

# LOW TONE RAISING IN BOLE

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Bole has a tonal process, referred to as Low Tone Raising (LTR) in this paper, first described by Lukas (1969) with additional information added by Gimba (1998), whereby a high tone spreads from the final syllable of a word and replaces a low tone on the initial syllable of a following word. LTR is blocked if the L-bearing syllable begins in a voiced obstruent. LTR is licensed only in certain syntactic environments, notably N+N genitives, V+nominal direct object, and clitic+host. It is blocked from applying in certain other environments, including Noun plus any post-nominal modifier. In addition to these syntactic conditions on LTR, certain word classes never undergo and/or never condition LTR, even where the phonological and syntactic conditions are met. Most notable among these word classes are proper names. The paper proposes that the syntactic requirement for LTR is that it apply only between items that, together, form the head of a phrase, and it proposes an intermediate level of structure (called “little xp”) that forms a phrasal head. In some cases, syntactic structure must be adjusted to allow for LTR, esp. in the case of mono-moraic clitics plus their hosts. It is suggested that proper names, which neither undergo nor condition LTR, are tonal “islands”.

## 1. Introduction

Bole is a West Chadic language spoken in northeastern Nigeria in Yobe and Gombe States.<sup>1</sup> Johannes Lukas provided the basis for modern Bole studies in a number of papers, most notably Lukas (1969, 1970-72, 1971). In his 1969 paper, “Tonpermeable und tonimpermeable Konsonanten im Bolanci (Nordnigerien)”, he describes a process whereby a low tone (L) is raised to high tone (H) following H, e.g. the first syllable of **tùrùm** ‘lion’, with LL tones, is raised following the H of the preposition **ń** ‘to’ (**ń turùm** ‘to the lion’). Lukas notes two types of conditions on the application of this process: there must be a close syntactic connection (*Verbindung*) between the words, and certain consonants (*tonimpermeable Konsonanten*) can block the process. We refer to this process as LOW TONE RAISING (LTR). The table on the next page illustrates the application and non-application of LTR in two syntactic environments, both discussed by Lukas: noun + noun genitive constructions and subject clitic + verb constructions.

Lukas’s short paper laid out all the basic facts of LTR, but it also raised questions about both the conditions for LTR and the phonetic motivation for it. Gimba (1998) took up some of these questions, extending consideration of both the range of constructions in which LTR does or does not apply and the phonetic nature of the consonants that are *tonimpermeable*. In this paper, we carry the discussion still further, ultimately attempting to formulate the generalization on the syntactic conditions for LTR that Lukas was seeking over 30 years ago. In section 2, we discuss the phonological conditions for LTR. In section 3, we list the syntactic environments where LTR applies as well as those where it does not apply. In section 4, we discuss a set of lexical categories that do not participate in LTR, regardless of environment. In section 5, we propose a characterization of the syntactic environment that licenses.

