A Conspiracy Argument for Optimality Theory: Emakhuwa Dialectology

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1 Introduction

In his (1962) paper on "Phonology in generative grammar", Morris Halle introduced the leading ideas of the generative theory of synchronic phonological structure. By devoting more than half of the paper to the contribution of generative phonology [=GP] to an understanding of (a) the acquisition of phonology, (b) the historical development of sound systems, and (c) the phonological relationships among dialects of a language, Halle emphasized that an adequate theory of phonology must provide the basis not only for understanding the synchronic grammar of a single (ideal) native speaker of a language, but also for understanding (a)-(c).

In the seminal works on Optimality Theory [=OT], beginning with Prince and Smolensky (1993), it has been argued – correctly in our opinion – that OT solves the so-called *conspiracy* problem identified as long ago as Kisseberth (1970). The notion of a "conspiracy" can be summarized as follows: a *single* phonological principle may both (i) trigger one or more "repairs" (of some offensive structure) and (ii) block repairs that are designed to avoid some other offending structure. Kisseberth (1970) argued that generative phonology failed to provide an adequate characterization of conspiracies in synchronic phonological systems. It is important to recognize, however, that the conspiracy problem is not unique to synchronic grammars of a single speech variety. The notion of a conspiracy is applicable to language change, language acquisition, disordered speech, variation, dialectology – in other words, any type of phonological behavior.

In the present paper, we discuss an example of the conspiracy problem drawn from the realm of *dialectology*. Halle (1962) argued that GP (a rule-based model where speakers acquire ordered rules whose function it is to characterize the occurring patterns of alternation in a language) provides insight into the relationship among dialects by showing that dialect differences are the consequence of (i) differences in the ordering of rules and (ii) differences in the rule set. Differences in the rule set include two specific subcases: one dialect contains while another dialect lacks a given rule, or one dialect contains a more general (simpler) version of a rule in another dialect.

We argue here that there may be *conspiratorial* relationships among dialects that GP is incapable of characterizing due to its inability to separate phonological principles from the means of implementing these principles. Having established the insufficiency of GP to illuminate dialectal relationships, we then argue that OT provides a solution for the conspiracy problem in dialectology just as it does for synchronic grammars of single languages. Thus dialectology provides a significant argument for OT.

2 Emakhuwa

Our argument is based on the tonal system of Emakhuwa, a Bantu langauge spoken by over six million people in northern Mozambique, as well as adjoining areas in Malawi and Tanzania. We have studied the tonal system of over twenty dialects of Emakhuwa, but will be restricting ourselves in this paper to three: Ikorovere, Eerati, and Esaaka.

Moras in underlying representations in Emakhuwa may be either High-toned or not. We shall, for simplicity's sake, retain the usual terminology of generative phonology and refer to the contrast as one between H moras and toneless moras. In all varieties of Emakhuwa known to us, there are no *lexical* tone contrasts in verb stems. The distribution of High versus toneless moras is determined by the moraic structure of the verb stem and the morphology in which it is embedded. Furthermore, lexical tone contrasts in nominal and other stems are extremely marginal in most Emakhuwa dialects. In this paper, we do *not* discuss the subsystem of the language that determines the distribution of H tones in phonological inputs. We are only concerned here with the *phonetic manifestation* that results from these input H tones. In order to assist the reader, we underline those moras that are High-toned as a result of the morphological assignment of H tone, as well as any affixes that bear a High tone in the input. We refer to these underlined moras as *sponsors* of High tone.

In some Emakhuwa speech varieties, H tones appear in the surface just where they are located in the input. In GP terms, these dialects (largely) lack any tonal rules. This paper focuses on three dialects where GP would require the formulation of rules to account for differences between surface forms and phonological inputs.

3 Ikorovere

Ikorovere (spoken in the Tunduru district of Tanzania) clearly reveals certain very essential tonal principles that recur in a significant range of Emakhuwa speech varieties. In (1), we cite examples from the infinitive form of the verb [IP=Intonational Phrase].

