

TONE IN SOME KIKUYU VERB FORMS¹

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1. Introduction

This paper deals first and mainly with some processes of tone assimilation governing the tonal configuration of affirmative verb forms in Kikuyu. The first part of the paper deals with tonal assimilations triggered by high and low tone verb stems, pronouns, prefixes and suffixes respectively. With the support of evidence from verb-noun constructions, it is suggested that the assimilation processes in question are most naturally viewed as cyclic and that a linear approach leads eventually to false claims about the nature of the assimilations. Subsequently it is shown that the assimilation rules fall into two classes according to their behaviour in forms where vowel coalescence is operative. More light is shed on this dichotomy by the presentation of a rule of dissimilation operative under rather special circumstances. Various means of expressing the dichotomy are discussed and all found wanting.

The data for this paper has been taken from L. E. Armstrong's Phonetic and Tonal Structure of Kikuyu [1940] and from the Kikuyu-English Dictionary edited by T. G. Benson [1964], the latter serving mainly as a source for verifying the former. All the examples given here are attested in Armstrong or Benson. In a few cases, mostly involving the tone of initial pronouns, the isolation examples cited by Armstrong differ unpredictably from the identical forms quoted later in the book in verb-noun constructions. When in doubt, I have adopted the forms given in the verb-noun examples.

The orthography adopted is that of Armstrong rather than that of Benson, except that /g/ has been used for both Armstrong's /g/ and /ɣ/ on the grounds that this alternation is predictable.² The orthographies of the two sources are easily mutually convertible.

¹Profound thanks are extended to Herb Stahlke, to whom this paper owes its existence, and also to Larry Hyman and Patrick Bennett for their comments and suggestions.

²As discussed in Bennett and Eastman [1971].

Unlike Benson, Armstrong fails to distinguish between contextually conditioned long vowels and underlying geminate vowels, representing both as surface long vowels (V_1V_1). Vowels are long predictably, for example, non-initially before the nasal stops: /mb/, /nd/, /ŋg/, and /nj/. I felt it would only add confusion to alter Armstrong's transcriptions so they reflected this distinction between underlying and derived long vowels, and therefore have, unless indicated, used the forms exactly as given by her. (Armstrong herself warns that her transcriptions of vowel length are not always certain.) When discussing the behaviour of geminate stems, however, I have chosen examples specifically given by Benson as having an underlying long (geminate) vowel.

I have taken one drastic liberty with Armstrong's data, that being to reinterpret the tonal system of Kikuyu as a two-level terrace-tone system rather than a system of three level tones as Armstrong would have. Armstrong postulates for Kikuyu three level tones (High, Mid, Low), two rising tones (LM and MH), and a falling tone. All her tonal transcriptions are made in terms of these six tones plus a few special marks. In Benson's dictionary, however, the tonal transcriptions attest four different level tones in simple copulative constructions alone, indicating that Armstrong's three levels are inadequate for an accurate description. Furthermore, according to the transcriptions in Benson, successive pitch drops occur after each L tone across an utterance, indicating that downdrift is operative. In fact, a cursory glance at the transcriptions in Benson makes it clear that while a three-level tonal system would be inadequate for the description of Kikuyu surface forms, a two-level system with downdrift is exactly adequate and even implicit in Benson's transcriptions.

Even without the evidence from Benson, it can be discovered that Armstrong's three-level system is ill-suited to her own data. If there were in fact three level surface tones in Kikuyu, we would expect to find six possible sequences of contrasting tone, that is, the sequences LH, HL, LM, ML, MH, and HL. The sequences LH, ML, and HM are virtually never found, however. If Armstrong's data is reinterpreted under a two-

level terrace-tone system, these gaps are readily explained. In a terrace-tone system, the interval between a H tone and a following L tone is considered to be about twice the interval between a L tone and a following H tone. Hence the continuous drop in pitch across an utterance. The three sequences which do not occur in Armstrong's system are exactly those in which these conditions are not met. That is, they are the three which could not occur in a terrace-tone system (unless a deletion had occurred).

Certain regular inconsistencies in Armstrong's data provide further support for a reinterpretation of her tonal transcriptions. This can best be made clear through an example. The string *ogorirɛ* 'you bought' (o 'you', gor 'buy', irɛ tense ending) is transcribed in isolation by Armstrong as having the tonal configuration LLLM. Whenever the same form is given with a following L tone initial noun, however, as in the string *ogorirɛ mociŋga* 'you bought a gun' (tone marks omitted), the tonal configuration of the verb form is given as MMMH rather than LLLM. Armstrong's system forces her to make the claim that the verb form 'you bought' has a different tonal configuration according to whether or not it is followed by a L tone initial noun. In a terrace-tone system, on the other hand, the sequences LM and MH are equivalent. They express the same pitch interval and are both storable as L'H sequences ('=downdrift). In this interpretation, the only difference between Armstrong's two transcriptions of the form 'you bought' is that in the longer utterance the starting pitch is higher than in the isolation form. The same tonal contrast is made in each case.

This inconsistency in the transcription of verb forms is so common in Armstrong as to be completely predictable, and I submit, provides evidence that there are two and not three underlying tones in Kikuyu.

I hope not to belabour this point further, although it is crucial to all that follows, for I think it will be patently clear to anyone who examines the two sources in question that a two-level terrace-tone system is involved.

In my reinterpretation of Armstrong's system, then, sequences described by her as HLM, for example, are treated as the sequence HLH, with downdrift understood after the L tone. Similarly, sequences such as Armstrong's MHL will be expressed as the sequence LHL. A sequence MHMHL in Armstrong is reinterpreted here as the sequence LHLHL, in keeping with a terrace system and corroborated by Benson. The sequence HML occurs only rarely in Armstrong, apparently as a result of a separate downstepping rule. I have not examined this question in detail, however.

Mechanically speaking, Armstrong's system may be converted into a two-level system if:

- (a) all M tones which follow L tones (in Armstrong) are regarded as (downdrifted) H tones and
- (b) all other M tones are regarded as L tones.

In examples, an acute accent on a vowel is used to indicate H tone and the vowels of L tone syllables are left unmarked. I have attempted to make it clear in every case whether the string in question is an underlying or surface form. In the case of long or geminate vowels and of vowel sequences forming a single syllable, I have adopted the practice of placing tone markings on both vowels of the syllable. For example, the monosyllabic H tone verb stem $\delta\acute{o}om$ will be represented as $\delta\acute{o}o\acute{m}$ and not as $\delta\acute{o}om$, since the latter representation could be mistaken for a contour tone. It is to be understood, however, that all sequences of identical vowels are monosyllabic. Sequences of non-identical vowels which are monosyllabic are joined as VV , as they are in Armstrong. Thus the sequence / $\acute{i}e$ / is monosyllabic, while the sequence / $i\acute{e}$ / is disyllabic. Downdrift has not been indicated in the examples and the reader may assume that it occurs between any L tone and a following H tone and nowhere else.

It will be noticed, especially in examples where vowel coalescence is operative, that Kikuyu has vowel harmony. I have not examined the extent or nature of this phenomenon in Kikuyu since only the tonal consequences of vowel coalescence are relevant to this discussion. Specifically, I am interested in vowel coalescence as a process whereby two

or more underlying tone-bearing units are reduced on the surface to a single tone-bearing unit, and the potential loss of contrast this entails.

The reader will also notice that in the discussion of the various verb tenses, reference is made to the tense marker of a tense, meaning the suffix(es) and prefix, if any, which are added to a verb stem to form a specific tense. The prefix a^3 with L tone, and the suffix pair $ir+\epsilon$ form the tense marker for the Remote Past tense, for example. It is somewhat artificial to regard each tense in Kikuyu as having a separate tense marker, for there are many regularities to be observed in the form of the many tense markers. The prefix a , for example, occurs only in past tenses as do the suffixes $ir+\epsilon$; the suffix a seems to be neutral in time reference; the suffix pair $ag+a$ indicates habitual aspect and when combined with the past prefix a indicates, predictably, the Past Habitual tense. Different combinations of the various tense morphemes can be used to form an even greater variety of verb tenses than the thirteen exemplified in Armstrong. What seems unpredictable about the tense markers is their tone. The suffix pair $ir+\epsilon^4$, for example, has underlying H tones in the Immediate Past tense

³This widely used prefix is given in Armstrong as aa . It is transcribed by Benson, however, as a , indicating that he considers its length to be derived rather than due to an underlying geminate. Since, in the discussion of tone assimilation rules, transcribing this prefix as aa could easily give rise to confusion, I have departed in this instance from my adopted practice of using Armstrong's transcriptions and will indicate this prefix as a throughout. Similarly, the Remote Future prefix, kaa in Armstrong but ka in Benson, will be given as ka , and the Near Future prefix, $ré$ or $rée$ in Armstrong and $ré$ in Benson, will be transcribed as $ré$.

⁴Since ir and ϵ always occur together, they could be thought to be a single disyllabic morpheme, that is, one suffix instead of two. However, when the reflexive morpheme i is added to a string containing $ir+\epsilon$, it is inserted between ir and ϵ , giving $irie$. This fact suggests the presence of a boundary of some sort between ir and ϵ . This is also the case with the other disyllabic endings such as the habitual marker $ag+a$ and the perfect marker $eet+\epsilon$. These, when reflexivized, become $agia$ and $eetie$ respectively, again indicating a boundary between the two syllables. It is possible that the final ϵ of $ir+\epsilon$ and $eet+\epsilon$ is underlyingly the same final a which appears

and L tones in the Recent Past tense. The prefix *a* has L tone in the Remote Past and Past Habitual tenses, but H tone in the Perfect of the Immediate Past. The neutral suffix *a* also varies in tone from tense to tense. Since I found no reasonable way of predicting the tone which particular prefixes or suffixes would bear in a given tense, I was forced to assume that these tones were underlying and that for each tense it had to be memorized what prefix and what suffix(es) were used and with what underlying tone. This information would constitute the tense marker for a given tense.

Finally, the tenses referred to by Armstrong as the consecutive tenses have not been dealt with here. These tenses are used only in the second and subsequent members of strings of conjoined clauses,⁵ and their tonal behaviour differs markedly, though not unpredictably, from that of the other tenses. It seems likely that the tonal system of the consecutive tenses will be derivable from that of the non-consecutive tenses.

2. Assimilation by verb stems

Kikuyu verb stems are basically monosyllabic, their unmarked form being CVC. Stems of the form VC, CV, and rarely V also occur. Geminate vowels may occur in CVC stems, producing minimal pairs such as *ōlga* 'dye' / *ōiiga* 'scrape'. As in all Bantu languages, the monosyllabic stems may be expanded by reduplications or by addition of verbal extensions which alter the meaning of the stem. An example is the causative extension *ek* which, when added to the stem *hat* 'be stuck' gives *hat+ek* 'squeeze, push back'. The precise semantic connection between a basic stem and its various extended forms is not always obvious, but the morphological behaviour of extensions and reduplications is always the same.

a. Assimilation by H tone stems. Any Kikuyu verb stem (indeed, any Kikuyu syllable) may appear with surface H or L tone, according to its

in all the other verb tenses in Kikuyu, and that it has become ϵ by assimilation to the preceding front vowel. Since these are the only two suffixes containing a front vowel in Armstrong's data, this hypothesis could not be tested further here. I shall continue to assume in any case that i_r and ϵ are separate suffixes, as well as *ag* and *a*, and *eet* and ϵ .

⁵I owe this piece of information to Patrick Bennett, with thanks.

environment; however, the verb stems fall into two classes according to their effect on a following syllable,⁶ be it verbal extension, reduplication, or tense suffix. For example, the stems *nɛŋg* 'hand over' and *tɛŋg* 'patch' are seen below in their infinitival forms with the infinitival prefix *ko*⁷ and the neutral suffix :

(1a) *konɛŋgá* 'to hand over'

(1b) *kotɛŋga* 'to patch'

The suffix *a* has H tone after *nɛŋg* and L tone after *tɛŋg*. If the applicative extension *er* is added to these forms, the result is:

(2a) *konɛŋgéra* 'to hand over for'

(2b) *kotɛŋgera* 'to patch for' (e > ε by vowel harmony)

The syllable following *nɛŋg* has H tone in both (1) and (2) while the identical morphemes following *tɛŋg* have L tone. The contrast is the same no matter how many syllables follow the stem, as shown by the following extended forms of the verbs *gor* 'buy' and *rom* 'follow':

(3a) *kogorangerera* 'to buy a few more of'

(3b) *koromángerera* 'to follow a little further'

We conclude that some verb stems cause an immediately following syllable to have H tone, while others do not have this effect.

This phenomenon is common among Bantu languages and has been dealt with in two main ways. In some analyses, such as A. E. Meeussen's Linguistische schets van het Bangubangu,⁸ morphemes having this effect of raising a following syllable are interpreted as having underlying L tone and are marked with a diacritic feature [+determinant], which

⁶This was first suggested in Harries [1954].

⁷*ko* is really a morphophonemic transcription of the infinitive prefix, which can appear as *ko* or *yo*. To avoid confusion, *ko* will be maintained throughout.

