

AN OUTLINE OF LULUBO PHONOLOGY*

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This article outlines the phonology of Lulubo, a little known Central Sudanic language spoken in the southern Sudan. An account is given of the phonemic inventory (vowels, consonants, and tones), vowel harmony, syllable structure, special features of ideophones, and vowel elision.

1. Introduction

The Lulubo language is spoken by the Lulubo people inhabiting the area around the Lulubo Hills in the Eastern Equatoria Province of the Sudan. The Lulubo call themselves /óíúóó/ and their language /óíúóó-tí/, lit. 'Lulubomouth'. According to the latest census (from 1983) they number approximately eight thousand. The only data from the Lulubo language previously published are included in Tucker [1940] in the form of a word list (comprising about 500 items) and a few scattered grammatical observations.

Tucker [1940] and Tucker and Bryan [1956] classified Lulubo as a member of the Madi dialect cluster, Lulubo being its northernmost dialect. Certainly Lulubo belongs to the Moru-Madi group, which is a genetic unit within the Central Sudanic language family suggested by Greenberg [1966]. However, the Lulubo do not conceive of themselves as being Madi, and their main social contacts are with Eastern Nilotic speaking peoples (the Bari and the Lokoya) rath-

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er than with the Madi.

The present article deals with the phonology of Lulubo. An account is given of the phonemic inventory (vowels, consonants, and tones), the syllable structure, special features of ideophones, constraints applying across syllable boundaries (vowel harmony), and processes operating across morpheme boundaries (vowel elision and tone deletion or retention).¹ The account is based on the variety spoken in Lokiliri, a village in the central part of the Lulubo area.

2. Vowels and Vowel Harmony

Lulubo has nine vowel phonemes belonging to two vowel harmony sets which are distinguished by the feature Advanced Tongue Root (ATR):²

- | | | | | | | |
|-----|------|---|---|---|---|---|
| (1) | -ATR | ɪ | ɛ | a | ɔ | o |
| | +ATR | i | e | | o | u |

The phonemic status of the nine vowels is shown by the subminimal sets of monosyllabic words in (2-4). The sets are minimal if tone is disregarded.

- | | | | | | | |
|-----|-----|-----|------------------------------|-------------|------|---|
| (2) | /i/ | t̩i | 'to give birth' ³ | /u/ | t̩u | 'to climb up' |
| | /ɪ/ | t̩i | 'to pick' | /o/ | t̩o | 'to bend or straighten' |
| | /e/ | t̩e | 'to wait for' | /o/ | t̩o | 'carefully' |
| | /ɛ/ | t̩ɛ | 'to swallow' | /ɔ/ | t̩ɔ | 'to dance' |
| | | /a/ | t̩a | 'tiredness' | | |
| (3) | /i/ | wɪ | 'to skin' | /u/ | wu | 'to remove' |
| | /ɪ/ | wɪ | 'to spit' | /o/ | (ɔwɔ | 'to cry') |
| | /e/ | wɛ | 'to do' | /o/ | wɔ | 'to bend' |
| | /ɛ/ | wɛ | 'to rub' | /ɔ/ | wɔ | (adverb indicating resulting situation) |
| | | /a/ | wɑ | 'to throw' | | |

¹For a similar account of Madi, see Andersen [1986c].

²For a comparison of the vowel systems in the Moru-Madi languages, see Andersen [1986b].

³Verb forms translated 'to (do something)' are stem forms. A monosyllabic stem is identical with the 2nd person singular subjunctive (= imperative) form. A polysyllabic stem is identical with the 3rd person perfective form.

- | | | | | | | |
|-----|-----|-----|----------------------|-----|------|--------------|
| (4) | /i/ | kṽ | 'to go' | /u/ | kū | 'to weed' |
| | /ɪ/ | kṽ | 'to affect' | /o/ | kō | 'not' |
| | /e/ | ké | 'non-existent' (PTC) | /o/ | (ōkō | 'to finish') |
| | /ɛ/ | kē | 'to tear' | /ɔ/ | kō | 'to catch' |
| | | /a/ | kā | | | 'to ripen' |

In monomorphemic words with more than one syllable, all vowels which are not /a/ belong to the same harmonic set:

- | | | | |
|--------|------------|----|------------|
| (5) a. | -ATR words | b. | +ATR words |
| | èbó | | èbì |
| | 'basket' | | 'lion' |
| | ēmbē | | éié |
| | 'neck' | | 'egg' |
| | fòlì | | ó'jú |
| | 'buttock' | | 'horn' |
| | ídé | | kóíóíí |
| | 'rat' | | 'adze' |
| | ómbí | | úgó |
| | 'locust' | | 'liver' |

The vowel /a/ , which phonetically is -ATR, can cooccur with any vowel. It occurs both before and after each of the other -ATR vowels, as in (6) and (7), and also in initial syllables before each of the +ATR vowels, as in (8).

- | | | |
|-----|--------|-------------------|
| (6) | àsṽ | 'fire' |
| | àṅwē | 'white' |
| | àgó | 'pumpkin' |
| | àlō | 'one' |
| (7) | ìbā | 'rope' |
| | édzá | 'pot' |
| | ò?ā | 'fruit' |
| | ōkwā | 'wealth' |
| (8) | àíí | 'short' |
| | àgwē | 'to be beautiful' |
| | rābōlō | 'banana' |
| | ámúrú | 'mosquito' |

While /a/ has a high lexical frequency in these positions, it never occurs between +ATR vowels and rarely after +ATR vowels, all the attested instances

probably being loanwords. See the examples in (9).

- (9) ìmòkwà 'to iron' (from Arabic)
 gómá (kind of hoe)
 tʃópà 'house pole'
 àgúrá 'horn' (musical instrument)

Derivational and inflectional prefixes agree with the root in terms of the ATR feature, i.e. the root controls the ATR value of the prefix. Cf. the pairs of verb forms in (11-14), whose prefixes have the respective meanings indicated in (10).