(1)	IP-final	IP-medial	Gloss
	(ú̲)-lya	(ú̲-lyá)…	‘eat’
	u-(thú̲)ma	u-(thú̲má)…	‘buy’
	u-(thú̲mé)la	u-(thú̲mé)la…	‘buy for’
	u-(má̲)ala	u-(má̲á)la…	‘be quiet’
	u-(má̲á)(lí̲)ha	u-(má̲á)(lí̲há)…	‘make quiet’
	u-(khó̲má)(á̲lí)ha	u-(khó̲má)(á̲lí)ha…	‘strengthen’

[Some points about our presentation of output forms is required. Later, in our OT analysis of the data, we will be using the notion of a *featural domain* in place of the notion of an *autosegmental representation*. We indicate a High (Tone) Domain [=HD] by parentheses in the above data. We indicate a surface H tone with an acute accent. In the cases presently under discussion, a HD containing more than one mora is the equivalent to a multiply-linked H tone in autosegmental phonology.]

We see from the transcriptions in (1) that the first mora of a stem regularly sponsors a H tone in the input (except that when the stem is just one mora, then the prefix sponsors the H). When the stem is four moras or longer, there is a second H tone in the input, located on the third mora of the stem. We refer to this as the V1-V3 pattern of tone assignment. In Ikorovere, the V1-V3 pattern occurs in certain finite, affirmative, main-clause verb forms as well as in the infinitive.

Examination of (1) reveals, however, that there are H-toned moras in addition to the ones assigned by the V1-V3 pattern. These additional surface H tones are the consequence – in GP terms -- of the most fundamental rule of Ikorovere tonology: High Tone Doubling. It says that if there is a H tone on a mora, then there is also a H tone on the following mora.

(2) High Tone Doubling:
H
/ :
μ μ

Examples showing application of (2): **(ú̲-lyá)…, u-(thú̲má)…, u-(thú̲mé)la, u-(má̲á)la… , u-(má̲á)(lí̲há)…, u-(khó̲má(á̲lí)ha**.

There are two environments where doubling does not occur: (i) not onto the final mora of the IP, and (ii) not onto the second mora of a bimoraic syllable that is penult in the IP. Examples of (i): **(ú̲)-lya, u-(thú̲)ma, u-(má̲á)(lí̲)ha**. Example of (ii): **u-(má̲)ala**.

Rule-based models have two possible lines of attack to deal with these phenomena. One solution is to build into the doubling rule limitations that would prevent doubling in the above two environments. One problem with this approach is that it becomes clumsy if the environment must be stated *positively*. The alternative approach is to allow doubling to be fully general, but then to postulate rules that *undo* doubling in the two environments cited. Many linguists find this approach troubling since it involves over-applying doubling, and then undoing this overapplication.

(3) High Tone Doubling (restricted)

$$\begin{array}{ccc} & & H \\ & / & \vdots \\ \mu_i & & \mu_j \end{array}$$

[Condition: if μ_i and μ_j are in the same syllable, then there must be two moras following; if they are in separate syllables, there must be one mora following.]

or:

High Tone Doubling (supplemented by the following rules):
Delink a H tone from an IP-final mora.
Delink the right branch of a multiply-linked H from the second mora of an IP penult bimoraic syllable.

The analysis in (3) is massively supported by the Ikorovere data. Additional data are provided in (4), where we cite a verb tense where there is a prefixal H-sponsor and in addition the second mora of the stem sponsors a H tone. In (5), the only H-sponsor is the negative prefix ***hi̱***.

(4) a-(k-á̱á)-li(má̱)le 'I didn't cultivate' a-(k-á̱á)-li(má̱lé)….
a-(k-á̱á)-ttha(wá̱)le 'I didn't run' a-(k-á̱á)-tthaw(á̱lé)….
a-(k-á̱á)-lo(kó̱tthá)le 'I didn't pick up'
a-(k-á̱á)-tho(kó̱lá)le 'I didn't sharpen'
kha-(y-á̱á)-ttho(kó̱lé)lacale '[cl.2] didn't use it for sharpening'
kha-(y-á̱á)-lo(ko̱ttá)nihacale '[cl.2] didn't pick up pl.'