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	N <sub>1</sub> +N <sub>2</sub> genitive	N <sub>2</sub> cit.		Subject clitic + verb	Verb base
'	ùnti adà	àdà	'nose of a dog	mu awan bə bin	àwàngòyi
p	rùni poti	pòti	'shade from the sun'	shi poyyattùk kùfa	pòyyattùkko
t	lo temshi	təmshi	'meat of a sheep'	ka tofbū kùla	tùfbuwòyi
s/sh	rùmpa sàro	sàrò	'shelter (made) of grass'	ka shanilū tāsà	shànkiluwòyi
k	ìdi kankirsà	kànkirsà	'eye of a puff adder'	mu karan gam	kàrangòyi
f	shòwi fādi	fādi	'handle of a knife'	mā botan zòri	fòtangòyi
f	àmma d'ālā	d'ālā	'water (soaked with) ashes'	shi d'inka' 'ottò	d'inkakkòyi
'y	gòma 'yala	'yala	'market for guinea corn'	shi 'yollaz zòri	'yòllakkòyi
m	temshi mondù	mòndù	'sheep of a woman'	shi mātak karài	mātakkòyi
n	moti nònu	nònu	'younger maternal aunt' (“younger sister of mother”)	mu nitan mongòrò	nìtangòyi
mb	ko mbirirì	mbirirì	'head of a wasp'	ka mbālū wùyo	mbàluwòyi
nd	shòwi ndaya	ndàya	'wood for a chair'	mā ndolan rùta	ndòlangòyi
ng	sèdi ngukà	ngukà	'remedy for a hernia'	shi ngadag gòrò	ngàdakkòyi
nj	d'ishi njulà	njùla	'skin of an occiput'	ka njakkutù ishi	njàkkutuwo
nz	d'insa nzimòkì	nzimòkì	'egg of a griffon'	mu nzutan zònge	nzùtangòyi
r	zòri riya	riya	'bowstring' (“cord of a bow”)	shi rāmà mōtā	(à) rāmà
l	dòsho lāwò	lāwò	'horse of a child'	ka ladirū gòggò	làdiruwòyi
y	Awu Yāyà	yāyà	'Within the Sand' (place name)	mu yātan òsoki	yātangòyi
w	àni wāshi	wāshi	'one who fights' (f)	shi wallaj jìshi	wàllakkò
b	lo bìdò	bìdò	'meat of a monkey'	ka bāyū àmma	bāyuwòyi
d	pìmo dàwun	dàwun	'palm fronds for a mat'	mu dàyan pìmo	dàyangòyi
j	kòd'ūwi jādà	jādà	'handle of a hoe'	ka jàbbutù àgògo	jàbbutuwo
z	àtti zòngè	zòngè	'gruel of desert dates'	shi zàla bòkku	(à) zàla
g	yāwi gùsho	gùsho	'stone partridge' (hen of stone)	mu gòjja yāwi	(à) gòjjà

## 2. Phonological Conditions for (LTR)<sup>2</sup>

Lukas (1969) gave a precise statement of the necessary phonological conditions for and effects of Bole LTR. They can be summarized in the following rule ( $\sigma$  = syllable, L = low tone, H = high tone, + = at least a clitic boundary):

$$\begin{array}{ccc} \text{L} & \text{H} & \text{H} \\ | & | & | \\ \sigma_2 \rightarrow \sigma_2 & / \sigma_1 + \text{---} & \text{where } \sigma_2 \text{ does not begin in a plain voiced obstruent (b, d, j, z, g)} \end{array}$$

The table on the preceding page presents examples of LTR (or its absence in the case of the voiced obstruents **b, d, j, z, g**) for syllables beginning in each of the consonants in Bole.

The table illustrates two of the canonical environments for LTR: N+N genitive constructions and subject clitic + verb. The columns to the right of the LTR examples show the citation tones of the N<sub>2</sub> nouns in the genitive constructions and the verbs with no clitic (e.g. as with third person subjects) for the subject clitic + verb examples. The verbs cited without clitic are in the form they would have without an overt object since we are interested here only in the initial syllable of the verb. We can break down the phonological conditions for LTR as follows. L tone is marked with a grave accent (**à**), H tone is unmarked, macron marks length (**ā**):

- **Tonal requirement:** LTR applies to raise the L of a H+L sequence, e.g. /lo + tēmshi/ → [lo tēmshi] ‘meat of a sheep’, where **lo** bears H and the first syllable of **tēmshi** bears L in phrase initial position. The H that conditions LTR may be a H syllable, or it may be the H mora of a syllable bearing a Rising tone,<sup>3</sup> e.g. /mbă + mōndù/ → [mbă mōndù] ‘arm of a woman’, /dām + lāwò/ → [dām lāwò] ‘goose of a child’.
- **Segmental requirement:** In order to be subject to LTR, the onset of the L syllable must be a consonant other than a modally voiced obstruent. That is, the consonants **b, d, j, z, g** BLOCK LTR, e.g. /lo + bīdò/ → \*[lo bīdò] ‘meat of a monkey’. The prenasalized stops and the implosives, though they have laryngeal vibration, do not block LTR, e.g. /ko + mbīrīrī/ → [ko mbīrīrī] ‘head of a wasp’, /shōwi + bādi/ → [shōwi bādi] ‘handle (“wood”) of a knife’. In particular, it seems anomalous that the prenasalized consonants would not block LTR inasmuch as they have a voiced obstruent component. Gimba (1998) shows that the duration of the nasal component of these sounds is several times longer than the stop component, suggesting that *orally released nasals* would be a more appropriate term than *prenasalized stops*. Their patterning with nasals rather than stops is evident in LTR.
- **Boundary requirement:** There must be a clitic or word boundary separating the H syllable from the L syllable. LTR does not operate within a word, e.g. **kēkirām** → \*[kēkirām] ‘large storm’ even though the word begins in the sequence HL and the L syllable begins in a consonant that meets the LTR requirement. The N+N genitive constructions in the table illustrate LTR across a word boundary, and the subject pronoun+verb examples illustrate LTR across a clitic boundary. As we will see in section 3, however, certain boundary types block LTR.