- (10) a. i- ~ ɪ- causative
 b. e- ~ ε- direction towards the deictic center
 c. o- ~ ɔ- 3rd person subject, perfective aspect
 d. u- ~ ʊ- multiple performance

- (11) ì-nì 'to teach' (cf. 10a)
 ī-ŋḍō 'to suckle'

- (12) ē-kī 'to come' (cf. 10b)
 ē-ŋgwī 'to come back'

- (13) ō-mbū 'he drank' (cf. 10c)
 ō-bō 'he threw'

- (14) ū-mbū 'to drink' (cf. 10d)
 ō-bō 'to throw'

When the root vowel is /a/, the prefix vowels are -ATR:

- (11') ì-ḍà 'to kill'
 (12') ē-sā 'to arrive'
 (13') ō-ḥā 'he ate'
 (14') ō-ḥā 'to eat'

These facts show that /a/ belongs to the set of -ATR vowels.

For suffixes there is no general rule of harmonization. Some suffixes are

inherently either +ATR or -ATR, and they are not harmonized by the root, which is not harmonized by them either. This class includes for instance the +ATR suffix /-gó/ , which is a masculine singulative morpheme, and the -ATR suffix /-kì/ , which is a 2nd person singular possessive morpheme in kinship terms. Examples (15-16) show that they can combine with both +ATR and -ATR roots.

- | | | | | | |
|------|-----------|--------------------|-----|---------|-----------------|
| (15) | ólúḃḃó-gó | 'Lulubo man' | cf. | ólúḃḃó | 'Lulubo people' |
| | ḡnóḃḃó-gó | 'boy' | cf. | ḡnóḃḃó | 'children' |
| (16) | àḃl-kì | 'your grandfather' | cf. | áḃl | 'grandfather' |
| | àmbò-kì | 'your sister' | cf. | āmbō-ḡá | 'sister' |

In some exceptional cases, however, /-gó/ harmonizes the root:

- | | | | | | |
|------|--------|---------|-----|-----|-----------|
| (17) | éró-gó | 'enemy' | cf. | èrō | 'enemies' |
|------|--------|---------|-----|-----|-----------|

Other suffixes are harmonized by the root, for instance the locative suffix /-lè/ ~ /-lè/ , which is added to verbal nouns in non-finite relative clauses (RC) with a relativized locative adverbial:⁴

⁴In literal translations the following abbreviations are used:

1/2/3	= first/second/third person	MASC	= masculine
1PEX	= first person plural exclusive	MULT	= multiplicative
1PIN	= first person plural inclusive	N	= noun
2P	= second person plural	NF	= non-finite
1S/2S/3S	= first/second/third person singular	OBJ	= object marker
ADV	= adverb	P	= plural
C	= completion	PF	= perfective
CAUS	= causative	POSTP	= postposition
CONJ	= conjunction	PTC	= particle
COP	= copula	REFL	= reflexive
CP	= centripetal, i.e. movement towards the deictic center	S	= singular
FOC	= focus	SG	= singulative
GEN	= genitive	SUBJ	= subjunctive (including imperative)
IMPF	= imperfective	TR	= transitive
LINK	= linker	UNSP	= unspecified subject
LOC	= locative	VA	= verbal adverb
		VN	= verbal noun

An oblique stroke (/) indicates that the following morpheme(s) is/are manifested solely or partly by the tone pattern of the word.

- (18) a. wí kó-ŋgwĩ ðfó [RC àwĩ rí ē-ŋgá-lè] rá wō
 monster 3-return/IMPF place RC 3S GEN CP-get-up/VN-LOC to PTC
 'the monster returns to the place it has come from'
- b. kō-zwé táká [RC kèñf rí ò-tū-lè rĩ] ìnì nĩ
 3-push/IMPF platform RC Kenyi GEN NF-climb/VN-LOC PTC this OBJ
 'it pushes the platform upon which Kenyi has climbed'

Phonetically, there is a tenth vowel quality, viz. an unrounded, mid, back, +ATR vowel [ɻ]. This vowel only occurs after the +ATR vowel /u/, as in

- (19) [úgɻ] 'liver'
 [túɻwɻ] 'ostrich'

When /u/ and [ɻ] are heteromorphemic, [ɻ] varies freely with the rounded, mid, back, +ATR vowel [o]:

- (20) [ògú-gɻ] ~ [ògú-gó] 'male thief' (thief/S-MASC+SG)
 [ū-ŋgɻ] ~ [ū-ŋgó] 'singing' (MULT-sing/VN)

The morphemes containing [ɻ] ~ [o] invariably have [o] when they are preceded by a vowel other than /u/:

- (21) [màdɻ-gó] 'Madi man' (Madi-MASC+SG)
 [ō-ŋgó] 'singing' (NF-sing/VN)

Thus we can infer that [ɻ] is an allophone of the phoneme /o/.

3. Consonants

Lulubo has 34 consonant phonemes, whose phonetic properties are indicated in Table 1. The stops, the affricates and the nasals form a major subsystem with six contrasting points of articulation. The interdental and the alveolars together form one series, and so do the palato-alveolars and the palatals. There are no retroflexes and labio-velars among the preglottalized stops and the nasals, nor is there a preglottalized velar stop.

Examples of words with each of the consonants are given sectionwise in (22-29) below. In the first column of each section an example is given in which each consonant is followed by the vowel /a/. Gaps indicate the lack of such words in the present author's corpus. The second column shows other,

Table 1. Consonants

		point of articulation									
		bilabial	labiodental	interdental	alveolar	retroflex	palato-alveolar	palatal	velar	labiovelar	glottal
manner of articulation											
stop	unvoiced	p		t		t			k	kp	ʔ
	voiced	b		ɟ		d			g	gb	
	prenasalized	mb		ɲd		nd			ŋg	ŋmgb	
	preglottalized	ɓ				ɗ			ʄ		
affricate	unvoiced							tʃ			
	voiced							dʒ			
	prenasalized							ndʒ			
fricative	unvoiced		f		s						
	voiced		v		z						
nasal		m			n			ɲ	ŋ		
lateral					l						
trill					r						
glide								y	w		

preferably (sub)minimal, sets, in which the consonants occur before another vowel.