(5) u-(hí̱)-lya 'to not eat' u-(hí̱-lyá)…
u-(hí̱-vá)ha 'to not give' u-(hí̱-vá)ha…
u-(hé̱)-etta 'to not go' u-(hé̱-é)tta…
u-(hí̱-lú)pattha 'to not hunt' u-(hí̱-lú)pattha…

Examination of these data reveals that – given the underlying distribution of H tones, the surface shapes follow automatically from (3). The only example that requires mention is **u-(hé̱)-etta** where we see that the prefix /hi̱/ combines with a following vowel-initial verb stem to yield a bimoraic vowel.

Doubling cannot go onto the second mora of this bimoraic syllable when it is penult in the phrase, cf. **u-(má)ala** above.

4 Eerati

The Eerati dialect (spoken in Nampula province of Mozambique) has the same V1-V3 pattern of H tone distribution in the infinitive as Ikorovere. However, examination of the data in (4) shows that this pattern is much more opaque on the surface. (Note that in this paper we do not examine the fact that certain IP-penult moras in Eerati are pronounced with a falling tone rather than a level H. This detail is of interest but not directly pertinent to the point of this paper – see Cassimjee and Kisseberth (1999) for some discussion.)

(6)	(ó)-lya	(o-lyá)…	'eat'
	o-(lí)ma	o-(limá)…	'cultivate'
	o-(má)ala	o-(máá)la…	'be quiet'
	o-(hukû)la	o-(hukú)la…	'brew'
	o-(rukú)(nú)sa	o-(rukú)(núsá)…	'turn s.t. over'
	o-(theré)(ké)la	o-(theré)(kélá)…	'cut'
	o-(máá)(lí)ha	o-(máá)(líhá)…	'make quiet'
	o-(khomá)(álî)ha	o-(khomá)(álí)ha…	'strengthen'
	o-(hokó)(lósê)ra	o-(hokó)(lósé)ra…	'return s.t. to'
	o-(hokó)(lósé)rana	o-(hokó)(lósé)rana…	'return ..e.o.'

A brief survey of the above data reveals a variety of cases where the mora that sponsors a H tone (assuming the V1-V3 pattern) is pronounced without a H, although the next mora in every case is H-toned: e.g. **(o-lyá)…**, **o-(limá)…**, **o-(limé)la…**, and so on. In some cases, of course, there is morphophonemic variation between pronunciations where the sponsor has an overt H tone and pronunciations where it does not: e.g. **(ó)-lya** but **(o-lyá)…**, and **o-(lí)ma** but **o-(limá)…**

What accounts for the superficial differences between Ikorovere and Eerati? The answer appears to rely crucially on the following observation: In a number of Bantu languages, once a H tone "spreads" to the following vowel (using the vocabulary of autosegmental phonology), the H tone is delinked from its original location. This is sometimes referred to as High Tone Shift as opposed to High Tone Doubling. If one examines (6), it seems that a significant subset of the data can be readily understood in terms of supplementing doubling with the delinking rule in (7).

(7) Delinking

H
ǂ \
μ μ

Delinking will account for quite a few examples in (6), including **(o-lyá)…**, **o-(thumá)**, and **o-(thumé)la…** However, there are other data where Delinking fails to occur. For instance, we do not get a Delinking effect in the second HD in **o-(rukú)(núsá)…** nor in the only HD in **o-(máá)la**… The cases where Delinking does not occur can be subsumed under the following two generalizations: (i) Delinking does not occur when the underlying H-toned mora is preceded by a H tone, and (ii) Delinking does not occur when the underlying H-toned mora is the initial mora in a bimoraic syllable.