⁸Annalen van het Koninklijk Museum van Belgische Kongo. Tervuren: Linguistiek, deel 5, 1954. Cited in McCawley [1971].

refers to their raising properties. McCawley [1971] has attempted to show that for Bangubangu at least, this diacritic may be dispensed with if the determinants are regarded as themselves having underlying H tone, which they retain under certain circumstances and lose under others. Thus the effect of determinants can, in this interpretation, be treated as assimilation. McCawley's analysis has both a naturalness and an explanatory value which the diacritic analysis lacks. Evidence from Kikuyu supports and perhaps necessitates an analysis such as McCawley's. We shall attempt to show that in Kikuyu, stems such as *nɛŋg* and *ɾɔm* above, which cause a following syllable to have H tone, are themselves underlyingly H tones, that they raise the tone of a following L tone syllable, and that they subsequently lose their H tone under certain circumstances. These stems will henceforth be marked with an acute accent, indicating underlying H tone. Stems with no raising powers will be referred to as (underlyingly) L toned, and will be left unmarked.

Within this analysis, a rule of Stem Raising will be required whereby a H tone stem raises a following L tone syllable:

(4) Stem Raising:

$$L \rightarrow H / H \text{ ______ } \\ \text{ [+stem] }$$

Thus:

(5a) *ko+nɛŋg+a* --> *konɛŋgá* 'to hand over'

(5b) *ko+tɛŋg+a* --> *koɾɛŋga* 'to patch'

Reference is made in this rule to the morphological feature [+stem] in order to distinguish this rule from the rule of Pro-Raising, to be discussed shortly, which has a somewhat different environment and different ordering relations.

b. Assimilation by L tone stems. L tone stems in Kikuyu are not defined merely by their inability to raise a following L tone syllable, however. The following examples illustrate the behaviour of H and L tone

stems in the Immediate Past tense. The marker for this tense is the H tone suffix pair $\acute{r}+\acute{e}$:

	<u>Stem</u>		<u>Imm. Past Verb Form</u>
(6a)	tém	'cut'	témíré
(6b)	gor	'buy'	goriré
(6c)	ðónd+ek	'mend'	ðóndékíré
(6d)	tɛŋ+ɛr	'run'	tɛŋɛríré

Pronouns have been omitted for convenience.

The tense marker $\acute{r}+\acute{e}$ has H tone in (6) except when it immediately follows a L tone stem, as in (6b), in which case the first syllable of the tense ending has L tone. Both suffixes *ir* and *ε* have H tone when an extension intervenes between a L tone stem and the tense marker, as in (6d). I propose that the tense marker $ir+\epsilon$ be interpreted as having underlying H tone in this tense, and that the L tone on the syllable *ir* in (6b) be attributed to assimilation triggered by the L tone unextended stem *gor*. That is, a L tone verb stem assimilates tonally an immediately following syllable in the same way a H tone stem does. We will thus postulate a rule of Stem Lowering, which is the converse of Stem Raising:

(7) Stem Lowering:

$$H \rightarrow L / L \underline{\quad} \\ [+stem]$$

Again it has been necessary to specify the morphological feature [+stem], for otherwise the L tone extension *er* in (6d) would be able to trigger Lowering, giving the incorrect form *tɛŋɛríré 'ran'.

There is a restriction on Stem Lowering, however. It does not occur if the stem contains a geminate vowel. Thus the L tone stem *niin* 'finish' does not cause lowering in the $\acute{r}+\acute{e}$ tense:

(8) $niin+\acute{r}+\acute{e} \rightarrow niiníré$ (not *niiniré)

There is no analogous restriction on Stem Raising, however, as shown by the following examples of the Habitual Present tense, whose marker

is the L tone suffix pair ag+a:

(9a) tém+ag+a ---> témága 'usually cuts'

(9b) ðóóóm+ag+a ---> ðóóómága 'usually reads'

That is, both tém and ðóóóm trigger Stem Raising in spite of the fact that the latter stem contains a geminate vowel.⁹

3. Assimilation by pronouns

In Kikuyu non-future tenses, the third person pronouns a 'he' and má 'they' have surface H tone, while the other pronouns, n 'I', o 'you', to 'we', and mo 'you pl.' have surface L tone. Like the verb stems, these pronouns trigger assimilatory raising and lowering processes.

a. Assimilation by H tone pronouns. Example (10) below contrasts the 2nd and 3rd persons singular of the L tone stem gor 'buy' in the habitual (ag+a) tense:

(10a) o+gor+ag+a ---> ogoraga 'you usually buy'

(10b) á+gor+ag+a ---> ágóraga 'he usually buys'

Similarly, in the 1st and 3rd persons plural:

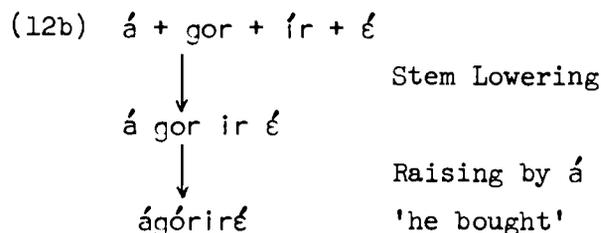
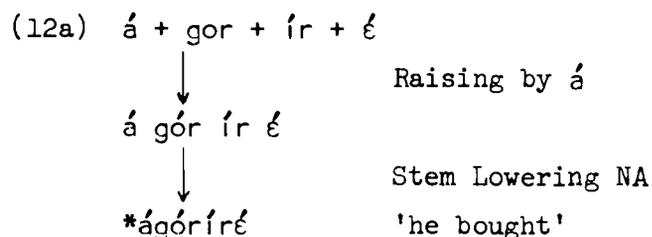
(11a) to+gor+ag+a ---> togoraga 'we usually buy'

(11b) má+gor+ag+a ---> mágóraga 'they usually buy'

Evidently a H tone pronoun raises a following L tone syllable just as a H tone stem does. The rule accounting for this raising by pronouns will have to follow Stem Lowering if L tone stems like gor are required

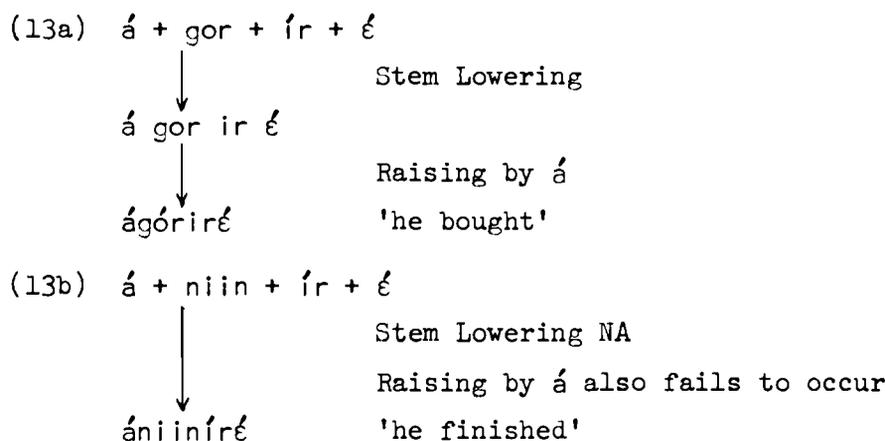
⁹Mechanically speaking, this difference between Stem Lowering and Stem Raising could be stated as a restriction of the environment of Stem Lowering such that the latter applied only in the case of non-geminate stem vowels. Such a 'solution', however, would be completely lacking in explanatory power. We hope to show later that the failure of geminate L tone stems to trigger Lowering is a consequence of a fundamental difference between the function of H and L tones in general in Kikuyu. It has been necessary to discuss the problem here, however, for it bears heavily on the next topic of discussion, the effect of pronouns on verb stems.

to have L tone at the point Stem Lowering applies. The following derivations illustrate this point:



The correct output is produced in (12b) by ordering Stem Lowering before raising by the pronoun.

Obviously we would like to be able to treat Stem Raising and raising by pronouns as a single process. However, raising by pronouns is subject to a restriction not exhibited by Stem Raising. We recall that L tone geminate stems like *niin* 'finish' fail to trigger Stem Lowering. Contrasting the following derivations of the stems *gor* and *niin* in the Immediate Past tense, we see that where Stem Lowering fails to occur, raising by pronouns also fails to occur:



The failure of pronoun raising to apply in (13b) is not directly due to the fact that *niin* has a geminate vowel, however. For in the

Present Habitual tense, where the tense suffix has L tone, both *niin* and *gor* undergo raising by the pronoun *á*:

(14a) $\acute{a} + \text{gor} + \text{ag} + \text{a} \rightarrow \acute{a}\acute{g}\acute{o}\acute{r}\acute{a}\acute{g}\acute{a}$ 'he usually buys'

(14b) $\acute{a} + \text{niin} + \text{ag} + \text{a} \rightarrow \acute{a}\acute{n}\acute{i}\acute{i}\acute{n}\acute{a}\acute{g}\acute{a}$ 'he usually finishes'

Regardless of how it comes about that *niin* fails to trigger Stem Lowering, the fact that *niin* fails to undergo raising in exactly the environments where it fails to trigger Lowering, and only in those environments, is not likely to be a coincidence. The relevant factor seems to be not whether the stem contains a geminate vowel, but whether it is followed by a L tone. If it is not, as in (13b), raising by pronouns is blocked. Stem Raising does not exhibit this restriction. H tone stems raise an extension whether or not the extension is followed by a L tone, as (15) exemplifies:

(15a) $\acute{o}\acute{o}\acute{n}\acute{d} + \epsilon\text{k} + \acute{i}\acute{r} + \acute{e}$
 \downarrow Stem Raising
 $\acute{o}\acute{o}\acute{n}\acute{d}\acute{e}\acute{k}\acute{i}\acute{r}\acute{e}$ 'mended'

(15b) $\acute{o}\acute{o}\acute{n}\acute{d} + \epsilon\text{k} + \text{ag} + \text{a}$
 \downarrow Stem Raising
 $\acute{o}\acute{o}\acute{n}\acute{d}\acute{e}\acute{k}\acute{a}\acute{g}\acute{a}$ 'usually mend'

For the moment, then, we will postulate a separate rule of Pro-Raising which will contain this extra restriction. This rule is stated roughly as:

(16) Pro-Raising:
 $L \rightarrow H / H \text{ ______ } L$
 [+pro]

As shown earlier, Pro-Raising must be ordered after Stem Lowering.

The restriction of Pro-Raising to the environment $\text{______} L$ provides important evidence in support of an analysis in which the so-called determinants are regarded as underlying H tones. If verbs like *tém* 'cut' were really underlying L tone syllables bearing the diacritic feature [+determinant] which caused them to trigger Stem Raising (and

prevented them from triggering Stem Lowering), then we would expect these stems also to fail to undergo Pro-Raising when followed by a H tone suffix such as *ír+é*. That is, we would expect the following derivation:

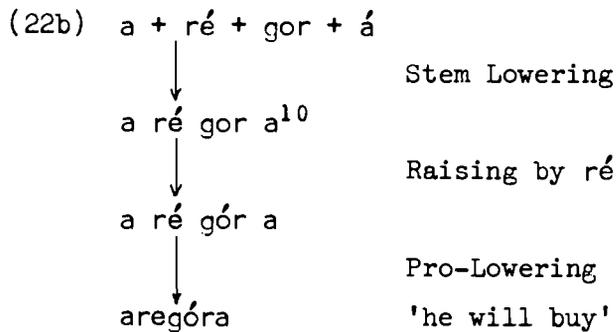
(17) *á + tém + ír + é* (underlining=determinant)
 ↓
 **átémíré* Stem Raising NA
 Pro-Raising may not apply
 'he cut'

The correct form is *átémíré*. The H tone on *tém* in this form cannot be attributed to Pro-Raising as formulated since the latter apparently does not affect L tones followed by H tones. In order to explain the H tone on *tém* in this form, the determinant analysis would require that Pro-Raising be reformulated so that determinants could be raised regardless of their following tone, and only non-determinants would be subject to the more restricted environment H L. The alternative analysis, which has been adopted here, claims [+pro]

that the H tone on *tém* in the form *átémíré* is underlying, and thus permits Pro-Raising to be stated in a simpler way.