<sup>2</sup> A perhaps more appropriate name for the process might be High Tone Spreading (HTS), since the obvious motivation for the alternation is perseverance of the H into the following syllable. However, it is the syllable bearing the L tone that is of primary interest because that is the tone of that syllable that changes, it is the phonological structure of that syllable that facilitates or blocks spreading, and it is the change of the tone of that syllable or its failure to change that is associated with particular construction types. We thus have chosen a name for the process that incorporates the name of the tone that changes.

<sup>3</sup> Rising tones, marked with a hacek (**ǎ**) and Falling tones, marked with a circumflex accent (**â**) can appear only on bimoraic syllables in Bole. We thus omit length marking on the vowel for syllables bearing these tones.

- Number of syllables: LTR operates on only one syllable. In /**idi** + **kànkìrsà**/ → [idi **kànkìrsà**] ‘eye of a puff adder’, only the initial syllable of **kànkìrsà** is raised even though the second syllable is L and does begin in a voiced obstruent. The “one syllable” condition on LTR follows from the requirement that there be at least a clitic boundary between the H and L tones and is thus not really a separate condition.

When LTR applies to the initial syllable of a word of two or more syllables, it completely replaces the original L with H, i.e. there is no phonetic trace of the original L in the form of a downstep or a contour tone. For example, /**lo** + **tèmshi**/ → [**lo** **tèmshi**] [ˈ ˈˈ] ‘meat of a sheep’, not \*[ˈ ˈˈ] (High followed by downstepped Highs) or \*[ˈ ˆ ˈ] (Falling tone on the initial syllable of **tèmshi**). However, when N<sub>2</sub> is a monosyllabic word, LTR applies only to the first mora of the word, resulting in a Falling contour on N<sub>2</sub>.

/pai + dầr/	→ [pai dầr]	‘region of the east’
/lo + kòm/	→ [lo kòm]	‘meat of a cow’
/ka + tâi/	→ [ka tâi]	‘that you eat’ (subjunctive)
/mu + ràì/	→ [mu ràì]	‘that we enter’ (subjunctive)

The question arises as to what would happen to a L monomoraic word following H. Bole does not provide an answer! The only monomoraic L words that would be candidates for LTR are **lò** ‘who?’ and **lè** ‘what?’. They do not undergo LTR, e.g. /**lo** **lò**/ → **lo lò?** ‘whose meat?’ (“meat of whom”), not \***lo lo** or \***lo lô**, but Bole question words as a group do not undergo LTR, regardless of phonological structure (see §4). All other monosyllabic words have H tone (**lo** ‘meat’), are bimoraic (**kòm** ‘cow’), and/or begin in a voiced obstruent (**bè** ‘son’).

### 3. Syntactic Conditions for LTR

Though LTR in the Fika dialect<sup>4</sup> is pervasive and consistently applies in certain syntactic environments, it is not an automatic process that applies whenever the phonological conditions are met. Section 3.1 discusses environments where LTR applies and §3.2 discusses syntactic environments where LTR is blocked.

#### 3.1. Environments where LTR applies<sup>5</sup>

**3.1.1. N+N genitive constructions.** N+N genitive constructions juxtapose the nouns in the order “possessed” “possessor”. The examples in the left-hand column in the table above are all of this type. The meaning relationship between the two nouns does not affect the application of LTR with the exception of cases where N<sub>2</sub> is a place or a time. For such constructions, contrastive pairs such as the following are possible:

<b>lo mālā</b>	‘bush meat’, i.e. a	<b>lo mālā</b>	‘animal in the bush,
< /mālā/	type of meat	= <b>lô-m mālā</b>	wild animal’

<sup>4</sup> This paper describes the Fika dialect of Bole, the dialect that Lukas (1969) was describing. In the Gadaka dialect, LTR is not an active process, though it may have been at one time. There are more or less frozen constructions such as **idi amma** ‘spring’ (“eye of water”) where the application of LTR is in evidence (cf. **amma** ‘water’), but speakers of this dialect do not apply LTR when forming phrases on the fly—cf. Gadaka **kāri kùtè** vs. Fika **kāri kutè** ‘stalk of sorghum’ (**kùtè** ‘sorghum’ in both dialects). We do not have information on LTR in other dialects.