(22) Unvoiced stops and affricates

/p/	pā	'to shape (wood with an adze)'	pè	'to defeat'
/t̪/	t̪ā	'tiredness'	t̪ē	'to swallow'
/t̪/	t̪ā	'to put down abruptly'	dèmèt̪èt̪èt̪	'swallow' (bird)
/tʃ/	tʃà	'to plait (a door)'	tʃérèpé	'calabash'

- | | | | | |
|------|----|------------|-----|-----------|
| /k/ | kā | 'to ripen' | kē | 'to tear' |
| /kp/ | - | | kpé | 'in vain' |
- (23) Voiced stops and affricates
- | | | | | |
|------|------|--------------------------|---------|------------------------------------|
| /b/ | ìbā | 'rope' | bómú | 'maize' |
| /d̥/ | d̥à | 'to cut (finger-millet)' | ḃóḃó | 'half (of something like a fruit)' |
| /d/ | dà | 'to die' | ḃḃḃḃ | 'frog' |
| /dʒ/ | édzà | 'pot' | dʒó | 'house' |
| /g/ | gā | 'to cut' | ágó | 'male' |
| /gb/ | ìgbà | 'to barter' | gbóróró | 'throat' |
- (24) Prenasalized stops and affricates
- | | | | | |
|--------|-------|--------------|-------|----------------------------|
| /mb/ | mbā | 'to grow up' | mbū | 'to drink' |
| /nd̥/ | ìnd̥á | 'good' | - | |
| /nd̥/ | ānd̥ā | 'face' | nd̥ù | 'to look for' |
| /ndʒ/ | ndʒà | 'protruding' | ndʒū | 'to suck' |
| /ng̥/ | ng̥ā | 'to get up' | ng̥ù | 'to smell' |
| /ngmb/ | ngmbā | 'to beat' | ngmbú | 'nothing being left' (ADV) |
- (25) Glottal and preglottalized stops
- | | | | | |
|-------|------|--------------|-----|------------|
| /ʔ̥/ | ʔ̥ā | 'home' (N) | ʔ̥ì | 'to taste' |
| /d̥/ | àd̥ā | 'to lower' | d̥ɪ | 'to spear' |
| /ʔ̥j/ | ʔ̥jà | 'to quarrel' | - | |
| /ʔ̥/ | ʔ̥ā | 'stomach' | ʔ̥ɪ | 'to grind' |
- (26) Nasals
- | | | | | |
|-----|----|------------|-------|-----------------------|
| /m/ | mā | 'I' | èmē | 'to be warm' |
| /n/ | nā | 'three' | nē | 'to cook' |
| /ɲ/ | ɲā | 'to eat' | èɲē | 'to turn upside down' |
| /ŋ/ | ŋā | 'to speak' | tʃíŋé | 'sand' |
- (27) Fricatives
- | | | | | |
|-----|----|-------------|-----|--------------|
| /f/ | - | | fò | 'to appear' |
| /s/ | sā | 'to arrive' | òsò | 'to destroy' |
| /v/ | - | | vò | 'to blow' |

/z/ ìzā 'meat' òzō 'to straighten'

(28) Lateral and trill

/l/ lā 'to lay down' lṭ 'to cut'

/r/ rā 'to' (POSTP) rì 'two'

(29) Glides

/y/ yà 'but' (CONJ) āyṭ 'rainy season'

/w/ wā 'to throw' wṭ 'to skin'

The only consonants that have a systematically defective distribution are the labiodental fricatives [f] and [v]. They only occur before rounded vowels. However, since [f] and [v] are not in complementary distribution with any other consonants, they have to be ascribed phonemic status. The phonetically most likely candidates for complementary distribution with the labiodental fricatives would be the bilabial stops [p] and [b]. But they also occur before rounded vowels, although lexically infrequently:

(30) pótò 'tendon'

pùtá 'whip'

(31) bòngó 'clothes'

bòngò 'tamarind'

For [b] and [v] there even is a minimal pair:⁵

(32) bō 'to throw'

vō 'to blow'

⁵Historically, the labiodental fricatives must have developed from labial stops before rounded vowels. This sound change seems to have affected all the Moru-Madi languages, but in Lulubo it has not been carried through for all instances of original *b and not at all for original *mb. Cf. the following examples from some of the languages, the dialect in question being indicated in parentheses:

Moru (Miza)	Lugbara (Terego)	Madi (Burulo)	Lulubo (Lokiliri)	Proto-Moru-Madi
-	òvó	èvó	èbó	*èbó 'basket'
vò	vò	vò	bō	*bò 'place, land'

The only consonantal phonemes with allophonic variation are the velars /g ng ŋ/. These consonants have palatal coarticulation after the mid front vowels /e e/ :

- (33) /gē/ [gʲē] 'to buy'
 /ngē/ [ngʲē] 'to pull out'
 /tʃ[ŋé]/ [tʃ[ŋʲé]] 'sand'

Palatalization does not occur before the high front vowels /i i/, and it does not affect the unvoiced velar /k/.