Secondly, the determinant analysis would have no explanation for the surface H tone on the pronoun *á*. It would have to claim that *á* is an element of a different category from *tém* in that it causes a following syllable to have H tone and has surface H tone itself. The present analysis avoids this complication by claiming that both *a* and *tém* are underlying H tones which assimilate a following syllable.

b. Assimilation by L tone pronouns. The claim that H tone stems like *tém* have underlying H tone which they retain after assimilating a following L tone syllable does necessitate the establishment of a second rule of L tone assimilation triggered by the L tone 1st and 2nd person pronouns. H tone stems, when following these pronouns, have L tone, as shown by the following examples using the H tone stems *tém* 'cut' and *ónd+ek* 'mend':



The raising caused by *ré* is subject to the same restriction as Pro-Raising: the syllable to be raised must be followed by a L tone. Thus stems with geminate vowels, which fail to trigger Stem Lowering also fail to undergo raising by *ré*, as shown in (23):

(23) o + ré + niin + á → oréniiná 'you will finish'

Notice that in (23) Pro-Lowering has also failed to apply to lower the tone of *ré*. That is, we do not get *oreniiná. This example is crucial in two ways. First, it supports an analysis in which *ré* has underlying H tone, for we have no other source to which to attribute the H tone on *ré* in (23). Secondly, it suggests that Pro-Lowering is subject to a restriction analogous to that placed on Pro-Raising. That is, the syllable to be lowered by Pro-Lowering, in this case *ré*, must be followed by a H tone or the rule does not apply. Since *niin* in (23) has not triggered Stem Lowering and is consequently followed by a H tone, thus inhibiting raising by *ré*, *ré* itself is not followed by a H tone and apparently for this reason may not be lowered by the pronoun. It is easy to see why this restriction on Pro-Lowering did not appear earlier: H tone stems are always followed by a H tone, and in the one environment, illustrated by (23), in which a H tone prefix fails to raise a following syllable, it also fails to undergo

¹⁰In actual fact, Stem Lowering here produces a rising tone on *á* unless a noun follows the verb, in which case the first syllable of the noun bears the H tone from *á* and *á* itself is fully lowered to a by *gor*. This question will be dealt with fully later.

Pro-Lowering. More evidence will be presented later for this restriction, and for the consequent reformulation of Pro-Lowering as:

(20') Pro-Lowering:

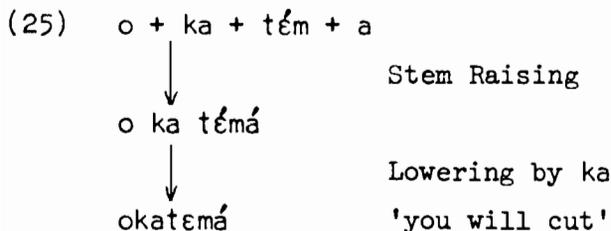
$$H \rightarrow L / L \text{ ____ } H$$

[+pro]

Since the raising triggered by *ré* occurs in exactly the same environment as Pro-Raising, we would hope, in the name of significant-generalization-about-the-language, to treat the two as a single process and to effect them by a single rule. It is difficult to see how this could be done in a meaningful way, since we have found it necessary to mention morphological categories in our assimilation rules. Within the present analysis, it would be necessary to formulate a raising rule which would be triggered by pronouns and prefixes, but not by stems or extensions. For the sake of the discussion, I am going to assume the existence of such a rule, which will be called P-Raising (short for Pro-Prefix-Raising). P-Raising will raise L tones which are followed by a L tone and preceded by a H tone prefix or pronoun. Example (22b), repeated below as (24), shows that P-Raising would have to follow Stem Lowering and precede Pro-Lowering:

(24)	o + ré + gor + á	
	↓	Stem Lowering
	o ré gor a	
	↓	P-Raising
	o ré gó r a	
	↓	Pro-Lowering
	oregóra	'you will buy'

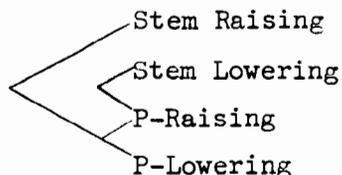
b. Assimilation by L tone prefixes. As one might expect at this point, the behaviour of L tone prefixes is analogous to that of H tone prefixes. This is exemplified by the Remote Future tense, which is marked by the prefix *ka* and the suffix *a*, both with L tone. *ka*, like the pronoun *o*, lowers a following H tone syllable, as shown in (25):



The L tone on tém in (25) cannot be attributed to Pro-Lowering by o, for we know that Pro-Lowering affects only an immediately following syllable. It does not, for example, apply to a string like o+niin+ír+é to produce *oniiniré 'you finished', or to a string like o+ré+tém+á to give *oretémá 'you will cut'. The correct forms are oniiniré and oretémá respectively. We conclude that the L tone on tém in (25) is therefore due to assimilation to the prefix ka.

Since the only syllables subject to assimilation by ka are H tone stems, and since H tone stems are always followed by H tones, it is impossible to test whether lowering by ka is subject to the restriction discovered earlier on Pro-Lowering, namely that the syllable to be lowered must be followed by a H tone. Since this condition will always be met in the case of lowering by prefixes, one could safely treat prefix-lowering and Pro-Lowering as a single process and propose a rule of P-Lowering, analogous to that of P-Raising. (Neither of these rules has been formulated for the simple reason that I have found no reasonable way of doing so, and intend to put both out of their misery as soon as possible.)

c. Summary. As derivation (25) shows, P-Lowering must follow Stem-Raising. Derivation (24) above showed that P-Lowering must also follow Stem Lowering and P-Raising. We thus have the following ordering relations:



The first two rules are converses of each other, as are the last two. All four are expressible as assimilations of tone. The fact that P-Raising

must intervene between the two lowering rules further removes the possibility of collapsing Stem Lowering and P-Lowering.

5. Assimilation by H tone suffixes in V NP sequences

a. The rule. The types of tone assimilation we have been discussing operate across word boundaries in Kikuyu as well as within verb forms. Three of the verb tenses in Armstrong cause the first syllable of a following noun to become H, provided it is followed by a L tone. The tenses causing this raising are the Remote Past (prefix a, suffixes ír+é), the Past Habitual (prefix a, suffixes ág+á), and the Near Future (prefix ré, suffix á). All three tenses have in common that their tense marker consists of prefix and H tone suffix(es). The Immediate Future tense (prefix ko, suffix á) should also fall into this group, but there are no relevant examples in Armstrong. The effect of these tenses on a following noun is illustrated in (26ff.):

- (26a) nd + a + hét + ok + ír + é ## mocie
 ndahetókíré mocie 'I passed a homestead'
- (26b) nd + a + gor + ír + é ## ndéegwa
 ndagoriré ndééegwa 'I bought an ox'
- (27a) nd + a + ún + ág + á ## njógu
 ndoonágá njógu 'I used to see elephants'
- (27b) nd + a + haand + ág + á ## marigo
 ndahaandágá máriigo 'I used to sell bananas'
- (28a) nd + ré + té + á ## mahuti
 ndeeté máhuti 'I shall throw away rubbish'
- (28b) nd + ré + réé + he + á ## marigo
 ndeerééhé máriigo 'I shall bring bananas'

In each case, the first syllable of the noun has H tone. Contrast the following examples from other verb tenses, where the first syllable of the noun is not raised:

- (29) má + hét + ok + ír + é ## moðuuri
 máhétókíré moðuuri 'They passed an elder'

(34) nd + ré + gor + á ## matuumbé
 ndeegórá mátuumbé (nd+r> nd) 'I shall buy eggs'

Since Stem Lowering lowers the suffix á in this form, the assimilation rule whereby this suffix raises the first syllable of matuumbé will have to precede Stem Lowering, barring the use of global rules. (34) would have the following derivation:

(35) nd + ré + gor + á ## matuumbé
 ↓
 ————— á mátuumbé Suffix Raising
 ↓
 ————— gor a mátuumbé Stem Lowering
 ↓
 ——— ré gór a mátuumbé P-Raising
 ↓
 nd re gór a mátuumbé P-Lowering
 ↓
 ndeegórá mátuumbé later rules
 'I shall buy eggs'

Raising by suffixes will have to precede Stem Raising also, for it is not triggered by suffixes whose H tone is derived via Stem Raising, whether or not a suffix is present. For example, in (36) below, the suffix a has derived H tone due to a preceding H tone stem, but Suffix Raising has not occurred:

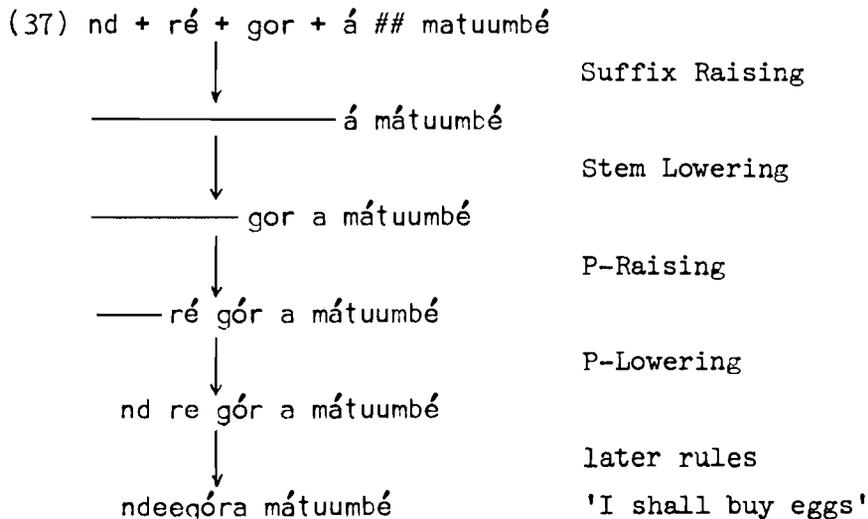
(36) nd + a + ʒn + a ## njogu
 ndɔɔná njogu 'I saw an elephant'

But since raising by suffixes precedes both Stem Raising and Stem Lowering, it will not be collapsible with P-Raising because P-Raising has to follow Stem Lowering. If Suffix Raising has to be made a separate rule from P-Raising, it will have to mention some morphological feature or boundary in order to distinguish it from P-Raising, whose ordering relations are different. Except for this feature or boundary, the statement of the rule of Suffix Raising would be identical to P-Raising. This is obviously undesirable. Suffix Raising is functionally identical

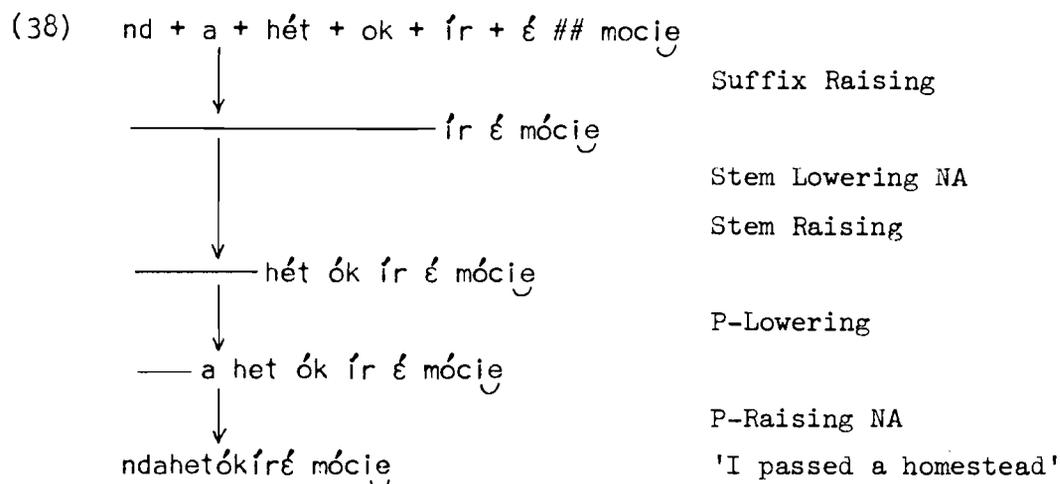
to P-Raising, and differs only in its ordering relations to Stem Raising and Stem Lowering. To formulate a separate rule of Suffix Raising, conditioned by yet another morphological feature is to condone an undesirable proliferation of nearly identical assimilation rules. By referring to four different morphological categories in three different raising rules, the present analysis makes the claim that the raising triggered by each of these categories is distinct from that triggered by any of the others. In a very real sense, this distinction, based on ordering and morphological category, is spurious. In an equally real sense it is false, for we have no reason to claim, for example, that *á* causes raising because it is a pronoun, or *é* because it is a suffix. What we really want to say is that *á* and *é* cause raising because they have underlying H tone. The fact that *á* is a pronoun and *é* a suffix means that they cause raising in a more restricted set of L tones (specifically those followed by a L tone) than if they were stems. The same relationship holds between Stem Lowering and P-Lowering.

6. The cycle

a. What the cycle solves. We are prevented by the tight ordering relations holding among the proposed assimilation rules from abandoning morphological conditioning and from making any further generalizations formally. It is this fact which leads one to reject linear ordering and to suggest that the raising and lowering processes are cyclic. Reconsider derivation (35), repeated here as (37):

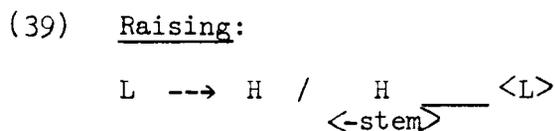


The rules have applied from right to left in the order raising, lowering, raising, lowering. Similarly, consider the derivation of the sentence 'I passed a homestead':

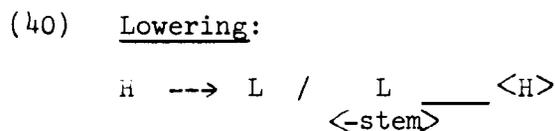


Again, raising and lowering seem to have proceeded from right to left across the string.