How would a rule-based model have to deal with these failures of Delinking? Just as we discussed earlier, two modes of attack are logically available. We could restrict Delinking by postulating two rules that undo its effect, or we could place two conditions on Delinking. While logically available, the device of writing additional rules that undo delinking runs into serious difficulties since one cannot reinsert the H tone in the correct environments unless one has the power to “remember” that there used to be an association line present. In other words, if we have (after Delinking) a representation such as /o-rukúnusá…/ or /o-maála…/, what is the environment in which we add a H tone? Specifically, do we add a H tone in the above two cases but not in the following cases:

(8) underlying: /a-hó-epettháca/, surface: a-hé-épettháca ‘[cl.2] have threshed’
underlying: /o-átta/, surface: w-aátta ‘to beat’

In order to insert a H tone correctly, all of the following would have to be contained in the rule: insert an association line on a mora$_i$ just in case (a) mora$_i$ is followed by a H- toned mora, (b) mora$_i$ is underlyingly H-toned, and either (c) mora$_i$ is preceded by a H tone or (d) mora$_i$ is the first mora in a bimoraic syllable. It is of course the (b) condition that is inconsistent with GP, where rules only have access to the output of rules earlier in the derivation, not to underlying representation..

We conclude, therefore, that an analysis in GP would involve placing two conditions on Delinking. These conditions are included in (8):

(8) Delinking (revised)

$$\begin{array}{ll} \mathrm{H} & \\ \nmid & \backslash \\ \mu_i & \mu_j \end{array}$$

Condition: (i) μ_i is not preceded by a H tone; (ii) μ_j is not the first mora in a bimoraci syllable.

To summarize, Eerati has the same High Tone Doubling rule as Ikorovere, including the restrictions that prevent doubling onto IP-final moras (**o-(thú̲)ma**) and onto the second mora of a bimoraic IP-penult syllable (**o-(má̲)ala**). In addition, it has added the rule of Delinking in (8). Delinking disassociates the left branch of a multiply-linked H tone (only sponsors are located in this position), but just in the event there is neither a H-toned mora preceding nor is the sponsor the first mora of a bimoraic syllable (**o-(ru̲kú)(nú̲sá)…** and **o-(ma̲á)la…**).

5 Esaaka

The third Emakhuwa dialect that we consider here looks, initially, like it might be one of those dialects mentioned earlier which lack doubling. Some representative examples:

(9)	(ó̲-)lya	(ó̲)-lya…	'eat'
	o-(lí̲)ma	o-(lí̲)ma…	'cultivate'
	o-(rú̲)kula	o-(rú̲)kula	'to pluck'

However, there are two situations where we in fact observe a doubled H tone.

(10)	o-(rú̲kú)(nú̲)sa	o-(rú̲kú)(nú̲)sa…	'turn s.t. over'
	o-(vé̲lé)(é̲)la	o-(vé̲lé)(é̲)la…	'see off'
	o-(thú̲kú)(mé̲)lihaca		'shake'
	o-(rú̲kú)(nú̲)wiheranaca		'turn pl. towards e.o.'

(11)	o-(má̲)ala	o-(má̲á)la…	'be quiet'
	o-(rú̲)ula	o-(rú̲ú)la…	'take from water'

What is the generalization underlying (10) and (11)? Doubling occurs (i) when the target mora is *followed* by a H-toned mora (cf. (10)), or (ii) when the target mora is the second mora of a bimoraic syllable that is further forward in the IP than the penult (cf. (11)).

In a rule-based model, we must assume a High Tone Doubling rule in Esaaka which is quite different from that which obtains in Ikorovere and Eerati. It would go roughly as in (12).

(12) High Tone Doubling (Esaaka-style)

$$\begin{array}{cc} \multicolumn{2}{c}{H} \\ / & : \\ \mu_i & \mu_j \end{array}$$

[Condition: (i) μ_j is followed by a H-toned mora; (ii) μ_j is the second mora of a bimoraic syllable that is not itself in IP-penult position.]

