

TONE SPLITTING AND VOWEL QUALITY:
EVIDENCE FROM LUGBARA*

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In recent surveys of tonal phenomena it is suggested that vowel quality rarely affects tone. In the present paper it is argued that one such case can be found in Lugbara. Internal and comparative evidence is presented that the vowel feature Advanced Tongue Root (ATR) has had an initiating role in tone splitting in Western Lugbara. It is demonstrated that the pitch of a vowel with a high tone was raised if the vowel was [+ATR], and it is suggested that the resulting tonal allophony was later phonemicized due to vowel merger and reduction or loss of segments.

1. Introduction

It is well attested that features of consonants can be part of the condition for the application of tone rules in tone languages and that they can play a crucial role in tonogenesis (see Hombert [1978], Schuh [1978], and Maddieson [1978] for recent surveys of tonal phenomena). Features of vowels, on the other hand, seem rarely to have influenced the historical development of tone (see Hombert [1978:96], Schuh [1978:224], and Maddieson [1978:354] for comments on putative cases). While it is widely recognized that high vowels generally have higher F_0 than low vowels, this phonetic correlation appears not to have phonological consequences. In the present paper it will be argued that, in Lugbara, tone has been affected by another dimension of vowel quality.

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2. Tone Systems of Lugbara and Related Languages

Recent information on the Moru-Madi languages, which are spoken in the Zaire-Uganda-Sudan border area, indicates that they are discrete-level tone languages with three level tones (cf. Callinan [1981], Goyvaerts [1983], and Andersen [1984]).¹ However, in Lugbara, one of the languages of this group, there is dialectal variation as to the number of tones. The Terego dialect of Ugandan Lugbara has three tones like the other Moru-Madi languages, whereas at least some of the dialects of Lugbara spoken in Zaire have four. These two varieties will henceforth be referred to as Eastern and Western Lugbara, respectively.

The phonemic status of the four pitch levels in Western Lugbara is shown by minimal sets like the following:²

- | | | | |
|-----|-----------------|-----|--------------------------------------|
| (1) | L (=low) | f̀ | 'it exploded' |
| | M (=mid) | f̄ | 'he entered' |
| | H (=high) | f́ | 'intestines' |
| | E (=extra high) | f̈́ | 'they entered' |
| (2) | | t̀ | 'he waited' |
| | | t̄ | 'but' |
| | | t́ | 'to be thick' |
| | | ẗ́ | particle indicating Recent Past |
| (3) | | r̀ | 'all' |
| | | r̄ | 'it flowed' |
| | | ŕ | particle indicating Completed Action |
| | | r̈́ | 'they flowed' |

¹The Moru-Madi group includes the following languages: Moru, Avokaya, Logo, Kaliko, Lugbara, Madi, Lulubo. In Greenberg's [1966] classification, the group is a member of the Central Sudanic branch of the Chari-Nile family, which is a subfamily of the Nilo-Saharan phylum.

²In his description of (Western) Lugbara, Crazzolaro [1960:11] is somewhat self-contradictory or vague as to the number of tones. On the one hand he distinguishes three tones throughout his grammar and dictionary, but on the other hand he claims there to be five distinct tone levels, his mid-tone comprising

It should be noted, however, that there seems to be no minimal set in which tone distinguishes four words belonging to the same distributional class, such as four nouns or four verb stems.

Both H and E in Western Lugbara correspond to H in Eastern Lugbara and in the other languages, while M and L correspond to M and L, respectively. Cf. the examples of cognate series in Table 1 (next page) which only includes languages from which the present author has collected data himself.³ Conclusions regarding Avokaya and Logo rely on Callinan [1981] and Goyvaerts [1983]. The regular tone correspondences indicate that the 4-tone system in Western Lugbara has developed from a 3-tone system by splitting of H into H and E or that the 3-tone systems of the other languages have developed from 4-tone systems by merging of E with H. Before any conclusion can be reached on this matter, the distribution of the tones in Western Lugbara will be examined. As vowel quality turns out to be a crucial factor in the tonal distribution, the vowel system of Lugbara will be outlined first.