4. Tones

Lulubo has three tones: low (L), mid (M), and high (H). The phonemic status of the tones is shown by the following minimal triplets:

- (34) L t̄l 'to give birth' ?à 'existent' (PTC)
 M t̄l̄ 'mouth' ?ā 'stomach'
 H t̄l̄́ 'cow' ?á 'we' (1PIN)

Any two tones may be combined within a syllable. Thus there are six compound tones:

- (35) LM t̄mbè̄ 'it is Tombe' (Tombe/FOC)
 LH b̄á ' (at) home' (home/LOC)
 ML ngè kwè̄ 'look at the tree!' (see/SUBJ+2S tree/SUBJ)
 MH ?ā́ 'in the stomach' (stomach/LOC)
 HL t̄-dà 'we killed' (CAUS/1PIN-die/PF)
 HM f̄zì́ 'his wife' (female/3S)

Moru (Miza)	Lugbara (Terego)	Madi (Burulo)	Lulubo (Lokiliri)	Proto-Moru-Madi	
v̄o	v̄o	-	b̄o	*b̄o	'to throw'
ámvú	ámvú	ámvú	ámbug	*ámbug	'field'
kámv̄o	ámv̄o	ámv̄o	ámbug	*(k)ámbug	'nose'
cémv̄o	ámv̄o	émv̄o	émbug	*(k)émbug	'orphan'

Except for \widehat{HL} , compound tones are restricted to occurring in morphemically complex words, in which their two components belong to or manifest two different morphemes, as in (35). \widehat{HL} is fairly common in monomorphemic words, but only on final syllables. Such words appear all to be recent borrowings, for instance the following:⁶

- | | | | |
|------|----------|-------------|---|
| (36) | dókê | 'gift' | (cf. Bari dók-et 'gift') |
| | ɲwàkê | 'tongs' | (cf. Bari ɲwak-et 'pincers') |
| | dìŋî | 'time' | (cf. Bari dɪŋɪt 'time') |
| | dî | 'chisel' | (cf. Bari dɪ 'chisel') |
| | gùrû | 'money' | (cf. Sudanese Arabic giriʃ, pl. guruuʃ 'money') |
| | sâ | 'watch' | (cf. Sudanese Arabic saaʃa 'hour, watch') |
| | kòmìt̥t̥ | 'committee' | (from English) |

Exceptions are

- | | | |
|------|--------|-----------|
| (37) | dêdê | 'all' |
| | t̥t̥t̥ | 'quickly' |

which are monomorphemic but have \widehat{HL} on non-final syllables. However, these words are also aberrant in having \widehat{LH} on their final syllables, and since they are furthermore characterized by segmental reduplication, they should probably be considered ideophones (cf. section 6).

Tone distinguishes many lexical items, especially mono- and disyllabic ones. In the following examples, the words of each pair belong to the same word class (noun, verb, or adjective):

- | | | | | | |
|------|----|------------|------|-----|-------------|
| (38) | rū | 'body' | (39) | gà | 'to refuse' |
| | rú | 'name' | | gā | 'to cut' |
| (40) | ɓì | 'to taste' | (41) | àlɪ | 'short' |
| | ɓɪ | 'to twirl' | | áɪ | 'deep' |

⁶The Bari and Sudanese Arabic data have been taken from Spagnolo [1960] and Persson and Persson [1980], respectively. Although Bari is a tone language, Spagnolo does not indicate tones.

- | | | | |
|------|----------------|------|--------------------|
| (42) | èrí 'blood' | (43) | èrì 'to come down' |
| | ērí 'mahogany' | | èr̄ 'to hear' |

Tone also has a high functional load in inflection and derivation. Examples given below will illustrate the use of tone for expressing contrasts within various grammatical categories.

Most nouns are not inflected for number, but nouns denoting human beings are, and one class of them distinguishes between singular and plural by means of tone. The examples in (44) illustrate two morphophonemic tone rules.

Nouns with the tone pattern HH in the singular have LM in the plural, and those with LH in the singular have HH in the plural.

(44)	Singular	Plural	
a.	HH	LM	
	áǵó	àǵō	'husband'
	ózá	òzá	'witch-doctor'
	òṅḍó	òṅḍō	'sterile person'
b.	LH	HH	
	èmbó	émbó	'orphan'
	òǵú	óǵú	'thief'
	òrí	órí	'coward'

Verbs are inflected for mood, aspect, and person and number of the subject. Together, these categories are expressed by prefixes and by particular tone patterns. The actual tone patterns depend on phonological and grammatical properties of the stem, including its number of syllables, its inherent tone pattern, its transitivity, and its morphological composition. Two examples are given in Table 2, which shows the inflection of the stems /ṛnā/ 'to eat' and /ṛmbē/ 'to tie'. The first paradigm is representative of transitive stems that are monosyllabic and have an inherently mid tone. The second paradigm is representative of disyllabic stems with the inherent tone pattern MM. Notice for instance that, in the perfective aspect, forms which express first or second person singular have the tone pattern HM, while forms which express first person plural exclusive or second person plural have LM. Another

Table 2. Two paradigms of verbal inflection

	/ṅā/ 'to eat'		/ṁbē/ 'to tie'			
	sub-junctive	indicative		sub-junctive	indicative	
		perfective	imperfective		perfective	imperfective
1S	á-ṅā	mō-ṅá	m-ṁbē	m-ṁbē	m-ṁbē	
1PEX	à-ṅā	mò-ṅá	m-ṁbē	m-ṁbē	m-ṁbē	
2S	ṅā	í-ṅā	ṁbē	n-ṁbē	n-ṁbē	
2P	ì-ṅā	nò-ṅá	ṁbē	n-ṁbē	n-ṁbē	
3	kò-ṅā	ṁ-ṅā	k-ṁbē	ṁbē	k-ṁbē	
1PIN	ṁ-ṅā	ṁ-ṅá	ṁbē	ṁbē	ṁbē	
UNSP	ṁ-ṅā	ṁ-ṅá	ṁbē	ṁbē	ṁbē	

er generalization is that the final stem vowel keeps its inherent tone in the perfective aspect but replaces it with a high tone in the imperfective aspect.