One could omit the stipulation "that is not itself in IP-penult position" if one proposed a separate rule delinking the right branch of a multiply-linked H on an IP-penult bimoraic syllable – cf. the "supplemented" version of High Tone Doubling for Ikorovere/Eerati in (3) above. This rule of delinking would of course have to be ordered after (12).

6 The Failure of the Rule-Based Model

Given the rule-based GP model, all three dialects discussed here would have some form of a doubling rule. The rule in Ikorovere/Eerati involves a general doubling that is barred in two contexts. The rule in Esaaka, on the other hand, applies in just two specific contexts.

In an approach where restrictions on doubling are built into the doubling rule itself, we would have no possibility of seeing any particular relationship between the Ikorovere/Eerati rule and the Esaaka rule. If, however, we are permitted to take the so-called "Duke of York gambit" and allow doubling to be general and then write rules that undo its effects, then we can bring about a clear relationship among the dialects.

Specifically, if we separated out of the doubling rule any reference to IP-penult bimoraic syllables, and added a separate rule of delinking in this context, then all three dialects would share such a delinking rule. If we also separated out the reference to IP-final position in the Ikorover/Eerati rule, and postulated a rule of delinking in this position, we would end up with a simple (unqualified) doubling rule for those two dialects. This would contrast with the Esaaka rule, where doubling would occur only onto a mora followed by a H or onto the second mora of a bimoraic syllable. We would thus be able to say that Ikorovere/Eerati has a more general rule of High Tone Doubling than does Esaaka. We have made some progress in establishing dialectal relationships, though at the cost of assuming the Duke of York gambit.

But now consider Eerati. In addition to a general High Tone Doubling rule, it would also have a Delinking rule (barred from affecting a mora that is preceded by a H tone or is the first mora in a bimoraic syllable). We have shown that the restrictions on Delinking could not be separated out and replaced with rules inserting H tones into the output of Delinking. In the rule-based model, then, all one can say is that Eerati has a (fairly complex) rule that the other two dialects do not have. But is this really the full story of how Emakhuwa dialects are related? We would argue that there is a clear dialectal relationship that the GP leaves totally unexpressed by the grammar.

Specifically, the rule-based model misses the fact that the following phonological principle,

(13) Plateau
H0H must be avoided.

is a *triggering* factor for High Tone Doubling in Esaaka (double just onto a mora followed by H) and a *blocking* factor for Delinking in Eerati (delink unless preceded by a H-toned mora). Furthermore, it misses the fact that the principle

(14) No Contour Tones
H0 and OH must be avoided.

is involved both in *triggering* High Tone Doubling in Esaaka (double so as to avoid a falling tone) and *blocking* Delinking in Eerati (delinking unless one would create a rising tone).

The basis of the conspiracy argument is simply that a phonological principle can both trigger and block phonological actions. We now see that, within dialects of a single language, dialects may differ in that a principle triggers an action in one dialect and blocks an action in the other dialect. The generative phonology explanatory devices – rule reordering, rule generalization – fails to characterize the conspiratorial relationship between what triggers High Tone Doubling in Esaaka and what blocks Delinking in Eerati. In the next section, we show that Optimality Theory provides a succesful account of the dialectal relationships in Emakhuwa.

7 An OT Analysis of Dialectal Relationships in Emakhuwa

We assume a theory of tonology that we have developed within OT that we refer to as *Optimal Domains Theory [=ODT]*. The major innovation in ODT is to replace the notion of autosegmental representations with the notion of a *featural domain*. Here we confine ourselves to *High (Tone) Domains (=HD's)*, but all other featural domains are parallel. A HD is a unit of phonological structure, similar to the syllable or the foot. Like the syllable, it has a *licensing* role. In particular, a mora may be H-toned in the phonological output just in case that mora is inside a HD. Although a HD licenses a H tone, a mora inside a HD is not necessarily H-toned. ODT assumes that there is a violable constraint, Express (H), which demands that HD-internal moras be H-toned. However, there may be more highly ranked constraints which bar a mora from being H-toned. Finally, ODT assumes that featural domains are *headed* and that the head of the domain may either be at the left or the right edge.