If the tone assimilation process were regarded as cyclic, that is, if the assimilation rules were allowed to apply cyclically from right to left, morpheme by morpheme across strings such as those in (37) and (38), the redundancy implicit in the linear analysis could be eliminated. There could be a single rule of raising to the effect that L tones are raised when preceded by H tones and followed by L tones, unless the H tone causing the raising is on a stem, in which case the raising occurs regardless of the tone following the affected syllable. That is:



Similarly, a single lowering rule could be stated:



What these rules say is that if the syllable causing the tonal assimilation is a verb stem, the following syllable is assimilated unconditionally, as in the previous rules of Stem Raising and Stem Lowering. If the syllable causing the assimilation is not a stem, that is, is a prefix, suffix, or pronoun, the following syllable is assimilated only if it is itself followed by a syllable of its own tone, as in P-Raising, P-Lowering and Suffix Raising. That is, an underlyingly H tone syllable will always be lowered by a preceding L tone stem, but will be lowered by a preceding L tone non-stem only if it is immediately followed by another H tone. This analysis seems to make the appropriate morphological distinction, namely that the raising powers of stem vowels are greater than those of non-stem vowels. The fact that assimilations by suffixes precede and condition assimilations by prefixes and pronouns, is reflected in a cyclic analysis by the fact that the cycle applies from right to left across the string. In the linear analysis, this right to left progression could not be stated and had to be viewed as accidental, just as the near identity of the several linear raising and lowering rules had to be viewed as accidental.

b. Mechanics of the cycle. The cycle we are proposing differs radically from the type of cycle proposed by Chomsky and Halle in Sound Pattern of English. First, it would not operate from innermost to outermost syntactic information. The first difference is, of course, partly a reflection of the second. This cycle does, however, require information other than the purely phonological characteristics of the string. Specifically, it must know whether a given tone-bearing unit is a stem, and it must be sensitive to morpheme boundaries obtaining, for example, between stems and suffixes in order that each morpheme trigger assimilations on a different cycle.

The syntactic bracketing for the string in (38) would be something like:

$$(41) \left[\left[\left[\left[\left[\left[\text{no} \right]_{\text{pro}} \left[\text{a} \right]_{\text{pre}} \left[\left[\left[\text{V} \text{hét} \right]_{\text{Vok}} \right]_{\text{V}} \left[\left[\text{ír} \right] \left[\text{é} \right] \right]_{\text{V}} \left[\left[\left[\text{mo} \right] \left[\text{cié} \right] \right]_{\text{NP}} \right]_{\text{NP}} \right]_{\text{VP}} \right]_{\text{VP}} \right]_{\text{VP}} \right]_{\text{VP}} \right]_{\text{VP}} \right]_{\text{VP}}$$

The input to the tone assimilation cycle, on the other hand, would be bracketed more or less as in (42):

(42)

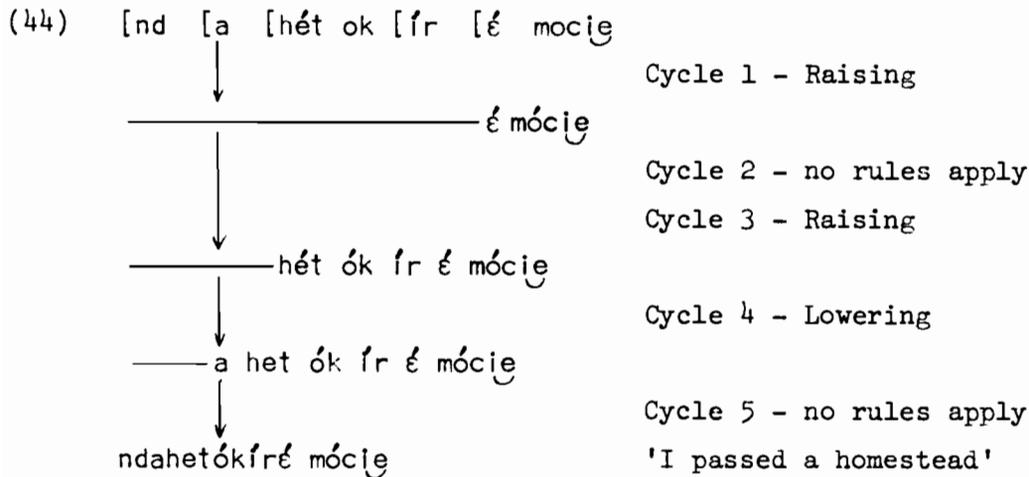
$$\left[\text{nd} \left[\text{a} \left[\text{hét} \quad \text{ok} \left[\text{ír} \left[\text{é} \left[\text{mo} \quad \text{c} \left[\text{é} \right] \right] \right] \right] \right] \right] \right]$$

Either an enormous readjustment rule would have to be created to change (41) into (42), or we could accept the obvious: the input to the cycle is not a syntactically bracketed string because this cycle is not syntactically conditioned. The bracketing in (42) is morphemic, that is, the cycle applies to one morpheme (or lexical entry) at a time. It is perhaps worth noting that there seems to be no reason to expect a tone assimilation cycle--or any cycle, for that matter--to be syntactically conditioned and to operate from innermost to outermost syntactic bracketings. Derivation (43) below illustrates the application of the cycle to the string in (37):

(43) [nd [ré [gor [á matuumbé	
↓	
----- á mátuumbé	Cycle 1 - Raising
↓	
----- gor a mátuumbé	Cycle 2 - Lowering
↓	
----- ré gór a mátuumbé	Cycle 3 - Raising
↓	
nd re gór a mátuumbé	Cycle 4 - Lowering
↓	
ndeegóra mátuumbé	Later rules
	'I shall buy eggs'

In (43), only one of the two assimilation rules has been able to apply on a given cycle. This is an obvious consequence of the fact that the string in question is made up entirely of monosyllabic morphemes, that is, morphemes composed of a single tone-bearing unit. In strings of monosyllabic morphemes, the two assimilation rules will be mutually exclusive on any given cycle. Hence such strings cannot provide a clue to any ordering relations obtaining between Raising and Lowering. It will be noticed, however, that the bracketing in (42) treats the extension ok as part of the stem hét rather than as an independent morpheme.

Semantically, this claim seems accurate. We noted earlier that the semantic relationship between an extended stem and its nonextended counterpart is not predictable, so that extended forms of a stem would constitute separate lexical entries. Phonologically, this is also exactly the claim we want to make, for extensions have no assimilatory powers, but always undergo assimilation to the stem. In fact, one of the reasons we were required to state morphological features in the earlier formulations of the assimilation rules was to prevent extensions from causing assimilations.¹¹ Within the cyclic interpretation this would be prevented by having Raising precede Lowering. This is illustrated by the following derivation for the string in (42):



¹¹It will also have been noticed however, that except for the verbal extension ok and the noun prefix mo, the bracketing in (42) is also syllabic, a fact which could point toward a cycle which is syllabically rather than morphemically conditioned. Such an analysis would have the advantage of requiring only phonological information about the string, but special readjustments would have to be made for syllables like extensions which do not cause assimilations. I rejected the syllabic analysis on the grounds that it would lack adequate explanatory power unless these 'readjustments' expressed the lesser morphemic status of the syllables not causing assimilation. To do so, however, these readjustment rules would have to incorporate into the syllabic analysis the information on the morphemic status of the syllables, and perhaps justify doing so. This information is inherent in the morphemic analysis. The morphemic analysis does fail to express the doubtless intimate relationship between the tonal structure of Kikuyu and the overall monosyllabicity of Kikuyu morphemes, but I feel this relationship must be expressed in some way other than a syllabically conditioned tonal cycle.

In (44), if Raising precedes Lowering, then on Cycle 3 (the stem cycle) the extension *ok* will already have H tone at the point at which Lowering gets its chance to apply on that cycle, and thus the extension will be unable to cause Lowering. If *hét* were a L tone stem, it would itself trigger Lowering, which would then apply vacuously. If the rules are stated in such a way that each rule gets only one chance to apply on a given cycle,¹² then the stem cycle would end with this vacuous application of Lowering. By ordering Raising before Lowering, then, it seems possible to account for the inability of extensions to cause assimilations, provided the extensions are treated as part of the stem. Treating extensions in this way seems to imply that they have a somewhat lesser status than other entities like prefixes or pronouns, a claim which is supported by the fact that extensions have no assimilatory powers.¹³

The environmental restrictions on assimilation are an interesting example of how underlying contrasts are preserved in this system. According to the environments we have discovered, with the exception of syllables immediately following stems, no syllable may have its underlying tone altered unless that tone is preserved on the following syllable. If assimilation by verb stems were subject to this restriction, however, the possibilities for assimilation by prefixes and pronouns would be a good deal more limited than they are. In (23) above, we saw that the failure of verb stem assimilation to occur precluded all further assimilations in the left hand end of the string. As it is, the system guarantees that a verb stem will always be followed by a syllable of its own tone. This means that for the cycle immediately following the stem cycle, the right hand side of the environment in (39) and (40) will always be met. The

¹²It will be seen below that the failure of L tone geminate stems to assimilate a following syllable can also be attributed to this restriction that the rules get only one chance to apply on a given cycle.

¹³This claim has received consideration elsewhere, specifically in Bennett and Eastman [1971] where it is proposed that the formation and interrelation of extended stems be effected in the lexicon rather than transformationally in the syntactic component.

only syllable whose underlying tone may be lost completely through assimilation, and not preserved on a following syllable is the syllable immediately following a verb stem. This may be either a verbal extension, whose underlying tone is known to be L anyway, or it may be a suffix. Even this latter loss is seldom of consequence: the paired suffixes (e.g. $ir+\epsilon$) always have the same underlying tone on both morphemes, so that the second of the pair always manifests the tone of the first even if the latter is assimilated to a verb stem. Loss of underlying tone is more of a threat to a single suffix (e.g. a) assimilated unconditionally to a verb stem; but even this is often prevented, first by the fact that, as will be discussed below, utterance final monosyllabic H tone suffixes do not lose their H tone altogether when assimilated, but rather preserve it in the form of a rising tone, and secondly by the fact that the suffix has the chance to pass its underlying tone to a following noun.

It has been shown that by treating the tone assimilation in Kikuyu as cyclic, the raising and lowering triggered by pronouns, prefixes, stems and suffixes may be expressed as a single process, whereas a non-cyclic analysis is forced to describe each of these assimilations as a separate rule conditioned by morphological category or boundary. It has been argued that an analysis which treats these assimilations as separate processes first ignores the right to left progression of assimilation and secondly draws artificial distinctions whose only external motivation is rule ordering and which thus make the claim that there are, for example, four distinct processes of raising rather than one.

7. Further evidence in support of a cycle

Other facts from Kikuyu support the proposal of a cycle. There are at least two additional cases which in a non-cyclic analysis would require the addition of morphologically conditioned rules, but which apparently can be accounted for naturally by a cyclic analysis.

a. Final rising tones. In note 10 it was mentioned that when a L tone stem lowers a following H tone suffix, a rising tone on the suffix results if that suffix is utterance final. If the suffix is not utterance final, its own underlying tone is realized on the following syllable, if possible,

and the suffix acquires L tone by Lowering. These two cases are illustrated in (45a) and (45b) respectively: (' = rising tone)

(45a) o + ré + gor + á ---> oregórá 'you will buy'

(45b) o + ré + gor + á ## moroođí ---> oregóra móroođí 'you will buy a lion'

A similar situation is encountered in a class of nouns referred to by Armstrong as the *mote* class, whose utterance final form in affirmatives has final rising tone. An example is the noun 'lion' in (45b). When these nouns are not utterance final, when they are followed by an adjective, for example, the first syllable of the adjective has H tone and the final syllable of the noun has L, not rising tone. Hence:

(46a) ndađóndéka mociingă 'I've just mended a gun'

(46b) ndađóndéka mociingă mókoro 'I've just mended an old gun'

We know that the H tone on *mókoro* 'old' is not underlying, first because it has not caused raising of a following syllable, and second because after a noun of Armstrong's *moondo* class, whose unmarked form has level L tones, this H tone does not appear:

(47) moheendo mokoro 'an old rope'