3. Vowel System of Lugbara

At the phonemic level Western Lugbara has a symmetrical 7-vowel system:

(4)	i	u
	ɪ	ʊ
	ɛ	ɔ
	a	

At the phonetic level, however, there are 9 vowel qualities. The phonemes /ɛ/ and /ɔ/ are phonetically [e] and [o], respectively, when they cooccur

three tone levels. In addition he says that "an ordinary high tone may sometimes be surpassed by a higher syllable". While the last statement probably reflects his perception of the extra high tone, his claim about three mid tone levels is not confirmed by the findings of the present author.

³The Moru data contained in the present article are from the Miza dialect, which is spoken in the northern part of the Moru area. Both Moru and Lulubo are spoken exclusively in the Sudan. 'S(outhern) Madi' refers to a variety of Madi spoken in Uganda, while 'N(orthern) Madi' refers to Burulo, the northernmost Madi dialect, which is spoken in the Sudan. The Proto-Moru-Madi forms are reconstructions by the present author.

Table 1. Tonal correspondences among Moru-Madi languages

		W.Lugbara	E.Lugbara	S.Madi	N.Madi	Lulobo	Moru Miza	Proto-Moru-Madi
L	'two'	èrì	ìrì	èrì	èrì	rì	rì	*èrì
	'to go out'	fò	fò	fò	fò	fò [†]	fò	*pò
	'to die'	drà	drà	drà	dà	dà	drà	*drà
M	'not'	kō	kō	kō	kō	kō	kō	*kō
	'stomach'	?ā	?ā	?ā	?ā	?ā	yā	*?ā
	'to spear'	dī	dī	dī	dī	dī	dī	*dī
H	'foot'	pá	pá	pá	pá	pá	pá	*pá
	'child'	mvá	mvá	ngwá	ngwá	ngwá	ngó	*ngwá
	'blood'	àrí	àrí	àrí	èrí	èrí	kàrí	*(k-)àrí
E	'field'	ámúú	ámú	ámú	ámú	ámú	ámú	*ámú
	'tooth'	sí	sí	sí	sí	sí	sí	*sí
	'spear'	àdzúú	àdzú	àdzú	àdzú	àdzú	àdzú	*àdzú

[†]'to appear'

with /i/ or /u/ within a word. Furthermore, /i/ and /u/ do not cooccur with /ɨ/ and /ɔ/. Thus, Western Lugbara has vowel harmony defined by the following sets of vowels:⁴

(5)	[+ATR]		[-ATR]	
	/i/	/u/	/ɨ/	/ɔ/
	[e]	[o]	/ɛ/	/ɔ/
	/a/		/a/	

The two sets are distinguished by the feature Advanced Tongue Root (ATR), which was suggested by Stewart [1967] to account for the type of vowel harmony found in the Akan language of Ghana and in many other African languages as well. In Western Lugbara /a/ is phonetically [-ATR] in both sets. In Eastern Lugbara, which has the same vowel system, /a/ is phonetically [+ATR], transcribed [ʌ], in the [+ATR] set.

4. Distribution of Tones

Although the four tones in Western Lugbara are phonemically distinct, there are certain restrictions on their distribution. As the restrictions are clearest in the case of verb stems, this subsystem of the language will be dealt with first. Inflected verb forms, which behave in a different way tonally, will be taken up in section 5.3.

4.1. Verb stems. The segmental structure of a verb stem is either CV, VCV, or VCVCV. For monosyllabic stems, only low and mid tones are possible. With disyllabic stems the following tone patterns occur:

(6) ṽCṽ	à è	'buy'	òp	'close'
ṽCṽ	ēr	'hear'	ād	'tie'
ṽCṽ	áv	'play'	édá	'show'
ṽCṽ	édú	'bring'	áts'	'walk'

Finally, there are two possible tone patterns for trisyllabic stems:

⁴Crazzolara [1960] is vague as to the number of vowel phonemes in Lugbara, and he did not realize the existence of vowel harmony in the language.

(7)	ṼCV̄CV̄	ókónà	'collect'
	ṼCV̄CV̄	éyíkì	'think'

ṼCV̄ and ṼCV̄CV̄ stems have the tonal variants ṼCV̄ and ṼCV̄CV̄.