<sup>5</sup> Lukas (1969) remarked on all the basic environments in §3.1 except intransitive verb of motion plus locative goal (§3.1.4).

<b>'amma 'aushi</b>	'river water', i.e. a	<b>'amma 'àushi</b>	'water in the river'
< /'àushi/	type of water	cf. <b>'ammâ-n 'àushi</b>	cf. 'southern water'
<b>'otto Lìtîrîn</b>	'Monday tuwo', the	<b>'otto Lìtîrîn</b>	'Monday's tuwo',
< /Lìtîrîn/	type eaten on M.	= <b>'ottô-l Lìtîrîn</b>	i.e. cooked on M.

If  $N_2$  is understood as a restrictive modifier of  $N_1$ , as in the left-hand column, LTR applies. If, however,  $N_2$  is taken to be an adverbial adjunct of  $N_1$ , as indicated by the translations of the examples on the right, LTR does not apply. The latter type of construction usually allows a linking / $\grave{n}$ /, suggesting that the L tone associated with this linker blocks LTR even if the linker is not segmentally overt. This solution is problematic, however, first because it is sometimes possible to get a meaning contrast based on absence or presence of / $\grave{n}$ /, like that in the second example,<sup>6</sup> and second, for poorly understood reasons, / $\grave{n}$ / is disallowed in some constructions with the adjunct meaning, but LTR still fails to apply, e.g. **bîya Pikkà** 'people (located) in Fika', with no LTR, but not \***bîyâ-n Pikkà** (cf. **bîya Pikkà** 'Fika people, Boles', with LTR). In section 5, we propose a syntactic account that differentiates expressions on the left from those on the right without reference to linking / $\grave{n}$ /.

Related to N+N genitives are phrases headed by **an** (m), **àni** (f) 'one who has..., one who does...' (corresponding to Hausa **mài/màsu**). Though these words are not, strictly speaking, nouns, they can head noun phrases, and they condition LTR on the following word.

<b>an shiri</b> (m), <b>àni shiri</b> (f)	'thief' (< <b>shîri</b> 'theft')
<b>an kuɗàɗi</b>	'enemy' (< <b>kùɗàɗi</b> 'dislike')
<b>àni leyi</b>	'a woman who has recently given birth' (< <b>lèyi</b> 'giving birth')

**3.1.2. Clitic+host.** All monomoraic clitics condition LTR on their hosts. The table at the beginning of this paper illustrates subject clitics with verbs. The H subject clitics are **ka** 'you (ms)', **shi** 'you (fs)', **mu** 'we', and **mă** 'you (pl)' (which is perhaps the only bi-moraic clitic that conditions LTR). The first person clitic **ñ**, though monomoraic, bears L tone. There are no third person subject clitics (non-clitic independent pronouns serve as overt pronominal subjects). The same set of subject clitics are used with non-verbal predicates and condition LTR with such predicates as they do with verbs.

<b>mu Apìnàwi</b>	'we are Hausas'
(cf. <b>màte Àpìnàwi</b> 'they are Hausas', where <b>màte</b> 'they' is an independent pronoun, not a clitic, and hence does not condition LTR)	
<b>shi ðole</b>	'you (f) are small'
(cf. <b>ita ðole</b> 'she is small', with non-clitic independent pronoun subject)	

Monomoraic prepositions cliticize to a following noun phrase and condition LTR on the word to which they are cliticized. The relevant prepositions, with examples, are the following (see §4.2.2 for prepositions with more than one mora):<sup>7</sup>

<sup>6</sup> The word **'aushi** means either 'river' or 'south'. The latter meaning comes from the fact that the Gongola River is to the south of Fika. In the Gombe dialect, which is spoken south of the Gongola, **'aushi** means 'north'!