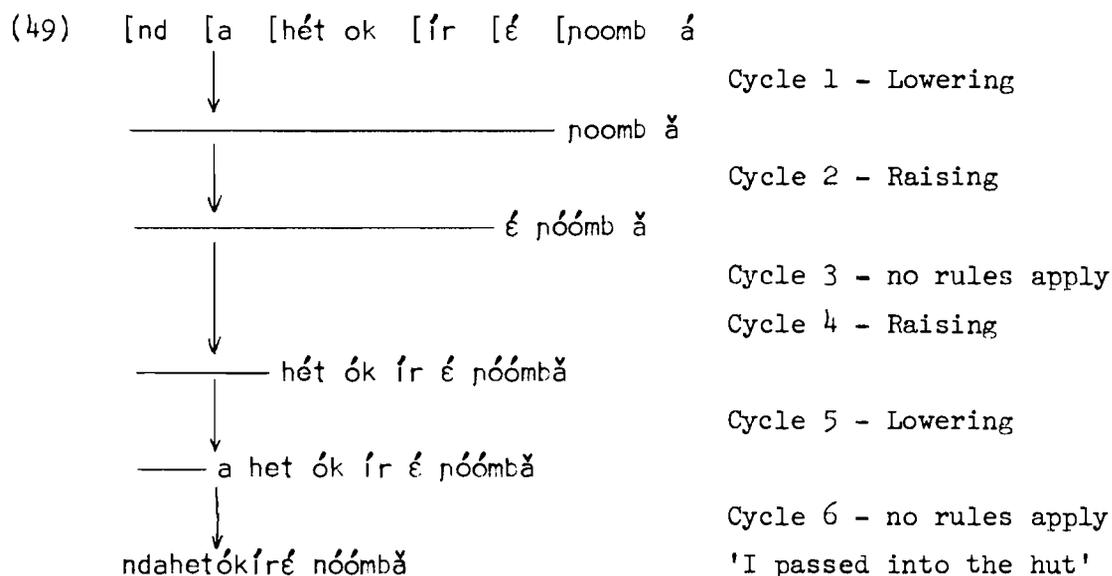
Concord prefixes such as *mo* above, like verbal extensions, apparently always have basic L tone and fail to trigger assimilations. We therefore attribute the H tone on *mókoro* in (46b) to Raising, triggered by an underlying H tone on the final syllable of a preceding noun, *mociingă* 'gun'. The L tone on the final syllable of *mociingă* in (46b) would be attributed to Lowering triggered by the underlying L tone on the preceding syllable *ciing*, just as the L tone on the suffix *a* in (45b) is due to Lowering triggered by the stem *gor*. In other words, the behaviour of *mote* class nouns with respect to a following noun. There is every indication that the two should be treated as a single process. In both cases, a rising tone occurs when Lowering applies to an utterance final H tone syllable, while if the same syllable is not utterance final, its underlying tone is borne by a following syllable. We therefore postulate that in its underlying form the noun 'gun' has

final H tone, and that in (46a), Lowering triggered by the noun stem results in a rising tone on the noun suffix *á* if that suffix is utterance final. And just as the verbal suffix *á* in (45b) raises the following syllable, so the noun suffix *á* in (46b) raises the following syllable *mo*. In a non-cyclic interpretation, the constraints imposed by linear ordering would prevent these two cases of assimilation in nouns and adjectives from being accounted for by previously existing rules. A new rule would be required to account for the initial H tone on the adjective *mókoro* in (46b) and another to account for the final L or rising tone on the noun *mociŋga* in (46). Both these rules would have to precede the rule of Suffix Raising and thus precede the other four rules necessitated by the linear analysis. (48) below provides an illustration of this. Here, the stem of the disyllabic noun *noombá* 'hut' is raised by the preceding H tone verbal suffix:

(48) nd + a + hét + ok + ír + é ## noombá
 ndahetókír_↓é noómbă 'I passed into the hut'

In (48), the raising of the syllable *noómb* by the suffix *é* obliterates the L tone to whose influence we attribute the final rising tone on *noómba* 'hut'. In a linear analysis, the lowering triggered by *noomb* would have to be effected by a rule preceding Suffix Raising. This rule would not be collapsible with Stem Lowering or P-Lowering, for these both must follow Suffix Raising. Similarly, a rule whereby the final syllable of *noombá* raises a following syllable would have to be added to the head of the list.

Without belabouring the point, it seems clear that the redundancies implicit in a linear interpretation will increase as longer strings are considered. Within a cyclic interpretation, this problem is eliminated. Since the cycle proceeds from right to left along the string, any tonal assimilations caused by nouns will be effected on the cycle(s) prior to assimilations triggered by verbal suffixes. Within the cyclic analysis, (48) above would have the following derivation:



b. Né forms. A second relevant case is that of the clitic *né*, which can be tacked onto the front of affirmative verb forms in most tenses to produce a second affirmative form which is used in many contexts. The *né* form of the verb is used, for example, in yes/no questions and in emphatic contexts. It may be that in actual use this *né* form is the more common of the two affirmatives. The addition of *né* to a verb form produces several tonal effects one of which is to raise a following L tone syllable when possible. It seems likely at this point that raising by *né* can be incorporated into the cycle as well, though I have not examined the question in detail. In a non-cyclic interpretation, another raising rule would be required to account for the *né* forms.

The addition of these two cases to the list of tone assimilation processes in affirmative verb forms provides further evidence that without a cycle a ridiculous proliferation of nearly identical tone rules would result.

The cyclic Raising and Lowering rules as formulated in (39) and (40) are converses of each other, a fact which would lead one to suspect they are collapsible by alpha notation. Since it does not seem possible for both Raising and Lowering to apply on the same cycle, perhaps there could be one gigantic, iterative rule something like:

$$(50) \quad \alpha H \rightarrow -\alpha H / -\alpha H \text{ — } \langle \alpha H \rangle \\ \langle \alpha \text{stem} \rangle$$

We will see later during the discussion of vowel coalescence that this is not possible, for there is a fundamental difference in the way Raising and Lowering react to vowel adjacency, a difference which would make it impossible and incorrect to treat them as identical processes.

8. Interaction of tone rules and vowel coalescence: the immunity phenomenon

a. Raising of adjacent vowels. Since Kikuyu has both vowel initial and vowel final verb stems, and since all prefixes are vowel final and all suffixes vowel initial, there is considerable interaction between vowel coalescence rules and the rules governing tone alterations in verb forms. As mentioned in the introduction, we do not intend to examine the actual processes of vowel coalescence, but only to consider them inasmuch as they influence tone rules. Generally speaking, when a series of adjacent vowels coalesces into a single syllable, the resulting syllable bears the tone of the first syllable in the input string. This is undoubtedly an oversimplification for the language as a whole, but it does serve as a rule of thumb for the verb forms we are considering.¹⁵

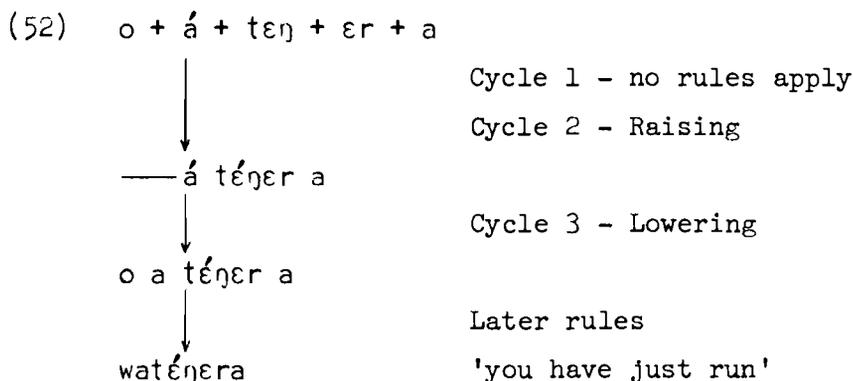
In what follows, it will be temporarily assumed that vowel coalescence is a single, post-cyclic rule. Some alternatives will be discussed briefly later.

In a string like $\acute{a} + t\eta + \epsilon r + ag + a$ 'he usually runs', Raising, we recall is triggered by the pronoun \acute{a} , and the first syllable of $t\eta$ thereby acquires H tone, giving the output string $\acute{a}t\acute{\epsilon}\eta\epsilon raga$. When the vowel initial, L tone stem $and+ek$ 'write' is used in this environment, the result is:

(51) $\acute{a} + and + ek + ag + a \rightarrow \acute{a}\acute{a}nd\acute{\epsilon}kaga$ 'he usually writes'

Notice that in this form it is the extension following the stem and which has been raised by the pronoun \acute{a} , whereas in the form $\acute{a}t\acute{\epsilon}\eta\epsilon raga$, only the stem has been raised. Similarly in the Perfect tense (prefix \acute{a} , suffix a), the second person singular form of $t\eta+\epsilon r$ has the following derivation:

¹⁵There is one counterexample to this claim in Armstrong, that being one form from the Perfect of the Immediate Past (prefix \acute{a} , suffix a). According to Armstrong, the underlying string $o\acute{a}+a\acute{n}+ek+a$ produces the surface form $w\acute{a}\acute{a}n\acute{\epsilon}ka$ 'you have just spread'. Here the vowels $o\acute{a}+a\acute{n}$ seem to have coalesced to $w\acute{a}\acute{a}n$ instead of $waan$ as our rule of thumb would predict.



The corresponding form for the vowel initial stem and+ek is:

(53) o + á + and + ek + a --> waandéka 'you have just written'

Once again, with a vowel initial stem, Raising has affected the syllable following the stem (i.e. the extension ék in (53)), whereas with a consonant initial stem, only the stem itself is affected. Evidently, Raising can affect not just a following syllable, but also a syllable which is two (underlying) syllables away if the intervening syllable is vowel initial. In other words, in a string of the form $V_1C_1V_2C_2V_3$ where V_1 triggers Raising, only V_2 is raised. But in a string of the form $V_1V_2C_1V_3$ where V_1 triggers Raising, V_3 is raised. As a third example, consider the third person singular of tɛŋ+ɛr in the Remote Past (a - ír+é) tense:

(54) á + a + tɛŋ + ɛr + ír + é --> áátɛ́ŋɛríré 'he ran'

As expected, tɛŋ has been raised by the pronoun á even though a L tone prefix intervenes between á and tɛŋ, for the intervening prefix is composed only of a vowel. The corresponding form of and+ek is:

(55) á + a + and + ek + ír + é --> áánde kíré 'he wrote'

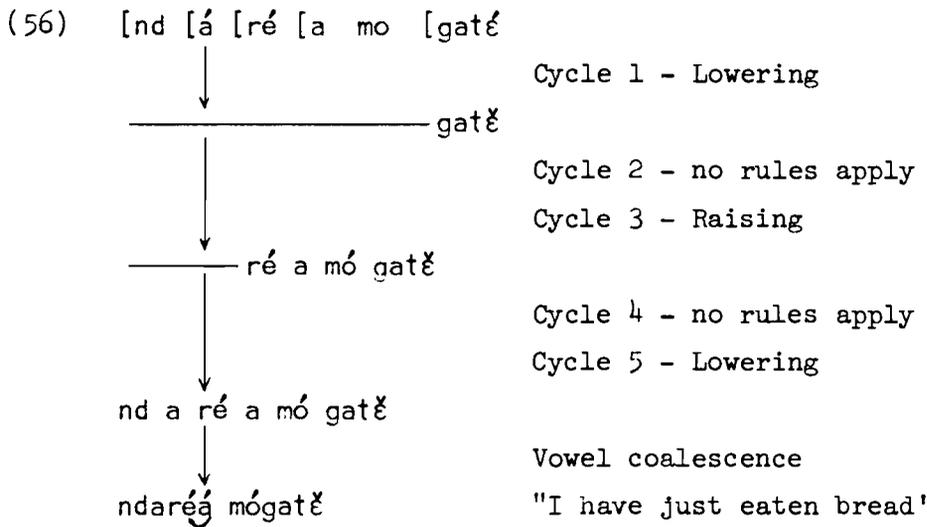
Here Raising by a has not affected ek, apparently because ek is not followed by a L tone.

It seems, then, that a H tone element is able to ignore vowels which are adjacent to it in the underlying string and affects only the first CV syllable following it (provided the rest of the SD of the rule is met). There seems to be a reason for this. If in (54) above, Raising

However, for the analogous string o+á+ét+a 'you have just called', the output is wɛɛtá, indicating that the vowels o+á+ét have coalesced to produce wɛɛt, as the rule would predict. This suggests the form wáánéka is exceptional.

were to apply to raise only the following underlying syllable, a, the intermediate string $\acute{a}+\acute{a}+t\epsilon\eta+\epsilon r+\acute{r}+\acute{e}$ would result. If vowel coalescence rules applied to this string, the result would be $*\acute{a}a\epsilon\eta\epsilon r\acute{r}\acute{e}$, that is, the effects of Raising by \acute{a} would be obliterated. Apparently the Raising rule contains a provision against this happening.