In Cassimjee and Kisseberth (1998) and Cassimjee (1998) the following Faithfulness constraints are proposed (notice that this treatment of Faithfulness is rather more articulated than the Ident (F) constraint of standard OT).

(15) Domain Correspondence (DomCor): for every input H tone, there is a "corresponding" HD.
Incorporate (H-sponsor): every H-sponsor is inside a HD.
Basic Alignment Left (BAL): the L edge of a HD is aligned with the L edge of a H-sponsor.
Basic Alignment Right (BAR): the R edge of a HD is aligned with the R edge of a H-sponsor.
Express (H): each mora inside a HD is H-toned.

In the Emakhuwa data examined in this paper, DomCor, Incorporate (H-sponsor), and BAL are never violated. For the most part, we refrain from discussing any candidates that would violate these undominated constraints and therefore omit them from tableaux. BAR is violated as a consequence of what in the rule-based model we referred to as High Tone Doubling.

In the works referred to above, the constraint in (16),

(16) No Monomoraic HD
A HD must not contain a single mora.

is proposed as the source of “doubling” in Bantu languages. In order to achieve this effect, (16) must outrank BAR. (We shall note below that an alternative constraint, Binarity, might be employed to induce a similar result.)

Although No Monomoraic HD forces a minimal violation of BAR, it does not necessarily result in an output that has two *H-toned* moras. It will have this effect only if Express (H) is undominated. This is the case in Ikorovere. But what about Eerati, where the rule “Delinking” was proposed in a rule-based account of the language?

In Cassimjee and Kisseberth (1998) and Cassimjee (1998), the following account of Bantu languages with a rightward “shift” of H tone is proposed: HD’s in these languages are R-headed. Furthermore, there is a universal constraint, given below as (17),

(17) *(H, nonhead)
A nonhead in a HD must not be H-toned.

which dominates Express (H). In order to successfully implement this analysis (as we will see below), it is necessary to assume that Express (H) is just one member of a family of constraints that in addition includes (18):

(18) Express (H on HD-heads).

The constraint in (18), if undominated, will guarantee that it is not possible to avoid violations of markedness constraints by leaving the head of the domain without a H tone.

The tableaux in (19) illustrate the analysis.

(19) **o-(lí̲mé)la**… (Ikorovere), **o-(li̲mé)la…** (Eerati)

Ikorovere system:

/o-li̲mela…/	Express (H,head)	Express	No Mono HD	BAR	*(H, nonhead)
o-(lí̲)mela…	✓	✓	*!	✓	✓
o-(li̲me)la…	*!	**	✓	*	✓
o-(li̲mé)la…	✓	*!	✓	*	*
o-(lí̲mélá)…	✓	✓	✓	**!	**
☞o(lí̲mé)la..	✓	✓	✓	*	*

Eerati system:

/o-limela…/	Express (H,head)	*(H,non-head)	No MonoHD	BAR	Express (H)
o-(lí)mela…	✓	✓	*!	✓	✓
o-(lime)la…	*!	✓	✓	*	**
☞o-(limé)la.	✓	✓	✓	*	*
o-(limelá)…	✓	✓	✓	**!	**
o-(límé)la…	✓	*!	✓	*	✓

Eerati requires, of course, further analysis, since Delinking does not occur in every context. We propose that the failure of Delinking in Eerati follows from the existence of two universal constraints (motivated on independent grounds in Cassimjee and Kisseberth (1998) and Cassimjee (1998)), given above as (13) and (14): Plateau (*H0H) and *Contour (which has two subparts, *Rise and *Fall).

We can successfuly block Delinking in Eerati if these two constraints dominate *(H, nonhead). The tableaux in (20) illustrate. We omit from these tableaux candidates that would violate No Monomoraic HD and thus omit any reference to that constraint and its interaction with BAR.

