order to explain why violations of Plateau are tolerated in Ikorovere (and its sister dialects) when they arise from High tone doubling, it



is necessary to assume one of the following: (a) Binariness outranks Plateau, (b) BAR outranks Plateau, or (c) No Adjacent Edges outranks Plateau. All three accounts are consistent with the data in those dialects.

However, in order to explain why, in Esaaka, there is a Plateau violation in **o-(ká-á)pe(é)la**, we cannot appeal to the (b) analysis – i.e. ranking BAR over Plateau. This is not a viable option since we have shown that Plateau must dominate BAR in order to derive forms such as **o-(rúkú)(nú)sa**. We also cannot appeal to the (c) analysis, i.e. ranking No Adjacent Edges over Plateau. This is not violable because **o-(rúkú)(nú)sa** shows that No Adjacent Edges is violated in order to avoid H0H. Thus in Esaaka, it is only the (a) solution, Binariness, that can explain forms like **o-(ká-á)pe(é)la**. Binariness will rule out a candidate like **\*o-(ká-ápé)(é)la**, while BAL will rule out **\*o-(ká-á)(péé)la**.

Although Ikorovere and the other dialects are ambiguous as to which constraint prevents Plateau from affecting the output of High tone doubling, we will assume that in fact it is Binariness that is at work in all dialects. Domains in Emakhuwa are maximally binary. Given that assumption, the crucial difference between Esaaka and Ikorovere etc. is just the following: in Esaaka, BAR dominates No Monomoraic HD while in Ikorovere etc., No Monomoraic HD dominates BAR.

It is interesting to note that while it is critical in Esaaka that Plateau and No Fall be ranked above BAR (since they are the two constraints that can drive High tone doubling), such rankings are *consistent* with Ikorovere and its sister dialects, just not *critical*. They do not need to be critically ranked since No Monomoraic HD is sufficiently highly ranked to induce the extension of a HD and thereby avoid violations of Plateau and No Fall. In sum, the critical differences between Esaaka and Ikorovere are minimal indeed.

The Esaaka constraint set is given in (51). We have included all of the constraints discussed in the paper, although not all are highly enough ranked to be observable in Esaaka. Indeed, the constraint No Adjacent Edges does not play any important role in any of the dialects. If the reader compares Esaaka with the earlier systems, it will be seen that the change in ranking between No Monomoraic HD and BR alters in some cases whether certain other rankings are crucial or not. This should not obscure the main point: dialectal differences in Emakhuwa reflect minimal rearrangements in the constraint rankings.

(51) The Esaaka system

Faithfulness, Express, Express Head, Nonfinality, BAL, Binariness, Crisp HD  
 Edges: undominated  
 Plateau: dominated by Faithfulness, Express Head, BAL, Binariness  
 (Bimoraic) Penults are Bad HD Edges: dominated by Faithfulness, Nonfinality  
 No Fall: dominated by Bimoraic Penults are Bad HD Edges  
 BAR: dominated by No Fall, Plateau  
 No Monomoraic HD: dominated by Faithfulness, BAR  
 [No Adjacent Edges: dominated by Plateau, No Fall]  
 No Rise: dominated by Faithfulness, Express Head, BAL, BAR  
 \*(H, nonhead): dominated by Express

## 8. Conclusion.

What have we learned from this exploration of Emakhuwa dialect variation? We have learned, first of all, that the very same universal constraints that have been proposed to explicate the cross-linguistic tone patterns in Bantu also explicate the cross-dialectal variation in Emakhuwa. (For example, does Nonfinality dominate No Monomoraic HD, or vice versa; does Express dominate \*(H, nonhead), or vice versa?) We have introduced a new constraint, (Bimoraic) Penults are Bad HD Edges, but the need for some such constraint is by no means motivated only by Emakhuwa. A variety of other Bantu languages reveal tonal patterns that are clearly connected to it. However, the apparent absence of dialects that respect (Bimoraic) Penults are Bad HD Edges but do not respect Nonfinality raises the issue of whether there is an implicational relationship between these two IP-sensitive constraints.

A natural question to ponder is the following: how did this tonal variation develop? If we exclude the Esaaka dialect type from consideration, we might propose that initially BAR dominated No Monomoraic HD (as it does presently in Central Emakhuwa). Then, a dialect developed where No Monomoraic HD dominated BAR. In this dialect, Express dominated \*(H, nonhead). This dialect then split, with a new dialect being formed by ranking \*(H, nonhead) over Express. However, in this new dialect No Rise and Plateau dominated \*(H, nonhead).

Esaaka, however, raises an intriguing alternative. Suppose that Emakhuwa tone spreading did not arise out of No Monomoraic HD. Suppose it originated as a response to No Fall and Plateau, just as in Esaaka. A new generation then misinterpreted these patterns of High tone doubling as being across-the-board (not just in the two environments where it was phonetically motivated). In other words, these speakers moved No Monomoraic HD above BAR. Subsequently, the redundancy that exists when a H-sponsor is followed by its double encouraged a depression of the tone in a “weak” position – i.e. in the nonhead position (expressed as a ranking of \*(H, nonhead) above Express). This weakening of nonheads, however, was blocked by Plateau and No Rise.

This latter scenario has two *separate* constraints, No Fall and Plateau, rising above BAR. Since these are separate constraints, one would expect that there might be a dialect or dialects where just one but not the other rose above BAR. While we have not noted such dialects as yet, we intend to pursue this possibility by studying further the more “western” dialects: what we have labeled Emakhuwa central, Exirima, and Elomwe which (on the basis of our preliminary work) do not seem to have doubling driven by No Monomoraic HD. In any case, we believe that the Optimal Domains Theory analysis of Emakhuwa tone provides significant insight into the pattern of tonal variation across Emakhuwa dialects.

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