As an example from derivational morphology, consider the formation of in-gressive verb stems from adjectives with an initial /V/ syllable. No affixes are used, but the tones of the adjectives are replaced by low tones in the verbs:

(45)	Adjective		Verb	
	àzṁ	'long'	àzò	'to become long'
	ìṅḡá	'good'	ìṅḡà	'to become good'
	ṁsú	'good'	òsú	'to become good'
	áíí	'deep'	àíì	'to become deep'
	àkēíí	'red'	àkèìì	'to become red'
	áfóró	'yellow'	àfòró	'to become yellow'

Combining the lexical and the morphological functions of tone, the number of disyllabic words distinguished tonally is often quite large, as in the following example:

- (46) ò-gù 'he laughed at' (3-laugh=at/PF)
 ògū 'back' (N)
 ògú 'thief' (N/S)
 ̄o-gū 'he carried' (3-carry/PF)
 ̄o-gú 'is being laughed at' (UNSP-laugh=at/IMPF)
 ó-gù 'was laughed at' (UNSP-laugh=at/PF)
 ó-gū 'was carried' (UNSP-carry/PF)
 ógú 'thieves' (N/P)
 ô-gù 'we laughed at' (1PIN-laugh=at/PF)
 ô-gū 'we carried' (1PIN-carry/PF)
 ô-gú 'we are laughing at' (1PIN-laugh=at/IMPF)

In addition to its lexical and morphological functions, tone also has syntactic functions in Lulubo. Thus, certain sentence types end in a floating tone (T̄), which is manifested on the sentence-final syllable as an addition to the inherent tone of that syllable. The result is a compound tone, unless the floating tone is identical with the inherent tone. All three tones, ȷ, ȸ, and Ȩ, have syntactic functions in this sense.

ȷ occurs after an unfocused object if the sentence has the subjunctive mood. Cf. the examples in (47), where the subjunctive verb form is identical to the perfective indicative verb form for first person subjects.

- (47) L+ȷ → L á-nqè èbì 'let me see the lion!'
 M+ȷ → M̄L á-nqè àr̄ 'let me see the bird!'
 H+ȷ → H̄L á-nqè t̄í 'let me see the cow!'
 (á-nqè '1S-see', èbì 'lion', àr̄ 'bird', t̄í 'cow')

Ȩ occurs after a sentence-final object if the sentence has the indicative mood and indicates that the scope of the focus is either the object or the verb and the object. Cf. the examples in (48), which are minimally different from those in (47).

- (48) L+Ȩ → L̄H á-nqè èb̄ 'I saw a lion'
 M+Ȩ → M̄H á-nqè àr̄ 'I saw a bird'
 H+Ȩ → H á-nqè t̄í 'I saw a cow'

That this final floating H is actually a focus morpheme is shown by the fact that it contrasts with other focus markers, which also occur after the object, and with adverbials, which are inherently focused in that position:

- (49) $\acute{a}\text{-nq}\acute{e}\ \acute{e}b\grave{i}\ \text{?}\bar{o}$ 'I *did* see the lion' (truth value focus)
 $\acute{a}\text{-nq}\acute{e}\ \acute{e}b\grave{i}\ m\bar{a}$ 'I saw the lion' (subject focus)
 $\acute{a}\text{-nq}\acute{e}\ \acute{e}b\grave{i}\ \grave{o}\text{-nq}\acute{e}$ 'I *saw* the lion' (verbal focus)
 $\acute{a}\text{-nq}\acute{e}\ \acute{e}b\grave{i}\ \acute{a}g\grave{i}n\bar{t}$ 'I saw the lion *yesterday*' (adverbial focus)
 (/ ? \bar{o} / indicates completion; / $m\bar{a}$ / is the first person singular personal pronoun; / $\grave{o}\text{-nq}\acute{e}$ / is a verbal adverb; / $\acute{a}g\grave{i}n\bar{t}$ / means 'yesterday')

The same morpheme H is used after the predicate in a non-verbal clause of identification, which is what native speakers will normally provide when asked to translate a noun into Lulubo:

- (50) $\acute{e}b\grave{y}$ 'it is a lion'
 $\acute{a}r\bar{t}$ 'it is a bird'
 $\text{t}\bar{f}$ 'it is a cow'

M is used instead of H in certain cases, for instance when the object is a proper noun. Cf. the examples in (51), which are minimally different from those of both (47) and (48).

- (51) $L+\text{M} \rightarrow \widehat{LM}$ $\acute{a}\text{-nq}\acute{e}\ \acute{e}b\bar{t}$ 'I saw Mr. Lion'
 $M+\text{M} \rightarrow M$ $\acute{a}\text{-nq}\acute{e}\ \acute{a}r\bar{t}$ 'I saw Mr. Bird'
 $H+\text{M} \rightarrow \widehat{HM}$ $\acute{a}\text{-nq}\acute{e}\ \text{t}\bar{f}$ 'I saw Mr. Cow'

Lulubo is a discrete-level tone language, i.e. there is (almost) no down-drift, nor is there anything like downstep. The pitch value of a tone remains by and large the same throughout an utterance, except on the utterance-final syllable. In utterances that are not yes/no-questions, prepausal L is realized as an extra low pitch, and \widehat{LM} , \widehat{LH} and \widehat{MH} rise to a lower pitch level prepausally than non-prepausally. Yes/no-questions are uttered in a higher register than the corresponding statements or orders, and a rising pitch is added after their final tone. Apart from the intonation, there is no formal difference between yes/no-questions and statements or orders.

5. Syllable Structure

The segmental structure of a syllable in Lulubo is /V/, /CV/, or /CCV/, but only initial syllables can be /V/:

(52)	(V)CV	bí	'ear'	ómbí	'locust'
	(V)CVCV	fólì	'buttock'	òpódò	'children'
	(V)CVCVCV	tó _̣ rò _̣ mè	'nine'	ìrùgù _̣ ò	'to kneel'

Apparent exceptions are found in words like the following, all of which are monomorphemic:

(53)	/l̀àw̄/	→	[l̀àw̄]	'time'
	/t̀òw̄ú/	→	[t̀òú]	'five'
	/g̀òw̄é/	→	[g̀òé]	'jackal'
	/āyí/	→	[āí]	'grass'
	/àràbíyà/	→	[àràbíà]	'car'

Phonetically, these words contain a non-initial /V/ syllable. But in such cases either that vowel itself or the vowel preceding it is high. Therefore, these words can easily be analyzed as having a homorganic glide, i.e. a consonant, between the vowels: /w/ if the high vowel is back, /y/ if the high vowel is front.