(20) **o-(rukú)(núsá)…**

/o-rukunusa…/	Express (H, head)	Plateau	*Contour	*(H, nonhead)	Express
o(rúkú)(núsá)..	✓	✓	✓	**!	✓
o(rukú)(nusá)..	✓	*!	✓	✓	**
o(ruku)(nusa)..	*!*	✓	✓	✓	****
☞ o(rukú)(núsá)..	✓	✓	✓	*	*

o-(máá)la…

/o-maala…/	Express (H, head)	Plateau	*Contour	*(H, nonhead)	Express
o-(maa)la…	*!	✓	✓	✓	**
o-(maá)la…	✓	✓	*!	✓	*
o-(máa)la…	*!	✓	*	*	*
☞ o-(máá)la…	✓	✓	✓	*	✓

It is important to note that while Plateau and *Contour can produce violations of *(H, nonhead), they do *not* lead violations of other certain other constraints. For example, a rising tone occurs in all dialects when a H-sponsor is on the second mora of a bimoraic syllable: **w-a(á)tta** 'to beat'. We can explain this by postulating that Basic Alignment Left dominates *Contour. A domain never expands to the left of a sponsor in order to avoid a rising tone. Similarly, we noted earlier the following example from Eerati: **a-hé-épettháca**. A H0H sequence is tolerated when the first H is itself a "doubled" H and not a sponsor. There are perhaps different tacks that one might take to explain why a Plateau violation is permitted here. We suggest that there is a constraint, Binarity, that requires a HD to be binary (in the present instance, bimoraic). The attentive reader will note that – given just the data here – Binarity could replace No Monomoraic HD as the driving force behind doubling in Ikorovere and Eerati. We believe that *both* constraints may be necessary in universal grammar, but that is a topic beyond the scope of this paper. In any case, assuming that Binarity outranks Plateau, then we can not avoid a violation of Plateau in the case of **a-hé-épettháca** by extending the first domain one mora further: ***a-(hé-épé)(tthá)ca** since that would yield a trimoraic domain, violating Binarity. We also cannot extend the second domain to the left: ***a(hé-é)(pétthá)ca**, since this output would violate the undominated BAL.

We have now characterized the Ikorovere and Eerati systems except for the fact that there are two environments in which High Tone Doubling does not occur. The failure of doubling to affect an IP-final mora is gotten at, in ODT, by ranking a Nonfinality constraint over No Monomoraic HD (and/or Binarity):

(21) Nonfinality: the R edge of an IP should not be aligned with the R edge of a HD.

This ranking guarantees that **o-(lí)ma**, which lacks a HD aligned with the right edge of the IP but has only a single mora in the domain, will be more optimal than **o(límá)**, which has two moras but also has a HD aligned with the right edge of the IP.

We are left, then, just with the failure of doubling in **o-(má)ala**. We believe that ultimately **o-(lí)ma** and **o-(má)ala** should *both* be the consequence of a single constraint. However, this issue is not of direct relevance to the present paper. Consequently, we will – quite arbitrarily -- attribute the failure of doubling in **o-(má)ala** to the effects of the constraint in (22):

(22) Avoid Bimoraic Penult
IP-penult bimoraic syllables should not be aligned with the R edge of a HD.

(22) is dominated by Faithfulness – hence an example such as **w-a(á̲)tta** will be optimal, despite having the right edge of the HD aligned with the right edge of a bimoraic IP-penult syllable. On the other hand, (22) dominates No Monomoraic HD, making **o-(má̲)ala** more optimal than **o-(má̲á)la**, despite the fact that it violates No Monomoriac HD. (22) will also have to dominate *Contour, since it prefers a falling tone to a level H tone.