Raising by stems and suffixes also shows this effect. When a H tone vowel final verb stem is followed by a monosyllabic suffix such as a, Raising, as we might expect, skips over this adjacent vowel and raises the first syllable of a following noun, as illustrated in (56):



Similarly:

(57) a + ka + nú + a ## njóohí --> akapua njóóhí 'he will drink beer'

In (56) and (57), the vowel final verb stem has ignored the presence of the vowel initial suffix and has raised the first syllable of the following noun. In (58) below, it is seen that the H tone suffix \acute{a} , when adjacent to a vowel initial noun, raises not the first underlying syllable of that noun, but the second:

(58) nd + a + hét + ok + ág + á ## ikoombe
 ndahétókágá íkóombe 'I used to pass a granary'

If the noun in (58) had been consonant initial rather than vowel initial, the syllable *koomb* would not have been raised, as (27b), repeated here

as (59), shows:

(59) nd + a₁ + haand + áǫ + á ## marigo
 ndahaandágá máriǫ 'I used to plant bananas'

The general Raising rule, then, is characterized by the fact that in a string $V_1V_2C_1V_3$ where V_1 triggers Raising, V_3 is affected, provided the SD of the rule is otherwise met, i.e. provided that V_3 is followed by a L tone or that V_1 is a stem vowel. In this way, the effects of Raising may not be obliterated by vowel coalescence.

b. Lowering of adjacent vowels. Lowering does not display this immunity to adjacent vowels. Consider the 2nd person singular form of the H tone vowel initial verb $\acute{a}n+ek$ 'spread' in the Immediate Past ($\acute{r}+\acute{e}$) tense:

(60) o + $\acute{a}n$ + ek + \acute{r} + \acute{e} --> wanékíré 'you spread'

Notice that Lowering by o in this form has not affected the syllable following the stem. That is, we do not get *wanekíré. Schematically this means that in a string $V_1V_2C_1V_3$ where V_1 triggers Lowering, V_3 has not been affected. Similarly, in the prefix a, suffix $\acute{r}+\acute{e}$ tense, the 2nd person singular of $\acute{a}n+ek$ is:

(61) o + a + $\acute{a}n$ + ek + \acute{r} + \acute{e} --> waanékíré 'you spread'

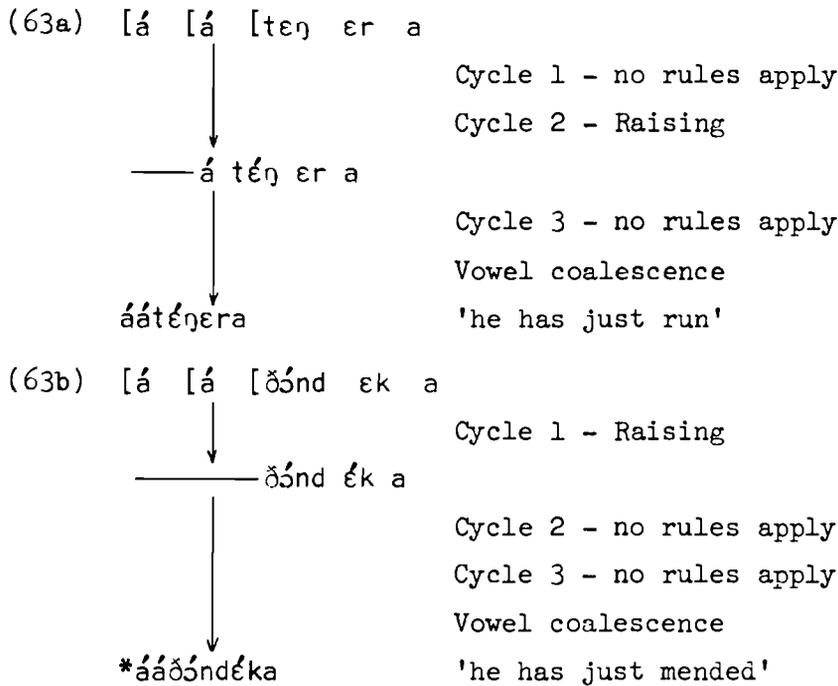
Again, the extension ek has not been lowered. (We have assumed in (60) and (61) that ek has derived H tone due to Raising by $\acute{a}n$.) In (61), both o and a could have triggered Lowering, but neither has caused lowering of ek. In effect, in (60) and (61), the effects of Lowering have been obliterated by vowel coalescence. According to our rule of thumb regarding vowel coalescence, whether or not Lowering applied to the string in (61), the correct form would still be produced after vowel coalescence had applied, for o+a+ $\acute{a}n$ would coalesce to produce waan with L tone.

There seems to be an important functional difference between Raising and Lowering in that the former has the capacity to skip over any number of adjacent vowels, while the latter does not.

This fact about Lowering provides a possible explanation for a problem encountered at the beginning of this paper: the fact that L tone stems do not cause Lowering if they contain a geminate vowel, whereas H tone geminate stems are not inhibited in this way. When a H

tone geminate stem such as $\delta\delta\delta m$ 'read' appears in a string of the form $C_1V_1V_2C_2V_3$ where V_1V_2 are geminate H tone stem vowels, Raising triggered by V_1 would raise V_3 . In a L tone geminate stem like $niin$ 'finish', Lowering would be triggered by the first stem vowel and would affect only the adjacent vowel, which in this case happens also to be part of the stem. Since a rule gets to apply only once on a cycle, the second vowel would never get the chance to trigger Lowering. In other words, in a string $C_1V_1V_2C_2V_3$, where V_1V_2 are geminate L tone stem vowels, V_1 triggers Lowering and only V_2 is lowered. In the light of the functional difference between Raising and Lowering in vowel coalescence environments, the difference in the behaviour of H and L tone geminate stems is just what we would expect, and is explicable in terms of more general properties of the Raising and Lowering rules themselves.

The fact that Raising is insulated in such a way that its effects may not be obliterated by Vowel Coalescence, while Lowering is not so insulated, suggests that the tonal system is biased in favor of the preservation of H tones. There is at least one other piece of evidence in support of this observation. We discussed earlier the fact that utterance final H tones, when subjected to Lowering, do not disappear, but rather become rising tones. That is, utterance final H tone syllables may acquire L tone by assimilation to a preceding syllable, but they also retain their underlying H tone, and the result is a rising tone. This rising tone, it will be recalled, does not occur if the underlying H tone is not utterance final and thus has had the chance to pass its H tone onto a following syllable. By contrast, underlying L tones, whether or not they are utterance final, may be completely assimilated (i.e. obliterated) by a preceding H tone. There are at least two cases, then, (i.e. vowel adjacency and utterance finality) in which underlying H tones are guaranteed survival on the surface while underlying L tones may disappear completely. A good deal more research will be needed before an explanation of this phenomenon may be arrived at, but it does support the hypothesis that L tone is the unmarked tone in Kikuyu, and that the system is weighted in favour of preserving the marked cases whose presence may not be assumed. The additional fact that Raising precedes



(63b) is incorrect. The correct form is ááðóndéka, that is, the stem ðónd has lost its H tone. Similarly, the simple H tone stem tɛm has the corresponding form áátɛmá 'he has just cut' instead of *áátɛmá as our rules would predict. The L tone verb ɔr has the expected form áágóra in this tense.

Evidently a new rule will be necessary to account for the L tone on the second syllable of ááðóndéka and áátɛmá, for here an underlying H tone syllable has lost its H tone between two H tones, indicating that a process of dissimilation is operative. The L tone on the stems in the two forms just quoted cannot be attributed to assimilation because the underlying strings for these forms contain no L tones to which the stem could assimilate.

A few immediate observations may be made about this dissimilation process. First, dissimilation does not occur when a L tone pronoun precedes the H tone prefix, as shown in (62). To express this fact, we could either mention a H tone pronoun in the SD of the dissimilation rule, or we could order that rule after Lowering had applied on the last cycle of (62b), and then state that dissimilation is triggered by a prefix with H tone. In this way, the rule would be unable to apply to the string in (62b).

Secondly, dissimilation does not apply to just any H tone stem located between two H tones. In the Immediate Past (ír+é) tense, for example, dissimilation does not occur even when a H tone stem is preceded by a H tone pronoun. That is:

(65) á + ðónd + ek + ír + é --> áðóndékíré 'he mended'

We do not get *áðóndékíré as we would have if dissimilation had not occurred in the derivation of the string in (65). This means that a H tone pronoun alone cannot trigger dissimilation. Rather, the presence of a prefix is somehow crucial to the operation of the rule. In fact, at least part of the raison d'être of the dissimilation process could be to maintain a distinction between strings like (66a) and (66b) below which, due to vowel coalescence, would be identical if dissimilation were not operative in (66b):

(66a) á + án + ek + ír + é --> áánékíré 'he spread (today)'

(66b) á + a + án + ek + ír + é --> áánekié¹⁶ 'he spread (before yesterday)'

Thirdly, dissimilation does not occur in strings containing a L tone verb stem as (64b) showed. We could express this fact by restricting the environment of dissimilation so that it applied only to H tones followed by H tones, in which case it could never apply to underlying L tone stems even if they did have derived H tone, for L tone verb stems are always followed by L tones.

To sum up, the three factors which in one way or another are crucial to the operation of the dissimilation process are:

1. a H tone pronoun
2. a prefix
3. a H tone following the syllable to be dissimilated.

These facts permit one to conclude that the new rule is a last-cyclic or post-cyclic rule, since it applies only to the lefthand end of the string. We may also conclude that unlike our other rules, Dissimilation will be genuinely morphologically conditioned, for a

¹⁶Notice that in (66b) it is the verbal extension ek which acquires L tone rather than the stem. This fact is to be discussed shortly.

statement of Dissimilation will perforce mention the feature [+prefix] or a boundary indicative of the presence of a prefix. (67a) and (67b) below show two possible formulations of Dissimilation, both of which would apply post- or last-cyclically:

(67) Dissimilation:

- (a) $H \dashrightarrow L / \left[\begin{array}{c} +\text{pro} \\ +\text{H} \end{array} \right] \text{ [+pref] } \text{ ______ } H$
- (b) $H \dashrightarrow L / \left[\begin{array}{c} +\text{pref} \\ +\text{H} \end{array} \right] \text{ ______ } H$

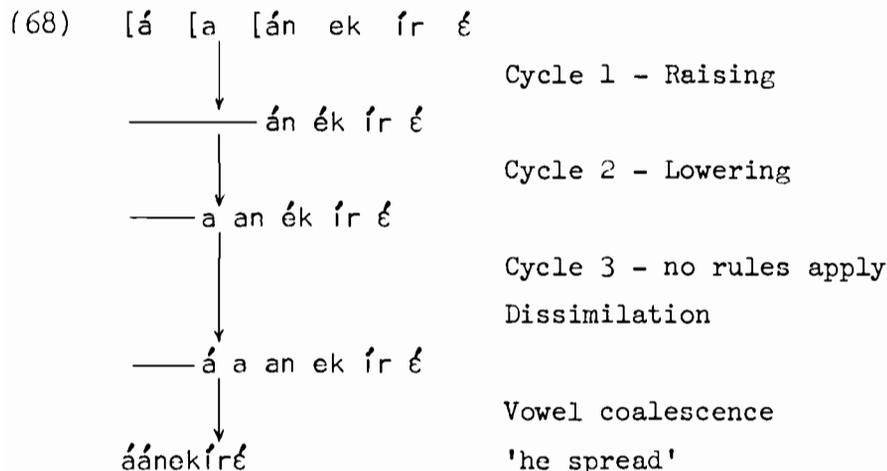
No apologies are made for the rather bizarre fact that this rule is conditioned by the presence of a prefix and is inoperative in tonally identical strings which do not contain a prefix. There is at least one other rule in Kikuyu which is governed by the presence of a prefix, any prefix, that being the rule governing the shape of the first person pronoun. Before a non-prefixal vowel, this pronoun has the surface form [ɲj]; before a vowel initial prefix followed by a verb, it has the form [nd].¹⁷ The fact that this pronoun has a different form when followed by a prefixal vowel than it does when followed by a stem vowel indicates that, as in the case of Dissimilation, reference would have to be made to the presence of a prefix in the formulation of the rule governing this alternation. Evidently, tense prefixes have rather special powers in Kikuyu.

In what follows, evidence will be presented which will indicate choice between the two formulations of Dissimilation given in (67).

Dissimilation appears to pattern with Raising as regards its interaction with adjacent vowels. In (62) above, it was shown that the underlying string $o + a + \acute{a}n + ek + \acute{r} + \acute{e}$ produced the surface form *waanékíré* 'you spread', indicating that Lowering by o or a had not been able to apply to the extension *ek*. The corresponding 3rd person form, $\acute{a} + a + \acute{a}n + ek + \acute{r} + \acute{e}$ has the surface form *áánekíré* 'he spread'. We know from (62) that the L tone on *ek* in the string just quoted cannot be due to Lowering triggered by the presence of the prefix *a*. It must rather be attributed to

¹⁷Patrick Bennett, who I thank for providing this information

Dissimilation triggered by the presence of a prefix (a), a H tone pronoun (á), and a H tone following the syllable to be dissimilated. If it is the case that Dissimilation is responsible for the L tone on the second syllable of the string *áánekiré*, then we must have the following derivation:



Notice that Dissimilation has applied to the intermediate string *á a an ék ír é* and the syllable *ek* has been affected. This means that in a string of the form $V_1V_2V_3C_1V_4C_2V_5C_3V_6$ where Dissimilation is triggered by the prefix V_2 (a), V_4 has been lowered. Dissimilation is able to skip over the intervening adjacent vowel of the stem *an*.