In /CCV/ syllables, the second consonant can only be a glide. Furthermore, only non-rounded vowels have been attested in such syllables. The contrast between /w/ , /y/ , and zero after the first consonant is shown by the following subminimal triplet:

(54)	lwà	'to count'
	lyà	'to shiver'
	lā	'to lay down'

While the syllable structure /CyV/ is rare, /CwV/ is quite common (especially when /C/ is a velar stop), so that there are many minimal pairs like the following:

(55)	ìḶwà	'to let (liquid) run out'	(56)	gwē	'to burn'
	ì-Ḷà	'you put' (2P-put/PF)		gē	'to buy'

- (57) kwā 'bone' (58) àmbwē 'to hide'
 kā 'to ripen' à-mbē 'we licked' (1PEX-lick/PF)
- (59) ŋgwá 'child'
 ŋgá 'thing'

The glide /w/ has been attested after about two thirds of the consonants, as in the examples in (60), which are grouped according to the point of articulation of the consonants. There are no examples of /w/ after plain labial stops and after labiovelars and no reliable examples of /w/ after interdentalals and palatals. The absence of /w/ after the bilabial stops /p/ and /b/ and its corresponding presence after the labiodental fricatives /f/ and /v/ is probably systematic, considering the facts that /w/ has lip rounding, that /p/ and /b/ tend not to occur before rounded vowels, and that /f/ and /v/ only occur before such vowels (cf. section 3 and footnote 5).⁷

- (60) bilabial
- | | | |
|------|------|-------------|
| /p/ | - | |
| /b/ | - | |
| /mb/ | mbwè | 'to be ill' |
| /β/ | βwī | 'to shoot' |
| /m/ | mwà | 'to rot' |
- labiodental
- | | | |
|-----|-----|------------|
| /f/ | fwè | 'to burst' |
| /v/ | vwí | 'hunger' |

⁷In the southern part of the Lulubo area (Aru), /w/ has disappeared after some consonants, e.g. after /v/, as in the following examples:

Lokiliri	Aru	
vwī	vī	'to follow'
àvwá	àvá	'infertile soil'

Thus, in Aru, /v/ does not have the defective distribution that it has in Lokiliri (see section 3). In Aru, /v/ now occurs before unrounded vowels as well as before rounded vowels.

interdental

/t̪/	-
/d̪/	-
/nd̪/	-

alveolar

/d/	ɔ̀wà	'to pick'
/s/	swè	'to become fat'
/z/	zwā	'to cross'
/n/	ónwé	'new'
/l/	lwē	'to whistle'
/r/	rwè	'to become thin'

retroflex

/ɖ/	ɖwà	'to become sour'
/ɗ/	ɗwé	'urine'
/nd̪/	nd̪wè	'to squeeze into'

palato-alveolar

/tʃ/	tʃwē	'to prune'
/dʒ/	ɔ̀dʒwè	'to wash'
/ndʒ/	ɔ̀ndʒwí	'bad'

palatal

/'j/	-
/ɲ/	-
/y/	-

velar

/k/	kwē	'tree'
/g/	ágwí	'big'
/ŋg/	ŋgwí	'to go back'
/ŋ/	òŋwíŋwíní	(kind of ant)

labiovelar

/kp/	-
/gb/	-

/ŋmgb/ -

/w/ -

glottal

/?/ ?wè 'to scoop (water)'

Whether there are any constraints on /C/ in /Cy/ combinations is difficult to determine, due to the lexical infrequency of such sequences. A few additional examples are given in (61).

- (61) ðmyā 'to mix'
 ìzyē 'excrement'
 mílyé 'oath'

The combinations glide + vowel in /CwV/ and /CyV/ should not be analyzed as heterosyllabic sequences of equi-tonal high vowel + vowel, since such an analysis would result in violations of three well-established constraints on the phonological structure of verb stems. Firstly, disyllabic verb stems cannot begin with a consonant, hence not */lòà/ 'to count' and */lìà/ 'to shiver', but /lwà/ and /lyà/. Secondly, trisyllabic verb stems can only begin with a high, unrounded vowel (unless they are multiplicative stems (see section 7) or have been derived from an adjective (see section 4)), hence not */ùdzùè/ 'to wash' and */ègùè/ 'to get lost', but /ùdzwè/ and /ègwè/. Thirdly, the tone pattern of trisyllabic verb stems can only be LLL, hence not */àmbōē/ 'to hide' and */òmā/ 'to mix', but /àmbwē/ and /òmā/.

6. Ideophones

Some ideophones deviate from the phonological system outlined in the previous sections. The deviations concern vowels, consonants, and syllable structure. The features mentioned below are probably not exhaustive.

In ideophones, syllables can have the structure /CVC/, i.e. they can end in a consonant:

- (62) ɖíʈ (having large volume)
 rùyúk (stone striking something)

pér-pér (very clean)
 †ú?~†ú? (sound of hammering)

In light of this, the following adverbs, which are aberrant by ending in a glottal stop, may also be considered ideophones:

(63) lí? ~ líbíǰí? 'all' (countable)
 pí? 'all' (uncountable)
 †í? 'only'

In addition to the nine vowels of ordinary words, ideophones can have a syllabic [r] after a vowel. In some cases, [r] varies freely with non-syllabic [r] plus a vowel. Cf. the following examples:

(64) †í† (iron or glass hitting something)
 ǰè†~ǰè† (running with raised neck)
 nǰò† ~ nǰòrò (high degree of redness)

While in ordinary words there is no length contrast in the vowels, vowels of ideophones are either short, like those of ordinary words, or long. Examples with long vowels are given in (65).

(65) wúur (movement away from the speaker)
 ǰùu† (movement towards the speaker)

Finally, at least one additional consonant can occur in ideophones, viz. an unvoiced velar fricative [x], as in

(66) xòxòxò (sound made by a ratel when attacking people)

The examples of ideophones listed above should probably all be classified as adverbs. But there are also a few nouns that deviate phonologically in the same ways. Cf. the nouns in (67), one being related to [ǰè†ǰè†] in (64), the other to [xòxòxò] in (66).