Whereas the final vowel can be either [+ATR] or [-ATR], in ṼCV̄ and ṼCV̄ stems it can only be [-ATR] in ṼCV̄ stems and only [+ATR] in ṼCV̄ stems. Similarly the penultimate vowel of ṼCV̄CV̄ and ṼCV̄CV̄ stems can only be [-ATR] and [+ATR] respectively. Thus, H and E are in complementary distribution in verb stems, H occurring only on [-ATR] vowels and E only on [+ATR] vowels. Within this sub-system of the language, H and E might, accordingly, be considered variants of one tone, say H. The occurrence of E could then be accounted for by a phonological rule to the effect that the pitch of H is raised if supported by a [+ATR] vowel. Taking into account the language as a whole, however, the phenomenon is more adequately treated as neutralization between H and E. Note also that there is free variation between M and H before E, another case of neutralization.

4.2. Nouns. In nouns (and adjectives) the distribution of the four tones is less straightforward than in verb stems. Like for the latter, there are no restrictions on the occurrence of L and M in terms of vowel quality. But whereas H normally does not occur on [+ATR] vowels, E occurs on both [+ATR] and [-ATR] vowels.⁵ Thus there is a 4-way tonal contrast in [-ATR] words, but only a 3-way contrast in [+ATR] words (cf. (8) and (9) respectively):

(8)	L	bà	'breast'	àngò	'place'
	M	ṽā	'stomach'	òtṽ	'navel'
	H	ḅí	'hair'	àrí	'blood'
	E	zṽ	'house'	òtsṽ	'dog'
(9)	L	ḅù	'sky'	àbì	'wall'
	M	tī	'mouth'	òmvū	'nose'
	E	bí	'eye'	òḍú	'thigh'

⁵In some nouns H does occur on a [-ATR] vowel, e.g. kùmútī 'knee' and òkī 'wife'. But in such nouns the [+ATR] vowel comes from a [-ATR] vowel which has been assimilated to a following [+ATR] vowel. In the Zaki dialect of Western Lugbara the word for 'knee' is kòmó, to which other dialects have added the suffix -tī (which is also the word for 'mouth'). òkī 'wife' probably comes from *òkó-pī, which consists of òkó 'woman' and the kinship suffix -pī occurring as, for example, in ágú-pí < *ágú-pī 'husband'.

At least two historical layers of nouns can be identified. All nouns which can be proved to belong to the Moru-Madi proto-language are either monosyllabic or begin with a vowel (and are most often disyllabic). From this fact it may be inferred that consonant-initial di- or polysyllabic nouns, unless they are compounds, are likely to be loanwords borrowed after the proto-Moru-Madi period. Nouns belonging to the older layer (exemplified in (8-9) above) resemble verb stems by not having extra high tone on word-initial vowels, whether the word is [+ATR] or [-ATR]:

- (10) éní 'skin'
 éní' [éní'] 'night'

By contrast, nouns belonging to the newer layer may have extra high tone on any syllable:

- (11) s'éndē 'money'
 mòkíkà 'mat' (from Swahili *mkeka*)
 pàkí' 'parcel' (from French *paquet*)
 í'pùmbú' 'flower'
 kúmbúsú' 'gorilla' (cf. Lingala *mòkómbósó* 'chimpanzee')
 r'ópò 'dress' (from French *robe*)
 púndà 'donkey' (from Lingala *mpúndà*)

Another difference is that in the older layer very few simplex nouns have high tone on the [-ATR] vowels *ɪ*, *a*, and *ɔ*, whereas these combinations are frequent in the newer layer. Finally, in the older layer the frequency of extra high tone on final *ɛ* and *ɔ* in simplex nouns is considerably lower than the frequency of high tone in the same environment.

4.3. Other word classes. In words belonging to other classes, i.e. adverbs, ideophones, particles, and interjections, there are no restrictions on the distribution of tones in terms of position within the word or in terms of vowel quality, apart from a general absence of high tone on [+ATR] vowels. For instance, extra high tone often occurs on [-ATR] vowels (cf. the ideophones in (12)):

- (12) kó'kó'kó' 'forcefully'
tró'kōtró'á 'being on the point of falling'

Thus, words belonging to these classes behave tonally like the newer level of nouns, and in fact few of them can be proved to be part of proto-Moru-Madi.