We have now provided an account of the Ikorovere and Eerati dialects of Emakhuwa. These two dialects share the ranking of No Monomoraic HD/Binarity over BAR. They differ in that Ikorovere ranks Express (H) over *(H, nonhead), while Eerati has the reverse ranking (although Express (H, head) is undominated in both dialects). They also both rank Nonfinality and Avoid Bimoraic Penult (assuming that these constraints are not, under a deeper analysis,. the same constraint) above No Monomoraic HD. Even though Eerati ranks *(H, nonhead) above Express (H), there will be cases where nonheads are H due to the fact that Plateau and *Contour dominate *(H, nonhead).

Now, what about Esaaka? Since Esaaka lacks general doubling, it must differ in a very significant way from the other two dialects: BAR dominates No Monomoraic HD. Why does doubling *ever* occur in this dialect? Because Plateau and *Contour dominate BAR. Consequently, a HD will be expanded just in order to avoid a violation of Plateau or *Contour. The tableaux in (25) illustrate.

(23) **o-(rú̲kú)(nú̲)sa**

/o-ru̲kunu̲sa/	Express (H)	Plateau	*Contour	BAR	NoMono HD
o-(rú̲)ku(nú̲)sa	✓	*!	✓	✓	**
o-(ru̲)ku(nú̲)sa	*!	✓	✓	✓	**
o-(rú̲)ku(nu̲)sa	*!	✓	✓	✓	**
o-(rú̲kú)(nú̲sá)	✓	✓	✓	**!	✓
☞o(rú̲kú)(nú̲)sa	✓	✓	✓	*	*

o-(má̲á)la…

/o-ma̲ala…/	Express (H)	Avoid Bi Penult	*Contour	BAR	NoMono HD
o-(ma̲á)la…	*!	✓	*	*	✓
o-(má̲)ala…	✓	✓	*!	✓	*
☞o-(má̲á)la….	✓	✓	✓	*	✓

In the preceding tableaux, we showed Express (H) as being undominated in Esaaka. Whether HD's consist of a single mora in Esaaka (due to the high ranking of BAR) or two moras (as a consequence of the fact that Plateau and *Contour outrank BAR), there are no domains where a mora fails to express H tone. Thus there is every reason to assume that *(H, nonhead) is too lowly ranked in Esaaka to have any effect.

Optimality Theory differs from generative phonology in that there is only one device – the ranking of constraints – that can be the source of dialectal differences (excluding, of course, the real possibility of differences in the lexical inputs). So do the crucial differences among these dialects follow from differences in the ranking of the constraints? The answer is clearly in the affirmative. Let us summarize the differences.

(24) (a) In Ikorovere and Eerati, No Monomoraic HD dominates BAR, while in Esaaka the reverse ranking holds.
(b) In Ikorovere and Esaaka, Express (H) dominates *(H, nonhead), while in Eerati the reverse ranking holds.
(c) In Eerati, Plateau and *Contour dominate *(H, nonhead). There is no critical evidence in Ikorovere and Esaaka in this connection since in any case *(H, nonhead) is ranked below Express (H).
(d) In Esaaka, Plateau and *Contour dominate BAR. In Ikorovere and Eerati, there is no evidence in this connection since in any case No Monomoraic HD dominates BAR and will achieve the same results.

Notice that the above account in fact succeeds in characterizing the conspiratorial relationships in these Emakhuwa dialects. Plateau both blocks "Delinking" in Eerati (by outranking *(H, nonhead)) and triggers "Doubling" in Esaaka (by outranking BAR). Similarly, *Contour both blocks "Delinking" in Eerati and triggers "Doubling" in Esaaka (though we should note that it is *Rise that blocks "Delinking" in Eerati and *Fall that triggers "Doubling" in Esaaka).

We conclude that OT provides the basis for understanding the conspiracies that may arise in dialectology, and that these conspiracies provide evidence favoring OT over rule-based models which are inherently incapable of providing a unified account of conspiracies (due to the rule-based model's failure to separate phonological actions from the principles that induce these actions). In our opinion, the conspiracy argument – be it based on the synchronic grammar of a single dialect, or different dialects of the same language – remains the primary cornerstone of the evidence for OT.

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