A second example comes from the Immediate Future tense, whose tense marker is the prefix *ko* and the H tone suffix *á*. We know that *ko* has underlying L tone, for it has not raised the first syllable of the stem *tɛŋ+ɛr* in (69):

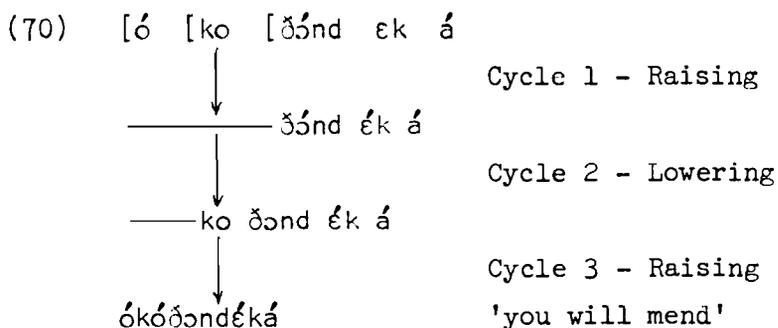
(69) *ó + ko + tɛŋ + ɛr + á* --> *ókótɛŋɛrá* 'you will run' (not **ókótéŋɛrá*)

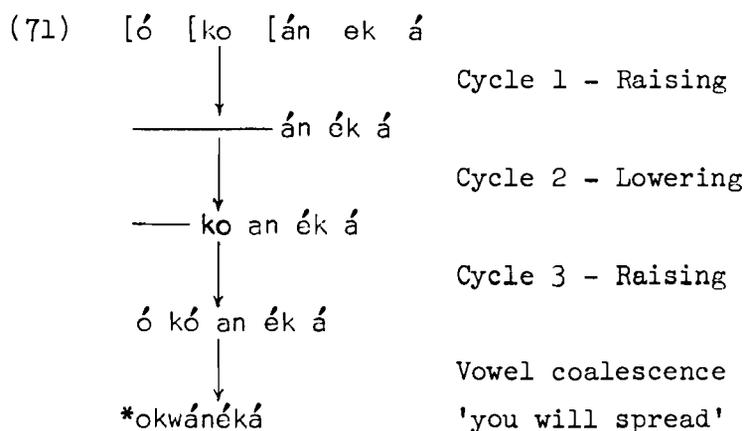
In this tense, all the pronouns except *n* 'I' have surface H tone. This would seem to contradict our earlier claim that pronouns have underlying L tone in future tenses; however, there is evidence indicating that the pronouns are indeed underlyingly L in the *ko*

on the first person pronoun, warns that the conditions on the *nd* form are actually somewhat more complex than stated here. The prefix remains crucial, however.

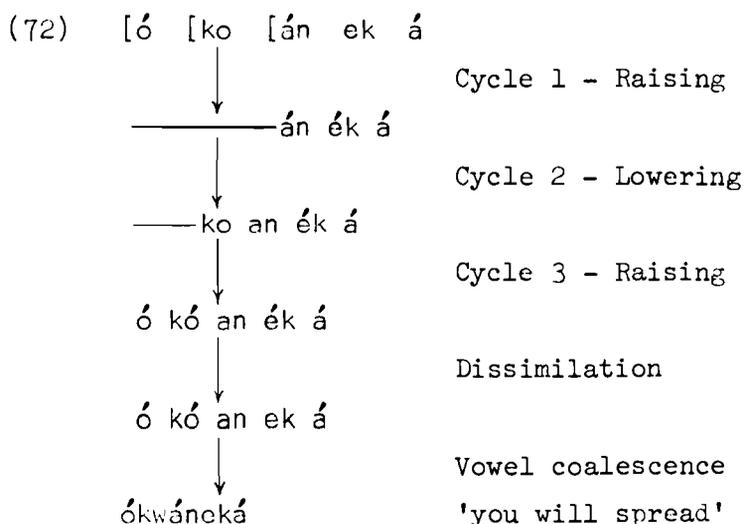
tense, and that *ko* itself has a H tone prefix, the remnant of a lost vowel. The tone of this prefix is assigned to those pronouns which are syllabic (that is, all but the 1st person sg.) and is lost when the pronoun is non-syllabic (as in *n* 'I'). There are two pieces of evidence in support of this hypothesis. First, the 3rd person pronouns *a* (sg.) and *ma* (pl.) have the forms $\epsilon\epsilon$ and $m\epsilon\epsilon$ in the *ko* tense and in no other tense. There is no explanation for this alternation unless we assume that *a* and *ma* have been affected by some other vowel preceding *ko*. Secondly, as it happens, this same tense prefix *ko* appears preceded by the vowel ϵ in forms like the negative relative *otekoruga* 'he who isn't going to be cooking'. I propose, then, that the prefix of the *ko* tense is at some point in the derivation the form $\acute{\epsilon}ko$ (or perhaps $\acute{\epsilon}ko$), and that a rule, which I shall hereafter presuppose, deletes the underlying vowel $\acute{\epsilon}$ after the pronouns *n*, *o*, *mo*, *to*, and coalesces it with *a* and *ma* to give $\epsilon\epsilon$ and $m\epsilon\epsilon$. This same rule, presumably, assigns the tone of $\acute{\epsilon}$ to the vowel of the pronouns, and when no vowel is present, as in the case of *n* 'I', this H tone is lost. It may turn out that this explanation has no significance at all in a synchronic description of the language. It is not crucial here, though useful in explaining the unusual behaviour of the pronouns in the *ko* tense. I note in passing that the Present Consecutive tense, whose prefix is *ka* displays this same tonal effect on the pronouns, and a similar explanation can likely be found. We shall assume in what follows that H tone has already been assigned to the pronouns in the *ko* tense at the point at which the tone assimilation rules begin to apply.

If the *ko* tense of the verb $\acute{\delta}\acute{o}nd+\epsilon k$ 'mend' is subjected to the cycle, the following derivation results:





The correct form for (71) is ókwáneká with L tone on the verbal extension ek. This L tone cannot be attributed to Lowering by ko, since we know Lowering can affect only an immediately following vowel, in this case án and not ék. The L tone on ek in (71) must be due to Dissimilation, triggered by the presence of a prefix, a H tone pronoun and a H tone following the syllable to be dissimilated. This means that in a string of the form V₁V₂C₁V₃, Dissimilation triggered by V₁, a prefixal vowel, has affected V₃, a verbal extension, and skipped over V₂, a stem vowel. We may thus range Dissimilation alongside Raising as regards its immunity to adjacent vowels. The string in (71) would have the following correct derivation:



Notice that both Lowering and Dissimilation have been triggered by ko in derivation (72). If Lowering had not occurred on Cycle 3,

Raising by \acute{o} on Cycle 4 would have been blocked, since ko would have been followed by a H tone. The effects of Lowering have otherwise been obliterated in (72) by Raising on Cycle 4 and by vowel coalescence.

To return to the original point, a split seems to have emerged between Raising and Dissimilation on the one hand and Lowering on the other as regards immunity to adjacent vowels. We would like to find a reason for this split. Why, for example, do Dissimilation and Lowering not pattern together, since both change H tones to L tones?

The one thing Dissimilation and Raising have in common to the exception of Lowering is that both apply to strings beginning with a H tone, that is, both are triggered by H tones. Lowering, on the other hand, deals with strings beginning with a L tone. If this is the relevant factor, we are led to postulate that there are two types of tone rules in Kikuyu, those which are immune to adjacent vowels and those which are not; and that the former type are triggered by H tones and the latter by L tones. To say a rule is immune to adjacent vowels is to say that it affects the first CV syllable following the syllable which triggers the rule in the underlying string, and ignores any intervening vowels. Rules which are non-immune affect the first vowel following the triggering syllable, regardless of whether a consonant intervenes.

9. Formalization of the immunity phenomenon

a. By complicating the Raising and Dissimilation rules. One way this distinction between immune and non-immune rules could be formalized is to make Raising and Dissimilation sensitive to a following consonant. Raising would then be restated as:

$$(73) \quad L \rightarrow H / \begin{array}{l} H \\ \langle \text{-stem} \rangle \end{array} \quad V_0^n C \text{ ____ } \langle L \rangle$$

and Dissimilation as one of:

$$(74a) \quad \acute{i} \rightarrow L / \left[\begin{array}{l} +H \\ +pref \end{array} \right] \quad V_0^n C \text{ ____ } H$$

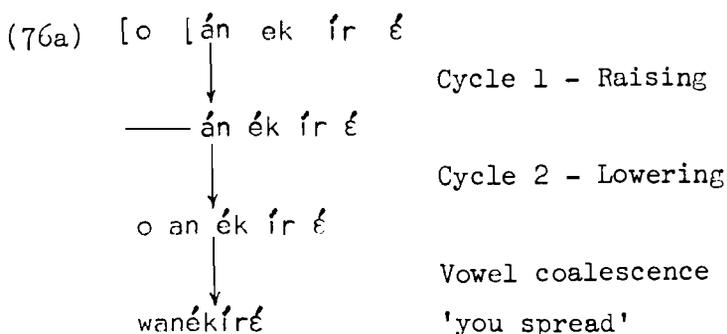
$$(74b) \quad H \rightarrow L / \left[\begin{array}{l} +\text{pro} \\ +H \end{array} \right] [+pref] V_0^n C \text{ ______ } H$$

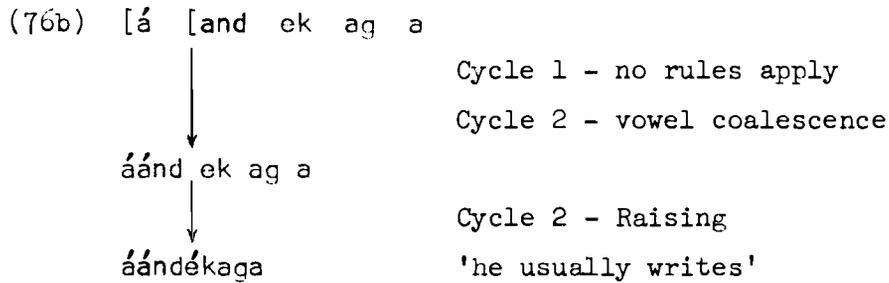
Lowering, on the other hand, would continue to apply in the environment $L \text{ ______ } H$. According to (73), in a form like: $\langle -\text{stem} \rangle$

$$(75) \quad \acute{a} + a + t\epsilon\eta + \epsilon r + \acute{r} + \acute{e}$$

Raising by a would directly affect the stem $t\epsilon\eta$ to give the intermediate string $\acute{a} a t\acute{\epsilon}\eta \epsilon r \acute{r} \acute{e}$. Later \acute{a} and a would coalesce to $\acute{a}\acute{a}$.

b. By complicating the vowel coalescence rules. Suppose that in the derivation of the string in (75) above, the coalescence of \acute{a} and a were to occur before Raising on the last cycle so that the hybrid syllable $\acute{a}\acute{a}$ would raise $t\epsilon\eta$. If this were the case, the problem of adjacent vowels would not arise in connection with (75) and no reformulation of Raising would be necessary to derive the correct output. Such a solution would give rise to an analysis in which sequences of vowels of which the first is a H tone, such as the sequence $\acute{a}+a$ in (75), would coalesce prior to the application of rules triggered by H tones (immune rules) while coalescence of vowel sequences of which the first is a L tone would coalesce after the application of rules triggered by L tones. Since Dissimilation and Raising would apply to strings already having undergone vowel coalescence, their effects could not be obliterated by vowel coalescence. Lowering, in this analysis, would apply to strings which had not yet undergone vowel coalescence, and Lowering would thus be susceptible to having its effects obliterated by vowel coalescence. This analysis would claim, for example, that on Cycle 2 of derivation (76a) below, vowel coalescence followed Lowering, while in derivation (76b), vowel coalescence preceded Raising on Cycle 2.





If such an analysis were adopted, Raising would not have to be reformulated. It would still be the converse of Lowering. Instead, there would have to be two rules of vowel coalescence, one which preceded Raising (and thus preceded Lowering) and one which followed Lowering. The former would apply to sequences of vowels of which the first had L tone. In this analysis, it would be necessary to incorporate the first vowel coalescence rule into the cycle, since it would be crucially ordered with respect to each application of Raising. The second vowel coalescence rule would not have to be made cyclic, for it would not interact at all with any of the tone assimilation rules.

The claims made by such an analysis are dubious. One of those claims would be that vowel coalescence was a tonally conditioned process. Another would be that some radical functional difference held between the two rules of vowel coalescence which resulted in their having quite different character and status within the tonal system. These are startling claims for which there would be little support: the actual formulation of the two putative vowel coalescence rules would be almost the same, and both would produce the same effect in terms of syllabification. Their only difference would be the point in the derivation at which they applied and the manner in which they applied (one cyclically and one not). Even if it worked, which is not clear at the moment, the analysis proposing rules of vowel coalescence would require the splitting of a single process into two rules and the drawing of a distinction solely on mechanical grounds. The only advantage this analysis would have is that it would permit the simpler, original formulation of Raising and Dissimilation and would preserve the symmetry between Raising and Lowering.

c. By abstracting questions of tone from questions of vowel coalescence: attempt 1. There are good reasons to favour an analysis in which vowel coalescence applies independently from the tone assimilation cycle. The assimilation cycle involves the interaction of morphemes, while vowel coalescence involves that of segments. The assimilation cycle is determined by the presence of boundaries, vowel coalescence obliterates boundaries. Perhaps most unnatural of all would be the claim that vowel coalescence were tonally conditioned. In fact, we might like to find a way of abstracting all questions of tone from the treatment of vowel coalescence.