5. Tone Split and Vowel Merger

5.1. Tone split. The non-occurrence of H on [+ATR] vowels (except in inflected verb forms to be treated below) could be explained as the result of a merger of H with E on such vowels. This hypothesis would imply that all the other Moru-Madi languages have uniformly merged E and H in all environments. A priori, it seems unlikely that the other Moru-Madi languages have developed tonally in the same way, as they constitute the periphery of the Moru-Madi area and have developed divergently with respect to vowels and consonants. More importantly, however, the hypothesis fails to explain (a) why no verb stems have E on [-ATR] vowels, (b) why there are (almost) no old simplex nouns with E on ɪ, ɔ, and a, and (c) why there are relatively few old simplex nouns with E on ε and ɔ.

A priori, a more likely explanation for the distribution of H and E would be that Western Lugbara originally had three tones like the other Moru-Madi languages and that E arose as a result of pitch raising of H on [+ATR] vowels. In order for this hypothesis to work, a further assumption is needed, viz. that at an earlier stage Lugbara had a 9-vowel system including *e and *o in addition to the present 7 vowel phonemes and that later *e and *o merged with ε and ɔ. A result of this merger would be that the allophonic variation between H and E had been phonemicized, and loanwords borrowed after that point would not need to conform to the prior distribution of E.

5.2. Vowel merger. The vowel merger hypothesized to explain the occurrence of extra high tone on [-ATR] vowels in Western Lugbara is confirmed by comparative evidence from other languages of the Moru-Madi group.

Like Lugbara, all the other languages of the Moru-Madi group have vowel systems with vowel harmony based on the ATR feature. What is commonly considered the prototype of such vowel systems is found in Moru, which has a completely

symmetric 10-vowel system as shown in Table 2, although the phonemic status of *e*, *ʌ*, and *o* is somewhat marginal. Madi and Lulubo have a 9-vowel system, lacking the phoneme *ʌ*. Avokaya and Logo have 7 vowel phonemes like Lugbara (cf. Callinan [1981] and Goyvaerts [1983] respectively).⁶ But whereas Lugbara has a "full" [-ATR] set with five vowels in addition to two [+ATR] vowels, Avokaya and Logo have only four [-ATR] vowels and on the other hand three [+ATR] vowels.⁷

Table 2. Vowel systems of Moru-Madi languages

	[+ATR]	[-ATR]
Moru Miza	i e ʌ o u	ɪ ɛ a ɔ ɔ
Avokaya	i ʌ u	ɪ ɛ a ɔ
Logo	i ʌ u	ɪ ɛ a ɔ
Lugbara	i u	ɪ ɛ a ɔ ɔ
Madi	i e o u	ɪ ɛ a ɔ ɔ
Lulubo	i e o u	ɪ ɛ a ɔ ɔ

Both *ɛ* and *e* in Madi and Lulubo regularly correspond to *ɛ* in Lugbara in root final position (cf. the examples of cognate sets shown in Table 3). As nothing indicates that *ɛ* has split into *ɛ* and *e* in Madi and Lulubo, it can be concluded that the proto-language had an opposition between **ɛ* and **e*, which merged in Lugbara. In Moru the same merger took place, but only under certain conditions not yet fully understood.

Similarly, both *ɔ* and *o* in Madi and Lulubo normally correspond to *ɔ* in Lugbara in root final position (cf. the examples in Table 3). It should be noted, however, that there is not always agreement among Southern Madi, Northern Madi, and Lulubo as to the choice between *ɔ* and *o*. But even the occurrence of *o*

⁶Although Goyvaerts [1983] does not analyze the Logo vowel system in terms of vowel harmony, the data he presents are compatible with an analysis using vowel harmony.

⁷In Avokaya and Logo **o* has merged with *ɔ*, cf. Logo *fò*, Eastern Lugbara *fò* 'to go out', and Avokaya *aɔ*, Eastern Lugbara *à|ò* 'one'.