<sup>7</sup> Two of the prepositions, the indirect object marker 'to, for' and the locative 'via, through' are homophonous H tone syllabic **ñ**. The nasal assimilates to place of articulation of a following consonant and completely to sonorant consonants. These prepositions are functionally distinct in a number of ways, e.g. the indirect object preposition may take a human complement, but the preposition meaning 'via' would require a complement headed by **gàmà** 'place of' (**ñ gàmà Bamoi** 'via [the place of] Bamoi'). It is likely that they have different etymological sources.

<b>ko</b>	‘from’	<b>ndin ko Pikkà</b>	‘he came from Fika’ ( <b>Pikkà</b> ‘Fika’)
		<b>à jì àlākō shòwi ko mālā</b>	‘they are bringing wood from the bush’ ( <b>mālā</b> ‘the bush’)
<b>ń</b>	‘to, for’ (indirect object preposition)	<b>mi’y’ya ònan sadikà m pukàràwa</b>	‘the people gave alms to the students’ ( <b>pukàràwa</b> ‘students’)
		<b>ń ina wàshi 1 lāwòko</b>	‘I will admonish (“do admonishment to”) your child’ ( <b>lāwò</b> ‘child’)
<b>ń</b>	‘via, through’	<b>dòppu m mālā</b>	‘he went through the bush’ (“he followed via bush”) ( <b>mālā</b> ‘the bush’)
		<b>an gògò m Pikkà</b>	‘they’ve made a road through Fika’ ( <b>Pikkà</b> ‘Fika’)

A third case of LTR applying in the environment akin to clitic+host is a productive derivational process whereby a noun can reduplicate the first CV to give the meaning “like NOUN”. The reduplicated syllable, which always has a short vowel, bears H tone and conditions LTR on the root.

**yàyà** ‘sand’ → **yayàyà** ‘like sand’  
**kàđo** ‘tick’ → **kakàđo** ‘like a tick’  
**ngùkà** ‘hernia’ → **ngungùkà** ‘like a hernia’  
 cf. **dàbi** ‘hoe’ → **dadàbi** ‘like a hoe’ with no LTR because of the voiced obstruent **d**

**3.1.3. Verb+Direct Object noun.** The following paradigm of verb+object, adapted from Gimba (1998:15-16), illustrates the tonal behavior of direct object nouns after verbs in the basic TAMs of Bole. The illustrative nominal objects in phrase initial position would be pronounced **lāwò** ‘child’, **kèbe** ‘gypsum’, and **gòji** ‘sickle’.

Future:	<b>ń dùwa lāwò</b>	‘I will beat a child’
	<b>ń kòna kèbe</b>	‘I will take gypsum’
	<b>ń kòna gòji</b>	‘I will take a sickle’
Habitual:	<b>ń duwo lāwò</b>	‘I beat a child’
	<b>ń kono kèbe</b>	‘I take gypsum’
	<b>ń kono gòji</b>	‘I take a sickle’
Subjunctive:	<b>ń dùwi lāwò</b>	‘that I beat a child’
	<b>ń kòni kèbe</b>	‘that I take gypsum’
	<b>ń kòni gòji</b>	‘that I take a sickle’
Imperative:	<b>dùwi lāwò!</b> (sg), <b>dùwa lāwò!</b> (pl)	‘beat the child!’
	<b>kòni kèbe!</b> (sg), <b>kòna kèbe!</b> (pl)	‘take gypsum!’
	<b>kòni gòji!</b> (sg), <b>kòna gòji!</b> (pl)	‘take a sickle!’
Completive:	<b>ń duwū lāwò</b>	‘I beat a child’
	<b>ń konū kèbe</b>	‘I took gypsum’
	<b>ń konū gòji</b>	‘I took a sickle’

In all TAMs other than the completive, the objects **lāwò** ‘child’ and **kèbe** ‘gypsum’ undergo LTR while **gòji** ‘sickle’ retains initial L tone because of the initial voiced obstruent **g**. In the completive, LTR does not apply, suggesting that verb+DO is not an environment for automatic application of LTR. Non-application of LTR in the

completive has a morphological explanation, first proposed in Schuh (1983) and reiterated in Gimba (1998:31-34). Consider the following paradigm.