(67) àǰè† 'mongalla gazelle'
 xòxòl† 'ratel'

Many ideophones do not have any of the aberrant features mentioned above and thus do not differ phonologically from non-ideophones, as in the follow-

ing examples:

- (68) ðòlú (sound of a stone falling into water)
 ròbó (sound of a calabash breaking into pieces)
 méǎ (breathing heavily)

However, many of them are characterized by total reduplication, as in the examples in (69) and (70).

- (69) ʦó-ʦó (sound of cutting a tree)
 ʦù-ʦù (sound of footsteps)
 bù-bù (sound of heavy wind)
 kpá-kpá (sound of a person walking)
- (70) wàlà-wàlà (moving of snake)
 púʦú-púʦú (nothing being left)
 kwíí-kwíí (sound of small bell)
 kòsè-kòsè (sound of small animal moving in grass)
 fòlà-fòlà (bubbles coming up)

7. Vowel Elision

In certain cases, a word-final vowel is optionally (but normally) elided before a vowel-initial word. Depending on the (type of) word whose vowel is elided, the tone of the elided vowel is either retained or deleted. If retained, the tone is added to the tone of the adjacent vowel, but only realized phonetically if it is different from the latter. In the following, some of the most common types of elision are illustrated.

One type of elision occurs when a finite verb is followed by a cognate object or by a cognate adverbial. In that case the final vowel of the verb is normally elided, but its tone is always retained:

- (71) kō-mbú ȳ-mbú n̄ [kōmbȳmbú n̄] 'he is drinking'
 3-drink/IMPF NF-drink/VN OBJ
- (72) nā ȳ-nâ [nȳnâ] 'eat!'
 eat/2S+SUBJ NF-eat/VN+SUBJ
- (73) k-āwé àwè [kāwāwè] 'he is walking'
 3-walk/IMPF walk/VA

If the final syllable of the verb is /CwV/ or /CyV/, the glide is elided along with the vowel. See (74)-(76) for /CwV/ and (77)-(78) for /CyV/.

- (74) k³-mwā ð-mwà [k³m³wā] 'it is getting rotten'
3-rot/IMPF NF-rot/VA
- (75) k-ɔʔwé ðʔwè [kɔʔɔʔwè] 'it is drying'
3-dry/IMPF dry/VA
- (76) k-úḍ-úḍwē úḍ-úḍwè [kúḍúḍúḍwè] 'he vomits'
3-MULT-vomit/IMPF MULT-vomit/VA
- (77) ðmyā ðmyā [ðm³myā] 'he mixed them'
mix/3+PF mix/VA
- (78) ð-lyà ð-lyà [ðl³lyà] 'he shivered'
3-shiver/PF NF-shiver/VA

This behaviour of a glide after another consonant clearly shows that /Cw/ and /Cy/ are clusters and not unitary consonants like, for instance, the affricates and the prenasalized stops. Note that this also holds for /ʔw/, as in (75), i.e. /ʔw/ is a cluster rather than a unitary consonant, and therefore it does not belong to the class of preglottalized consonants.

The vowel /ɪ/ is often elided in certain monosyllabic function words when they occur in particular syntactic environments. The tone is deleted in the case of /n̄/, which either links an adjective to a preceding noun (79) or a non-finite verb to its preceding object (80).

- (79) t^hóré n̄ àzō [t^hóré n̄àzō] 'a long stick'
stick LINK long
- (80) Tkōzó n̄ ì-ḡgwí ősú nā' 'it is good to re-
property LINK CAUS-return/VN good COP+S/FOC
return property'
[Tkōzó n̄ḡgwí ősú nā']

The tone is retained in case of the genitive postposition /r̄í/, the reflexive particle /r̄í/, and the particle /r̄í/ that follows a transitive verb in the imperfective aspect. Cf. (81), (82), and (83), respectively.

- (81) Tn̄ r̄í èr̄í [Tn̄ r̄ér̄í] 'snake blood'
snake GEN blood

- (82) mó-ngT r̄ ò-ngì 'I am falling'
 1S-fall/IMPF REFL NF-fall/VA
 [móngT rṑhì]
- (83) ó-dwā r̄ ò-dwà 'they are being picked'
 MULT-pick/UNSP+IMPF TR MULT-pick/VA
 [ódwā rṑdwà]

Vowel elision also affects the locative postposition /a/, which governs a noun phrase (NP), as in the following sentences with a postpositional phrase (PostpP):

- (84) íkérē kó-kT [PostpP [NP gólò] á]
 Ikere 3-go/IMPF river LOC
 'Ikere goes to the river'
- (85) àz̄ kìdê kó-kw̄ [PostpP [NP àw̄ rí dzó] ā]
 then Kide 3-enter/IMPF 3S GEN house LOC
 'then Kide enters her house'
- (86) òpódò ìlékì k-ōlá [PostpP [NP òfó n̄ àlūbé] ā]
 children those 3-play/IMPF place LINK one LOC
 'those children played together (lit. in one place)'
- (87) óní [PostpP [NP d̄í n̄ ìngá] ā]
 stone hand LINK good LOC
 'the stone is to the right'

The tone of this postposition, which must have developed from the noun /ʔā/ 'stomach', is determined by the last tone of the noun phrase: it is mid after a high tone but high after a low or mid tone. The postposition is encliticized to the last word of the noun phrase whether that word is the head of the noun phrase, as in (84) and (85), or a modifier, as in (86) and (87). The vowel of the postposition is retained after a high vowel, but it undergoes harmonization in that context: it remains /a/ after the -ATR vowels /ɪ/ and /ɔ/, but it is changed to /o/ after the +ATR vowels /i/ and /u/.⁸ The high vowel preceding the encliticized vowel is, in turn, realized

⁸Alternation between /a/ and /o/ is also found in some other Central

phonetically as a semivowel, i.e. it keeps its vocalic quality and its tone, but together with the encliticized vowel it forms a diphthong with the length of a monophthong. (The semivowels cannot be analyzed phonemically as the glides /y/ and /w/ since the latter phonemes do not carry separate tones. Another reason for not analyzing the semivowel [i̯] as /y/ is that it does not become phonetically rounded before the rounded vowel /o/). The operation of these rules is exemplified in (88) for each of the four high stem-final vowels. Encliticization and harmonization turn the underlying forms into phonemic forms, which are themselves turned into phonetic forms by semivocalization and by optional de-rounding of /o/ .