If the first analysis proposed is adopted, whereby Raising and Dissimilation are made sensitive to a following consonant and vowel coalescence is stated as a single, post-cyclic rule, we are still unable to abstract tonal considerations from the formulation of vowel coalescence. It would still be necessary to add a clause to the vowel coalescence rule stating that the tone of the first vowel in the sequence is preserved. This is a direct consequence of the fact that the rules of tone assimilation have had to be stated in terms of segmental features of vowels.

Another consequence of the first analysis proposed is that Raising as formulated in (73) above cannot be termed, strictly speaking, a true assimilation or spreading phenomenon, for it skips over an intervening underlying tone-bearing unit. If we could say, however, that when Raising was triggered by \acute{a} in a string like $\acute{a} + a + t\epsilon\eta + \epsilon r + \acute{r} + \acute{e}$ it raised both the adjacent vowels (i.e. a) and the vowel of the next CV syllable, then Raising could be expressed as a true assimilation, and the rule coalescing the vowels \acute{a} and a would not have to make any tonal adjustments whatever. To do this, Raising could be expressed as a conjunction of two rules, the first of which would raise all vowels adjacent to the vowel doing the raising, and the second of which would raise the vowel of the first CV syllable following the

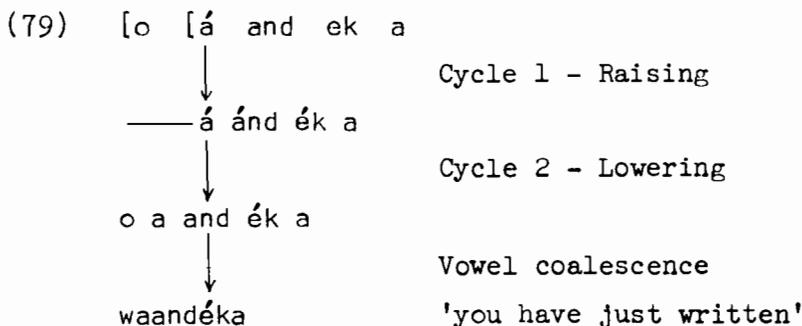
vowel doing the raising. This would be formalized approximately as:

$$(77) \quad L \rightarrow H / H \left\{ \begin{array}{l} \text{---} V_0^n C \langle L \rangle \\ \langle \text{-stem} \rangle C \text{---} \langle L \rangle \end{array} \right.$$

The second conjunct would always apply, while the first would only apply if there were vowels adjacent to the vowel triggering the raising. Similarly, Lowering could be expressed in such a way that it lowered not just the first vowel following the one triggering the lowering, but all adjacent vowels, so that in a string like $o + \acute{a} + \acute{a}n + ek + a$, Lowering would affect both \acute{a} and $\acute{a}n$ to give the string $o + a + an + \acute{e}k + a$. Then the rule coalescing $o+a+an$ would likewise have to make no tonal adjustments, for it would be applying to strings of vowels all of which would have the same tone. To do this, Lowering would be expressed as a disjunction of two rules, one of which would apply to all adjacent vowels up to the first consonant following the vowel doing the lowering and the other of which would apply to the vowel of the first CV syllable following the vowel doing the lowering. This possible formulation of Lowering is shown in (78):

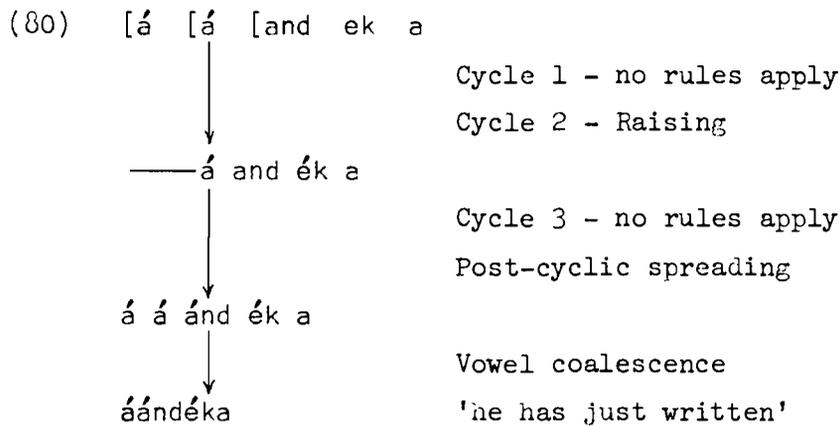
$$(78) \quad H \rightarrow L / L \left[\begin{array}{l} \text{---} V_0^n C \langle H \rangle \\ \langle \text{-stem} \rangle C \text{---} \langle H \rangle \end{array} \right]$$

This solution has the advantage that it permits Raising and Lowering to be expressed as assimilation, and it completely abstracts tonal considerations from the statement of vowel coalescence by guaranteeing that the input to vowel coalescence will always be strings of vowels all having the same tone. It is not a satisfactory solution, however, for it seems to create great redundancies in the cycle. Derivation (79) illustrates how the reformulated Raising and Lowering rules would apply:



That is, due to the cyclic applications of Raising and Lowering as formulated in (77) and (78), the stem and in (79) has had its tone altered twice, from L to H and back to L.

d. Attempt 2. An alternative proposal¹⁸ would be to formulate a post-cyclic rule which would spread the tone of a vowel to any following adjacent vowels prior to the application of vowel coalescence rules. Vowel coalescence would then apply and would need to make no changes in tone. This rule would, in a sense, prepare a string for the application of vowel coalescence. Derivation (80) illustrates how such a rule would work:



This putative rule of post-cyclic spreading, which we shall baptise Adjacent Assimilation, would be formulated roughly as:

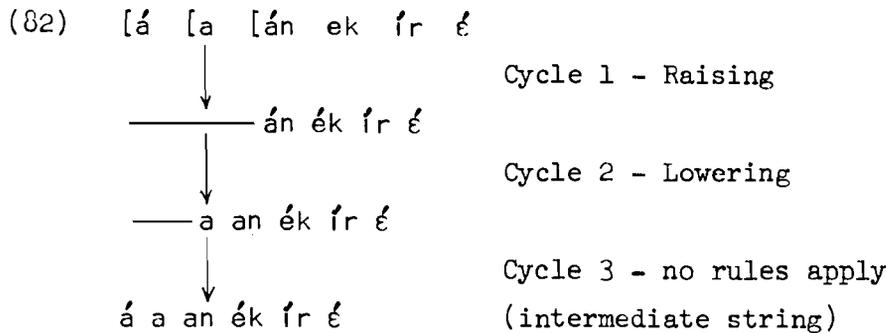
(81) Adjacent Assimilation:

$$V \rightarrow \alpha H \left[\begin{array}{c} V \\ \alpha H \end{array} \right] \text{---}$$

and it would apply iteratively.

If the only advantage of a rule of Adjacent Assimilation were that it rendered more elegant the formulation of vowel coalescence, it would have little justification. However, it has at least one other advantage. It would enable us to adopt the simpler of the alternative formulations of Dissimilation given in (76a) and (76b) above. Consider the partial derivation below of the form 'he spread':

¹⁸which was the gift of Herb Stahlke.



Raising on Cycle 3 has no effect in this form, for the syllable it would affect (i.e. *ék*) already has H tone. The final output for this string is *áánekiRé*, indicating that Dissimilation has applied to lower the extension *ék*. If Dissimilation is to apply to the intermediate string produced in (82), it will have to mention in its SD both the presence of a prefix and of a H tone pronoun. That is, we would have to accept the formulation given in (76b). This formulation would claim that the tone of the prefix itself is not relevant to the application of the Dissimilation rule. Consequently, Dissimilation would not be expressed as a genuine process of dissimilation. Yet we know that in every case where a prefix is preceded by a H tone pronoun, that prefix will end up with H tone either through Raising or through vowel coalescence. In other words, in surface forms, a syllable which undergoes Dissimilation is, in fact, preceded by a prefix with H tone and followed by a H tone. This generalization is missed in the formulation of Dissimilation given in (76b) and repeated here as (83):

$$(83) \quad H \rightarrow L / \left[\begin{array}{c} +\text{pro} \\ +\text{H} \end{array} \right] \left[+\text{pref} \right] V_0^n C \text{ ______ } H$$

Adopting the environment in (83) is tantamount to looking ahead in the derivation and saying that when a prefix is going to have H tone, Dissimilation occurs. The environment we wish to state is that given in (76a) and repeated here as (84):

$$(84) \quad H \rightarrow L / \left[\begin{array}{c} +\text{pref} \\ +\text{H} \end{array} \right] V_0^n C \text{ ______ } H$$

Derivation (82) showed this formulation is impossible if the prefix *a* does not have H tone at the point at which Dissimilation applies. Supposing, however, that the putative rule of Adjacent Assimilation applied to the intermediate string *á a an ék ír é* produced in (82) prior to the application of Dissimilation. It would turn the intermediate string just quoted into *á á án ék ír é*. That is, the prefix *a* would acquire H tone prior to the application of Dissimilation, but after the assimilation cycle. Then Dissimilation could be formulated as in (84) and the correct claim would be made. We have, then, at least two reasons for postulating a post-cyclic rule of Adjacent Assimilation. First, the vowel coalescence rule will not have to make tonal adjustments, and secondly, a misleading environment for Dissimilation is avoided. More important than these two mechanical considerations is the claim that in a correct analysis the tonal consequences of vowel adjacency are to be regarded as distinct from the segmental ones. This claim is made in the expectation that more evidence will be revealed in support of the hypothesis that tonal features and segmental features may be distinct and may operate in different ways.

In point of fact, once this separation of the tonal consequences from the segmental consequences of vowel coalescence is accepted, it becomes less relevant whether the segmental alterations of vowel coalescence are effected pre- or post-cyclically. If the segmental alterations were to be made pre-cyclically, some way would have to be found to preserve the morpheme boundaries holding between the adjacent vowels in strings like the one in (82) in order that the correct number of cycles be triggered. In fact, it does not seem impossible that the changes in vowel quality and syllabicity resulting from vowel coalescence in Kikuyu be effected pre-cyclically without destroying the morpheme boundaries which condition the cycles. This providing we are willing to accept the existence in Kikuyu of non-syllabic entities which are tone-bearing units and have the status of morphemes. But the tonal consequences of vowel coalescence clearly could not be effected pre-cyclically in strings like (82), since the

cycle works with the underlying tone of each morpheme. The post-cyclic rule of Adjacent Assimilation would have to remain in such an analysis, and any pre-cyclic rule of vowel coalescence would necessarily be unable to make tonal adjustments.

The Adjacent Assimilation rule does not eliminate the problem encountered earlier with regard to Dissimilation and Raising, that is, the fact that both must skip over adjacent tone-bearing units and thus cannot be treated as true spreading phenomena. This is not a trivial problem. In the environment we have adopted for Raising, that is, $H \quad V_0^n C \text{ ____ } \langle L \rangle$, the mention of the intervening vowels is $\langle \text{-stem} \rangle$ tantamount to a statement that the rule does not affect vowels which are going to undergo coalescence, i.e. tone-bearing units which are going to cease to be tone-bearing units. There should be some simple way of expressing this generalization--it is not, after all, an unusual constraint--without sacrificing the statement of Raising as a spreading phenomenon. Having come up with no feasible alternatives within the present theory, I am forced to accept the less than satisfactory formulations of Dissimilation and Raising given in (73) and (74) and repeated in (85):

(85a) Raising:

$$L \text{ ---} \rightarrow H / H \quad V_0^n C \text{ ____ } \langle L \rangle \\ \langle \text{-stem} \rangle$$

(85b) Dissimilation:

$$H \text{ ---} \rightarrow L / \left[\begin{array}{l} +\text{pref} \\ +H \end{array} \right] V_0^n C \text{ ____ } H$$

10. Conclusion

In this paper, the view has been presented that Kikuyu has a two-level terrace-tone system characterized by the fact that, in affirmative verb-noun constructions at least, an underlying syllable is tonally assimilated to a preceding syllable under certain conditions. It has been proposed that the rules governing this assimilation operate cyclically, morpheme by morpheme from right to left across the string.

A post-cyclic rule of Dissimilation, operating in a highly specific environment has been postulated. The interaction of these rules with processes governing adjacent vowels was examined and a second post-cyclic rule governing the tonal consequences of vowel adjacency was proposed. Finally, an inadequacy in the formulation of Dissimilation and Raising was pointed out in the hope that a more revealing statement of these processes, and of the difference between them and Lowering, may be arrived at. The question of why the tonal system of Kikuyu should be weighted in favour of the preservation of underlying H tones in the first place was left in the lap of the reader.

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