Table 4. Regular and irregular reflexes in Western Lugbara of high tone in proto-Moru-Madi

		W.Lugbara	E.Lugbara	S.Madi	N.Madi	Lulubo	Moru Miza	proto-Moru-Madi
i	'house'	dzó	dzó	dzó	zó	dzó	zó	*dzó
ii	'urine'	ódré	ódré	údré	údwé	íqvé	kúdré	*(k-)ódrwé
iii	'grass'	ásé	áyísé	áyísé	áyísé	áyí	káyí	*(k-)áyí(-sé)
iv	'dog'	òtsé	òtsó-ó	òtsé	òké	òké	kòcé	*(k-)òké
v	'yesterday'	ádžé	ádžé	ádžíní	ágíní	ágíní	-	*ágéní
vi	'granary'	èró	èrá	èró	èró	èró	cìró	*(k-)èró
vii	'hare'	ètó-ó	ètó-ó	ìtó	ìtó	ìtó	cìtó-ḡwà	*(k-)ìtó
viii	'witch-doctor'	ódžó-ó	ódžó-ó	ódžó	ózó	ózó	kózó	*(k-)ódžó
ix	'bird'	àrí-á	ìrí-á	àrí-ángwá	àrí-ángwá	àrí	àrí	*àrí
x	'rope'	bá(-ká)	̀bá(-ká)	ìbá	ìbá	ìbá	ìbá	*ìbá
xi	'basket'	èvó	òvó	èvó	èvó	èbó	-	*èbó

in only one of these languages is evidence that the word had *o in the proto-language and, accordingly, that *o has merged with ɔ in Lugbara.

The frequency of *e and *o seems to have been much lower than the frequency of *ɛ and *ɔ in the proto-language. This explains why extra high tone is less frequent than high tone on ɛ and ɔ in final position in old simplex nouns in Western Lugbara.

5.3. Reduction or loss of segments. The sound change *e, *o > ɛ, ɔ in Lugbara immediately accounts for some cases of extra high tone on ɛ and ɔ in Western Lugbara (cf. examples (i-iii) in Table 4). However, it appears that the vowel change is neither a sufficient nor a necessary condition for the presence of extra high tone on [-ATR] vowels in old nouns. Firstly, there are some words with ɛ̃ and ɔ̃ for which there is no independent evidence of a change from [+ATR] to [-ATR], (cf. (iv-vi) in Table 4). Secondly, some words have é and ó, although cognates in the other languages have the corresponding [+ATR] vowels (cf. (vii-viii) in Table 4). Thirdly, some words have extra high tone on the other [-ATR] vowels ɪ, a, and ɔ (cf. (ix-xi) in Table 4).

Although the specific mechanisms are not yet understood, it seems likely that these irregularities in the tonal correspondences have resulted from influence from the tone of reduced, assimilated, or elided suffixes. Note for instance that ètɔ́-ɔ́ 'hare' in (vii) has a suffix which in Moru exists with a less reduced form -ŋwá (< *ŋgwá 'child').

That loss of tone bearing segments has had an effect on the distribution of the tones in Western Lugbara is shown clearly by the development of verbal inflexion. From a synchronic point of view, one class of non-finite verb forms is characterized by addition of H to the tone of the final stem vowel, whatever the quality of that vowel. Similarly, E is added as a plural marker, if the subject is third person plural. If the tone of the final stem vowel is M, the resulting compound tones MH and ME are simplified to H and E respectively. The contrast between H and E is shown by forms like the following:

(13) Stem	Non-finite	3rd plural	
nè	ně	ně''	'see'
zì	zí	zí''	'open'
sā	sá	sá''	'bury'
đu	đú	đu''	'take'

In Eastern Lugbara a third person plural subject is indicated by a suffix $-kí'$ added to the verb stem. It seems reasonable to assume that this suffix is what has developed into the non-segmental extra high tone plural suffix in Western Lugbara. The non-finite form with a non-segmental high tone suffix is used in a number of syntactic constructions, but in one of them, viz. relative clauses in which the relativized element is the object, the tonal suffix alternates freely with $-|é$. This $-|é$ is probably the origin of the tonal suffix, an assumption which is further evidenced by the fact that in Southern Madi $-|é$ is used in all the syntactic constructions where Western Lugbara has the tonal suffix. Why $-kí'$ has developed into an extra high tone while $-|é$ has kept its high tone is still a mystery, however.

6. Conclusion

It has been shown above that in Western Lugbara the vowel quality feature [+ATR] has had the effect of raising the pitch of high tones in stem-final position. Furthermore, evidence has been presented that the tonal allophony resulting from this pitch raising was later phonemicized by a merger of non-high [+ATR] vowels with the corresponding [-ATR] vowels and by elision or reduction of segments. It is still an open question, however, what could be a phonetic explanation for the pitch raising.

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