(88)	underlying	phonemic	phonetic	
/ɪ/	às̄ á	/às̄-á/	[às̄á]	'on the fire'
/ɔ/	í̄t̄ó ā	/í̄t̄ó-ā/	[í̄t̄óā]	'on the ant-hill'
/i/	àd̄t̄ á	/àd̄t̄-ó/	[àd̄t̄ó]	'in the well'
/u/	ògū á	/ògū-ó/	[ògūó] ~ [ògūí]	'on the back'

After non-high vowels, the vowel of the postposition is elided, but its tone is retained. This is shown by the following examples for each of the five non-high vowels:

(89)	underlying	phonemic	
/e/	ìzyē á	/ìzyē'/	'in the dung'
/ɛ/	t̄óré ā	/t̄óré'/	'on the stick'
/a/	óswà á	/óswà'/	'in the fats'
/ɔ/	èbó ā	/èbó'/	'in the basket'
/o/	dʒó ā	/dʒó'/	'in the house'

Note that in this case it is the second of the two contiguous vowels that is elided, not the first one as in the other constructions mentioned above.

Sudanic languages with vowel harmony based on the ATR feature. In Moru, another language of the Moru-Madi group, the alternation occurs in verbal prefixes [Andersen 1986a], and in Modo, which belongs to the Bongo group, it occurs in the first person singular possessive suffix /-ma/ ~ /-mo/ .

There is evidence that vowel elision also occurs within the boundaries of a word. Consider for instance the formation of multiplicative verb stems from verb stems with more than one syllable, such stems being formed by means of reduplication. The formation of multiplicative stems from disyllabic stems is illustrated by the following examples:

(90) basic stem	multiplicative stem	
VC(C)V	ṼC-ṼC(C)Ṽ	
12 3 4	12 12 3 4	
ìdĩ	ìd-ìdĩ	'to burn'
ṁbē	ṁb-ṁbè	'to tie'
ìgbò	ìgb-ìgbò	'to bark'
ìdà	ìd-ìdà	'to kill'
ìgwē	ìg-ìgwè	'to burn'
ùdṁwē	ùd-ùdṁwè	'to vomit'
ṁ?wē	ṁ?-ṁ?wè	'to dry'
ṁmyā	ṁm-ṁmyà	'to mix'
ṁlyà	ṁl-ṁlyà	'to shiver'

The multiplicative stems in (90) consist of the first two segments of the corresponding basic stem followed by all the segments of that stem. (All the tones of the multiplicative stems are low, whatever the tones of the corresponding basic stems.) Notice, however, that this sequence of segments is exactly the same as the one that results from vowel elision applied to a verb before a cognate object or cognate adverbial. Cf. (71-78) above and the following examples:

- (91) a. /ṁb-ṁbè ṁ/
MULT-tie/3+PF C 'he *did* tie them (one by one)'
- b. /ṁbē ṁbè/
tie/3+PF tie/VA → [ṁbṁbè] 'he *tied* it'
- (92) a. /ìg-ìgwè ṁ/
MULT-burn/3+PF C 'he *did* burn them (one by one)'
- b. /ìgwē ṁgwē/
burn/3+PF burn/VA → [ìgṁgwē] 'he *burnt* it'

Note in particular that a glide following another consonant in the basic stem is absent from the first part of the corresponding multiplicative stem (92a), just as it is when the basic stem has been exposed to vowel elision (92b).

This similarity can be accounted for by positing underlying forms with total reduplication, to which vowel elision is applied:

- (93) òmbè-òmbè → òmb-òmbè 'to tie'
 ìgwè-ìgwè → ìg-ìgwè 'to burn'

Independent evidence for such underlying forms comes from multiplicative stems formed from stems with more than two syllables.⁹ In such stems the second vowel is retained in the first part of the stem, while the initial vowel of the second part of the stem is elided:

- | (94) basic stem | multiplicative stem | |
|-----------------|---------------------|-----------------|
| VC(C)VC(C)VX | VC(C)V-C(C)VC(C)VX | |
| 12 3 45 6 78 | 12 3 4 2 3 45 6 78 | |
| ìlèmì | ìlè-lèmì | 'to curse' |
| ìgbèlà | ìgbè-gbèlà | 'to distribute' |
| ìḡàrà | ìḡà-ḡàrà | 'to help' |
| ìrùgùḡò | ìrù-rùgùḡò | 'to kneel' |
| ìtòmòròdzà | ìtò-tòmòròdzà | 'to join' |

That is, the stem formation rule reduplicates the first two syllables of the basic stem, whether the latter has two or more than two syllables:

- (95) $V_1C_2(C_3)V_4X \rightarrow \dot{V}_1C_2(C_3)\dot{V}_4-\dot{V}_1C_2(C_3)\dot{V}_4X$
 (where X may be zero)

This analysis implies that vowels can be contiguous within a word in its underlying form and hence that the absence of such sequences from the phonetic

⁹All non-reduplicated non-derived verb stems with more than two syllables appear to be loanwords which have been adapted to the verbal system of Lulubo by addition of an initial /ì/ ~ /ì/. Compare the basic stems in (94) with the corresponding forms in Bari, which seems to be the most common source language: /lɪm/ 'to insult', /gweɪ-/ 'to distribute', /ḡar/ 'to do something together with somebody', /rugunʌ/ 'to kneel down', /tòmɔr-ja/ 'to join'.

form of a word (cf. section 5) is due to a surface constraint. However, even in underlying forms, contiguous vowels always belong to different morphemes.

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