<b>konu -wò -yi</b>	‘he took (it)’
take cpl Ø DO	
<b>kon-tā-wo</b>	‘he took her’
<b>konu-wò nzòno</b>	‘he took (it) yesterday’
<b>kon-tā nzòno</b>	‘he took her yesterday’
<b>konū kèbe (nzòno)</b>	‘he took gypsum (yesterday)’
<b>’yor-wò</b>	‘he stopped’
<b>’yorū nzòno</b>	‘he stopped yesterday’

Gimba (2000:113) develops the concept of suffix *suppression* to account for these facts. The Ø-object suffix **-yi** appears phrase final with transitive verbs only when the sentence contains no overt object, but it is suppressed if not phrase final. The completive suffix **-wò** appears phrase final with transitive verbs bearing an object clitic (**-tā-** ‘her’ in the example above) and phrase final with intransitive verbs, but it is suppressed if not phrase final. We can schematize these facts as follows, under the assumption that suffix **-wò** is always underlyingly present in the completive and the **-yi** Ø-object suffix is always underlyingly present with transitive verbs if there is no overt object.

Suppression of **-yi**: /VERB **-wò-yi** X/ → [VERB **-wò** X] (“X” = any non-null material)  
 Suppression of **-wò**: /VERB **-wò** X/ → [VERB X]

We argue that the reason why LTR does not apply between verb and nominal object in the completive as it does in other TAMs is that the presence of the underlying completive suffix **-wò**, which bears L tone (except after pronominal object clitics), blocks LTR. Additional evidence for the underlying presence of the **-wò** suffix is the fact that the final vowel of the verb is long in just those cases where we argue that **-wò** has been suppressed (**konū kèbe** ‘he took gypsum’, **’yorū nzòno** ‘he stopped yesterday’). Most clitics/suffixes in Bole condition lengthening of a preceding vowel, though ironically, vowel length of high vowels is neutralized before homorganic semivowels, so that the final vowel **-u** of a verb root is not heard as long when **-wò** is present.<sup>8</sup>

All the examples where LTR applies to objects in the paradigm above have the simple verb with an object directly following. LTR also applies when verbs bear H tone clitics/suffixes, including the *totality extension*, the *additive extension*, and *indirect object pronouns*, though not the ventive—see §4.2.4.

Totality

<b>à d’òppà-ti temshi</b>	‘he will follow the sheep’ ( <b>tèmshi</b> )
aux follow(fut)-tot sheep	
<b>ngòr-ti temshi</b>	‘that he tie up the sheep’
tie(sjn)-tot sheep	

<sup>8</sup> Lukas (1969), who observed the operation of LTR with verbs in TAMs other than the completive, proposed a different account. Lukas (1970-72) argued for a division between *nominal* TAMs and *verbal* TAMs on the basis of whether object clitics were identical to genitive pronouns or not. In effect, this criterion made the completive the only *verbal* TAM. Noting that LTR takes place in N+N genitives, he proposed in Lukas (1969) that LTR takes place in *nominal*, but not *verbal* TAMs because in nominal TAMs, Verb+Object is structurally like N+N genitive. This analysis will not work for several reasons. First, the criterion for the *nominal* ~ *verbal* TAM distinction is not viable. The type of pronoun clitic depends on whether or not it is the final morpheme of the verbal complex, not on the TAM per se (Gimba 2000:102). Second, as we show immediately below, LTR takes place with objects following verbs that bear suffixes that could not be part of a nominal construction.

## Additive

- Q: **ka īsho mecce gà àgōgo?** ‘do you do travels with a watch?’ (**mècece**)  
 you do(hab) traveling with watch
- A: **ò’o, ñ īshò-di mecce** ‘yes, I do travels with one’  
 yes I do (hab)-add traveling

## Indirect object pronoun

- à d’òppà-to temshi** ‘they will follow the sheep for her’ (**tèmshi**)  
 aux follow(fut)-her sheep
- màte òn-su atti** ‘and they gave them gruel’ (**àtti**)  
 they give(sjn)-them gruel

**3.1.4. Intransitive verb of motion+locative goal.** With an intransitive verb of motion, a locative goal may immediately follow the verb. LTR applies to the locative goal in such cases.

- l loma matira** ‘I will arrive at the entrance room’ (**màtira** ‘entrance room’)  
 I arrive(fut) entrance room
- mu koba kòrì** ‘we will head for the farm’ (**kòrì** ‘farm’)  
 we head for(fut) farm

When an Intransitive Copy Pronoun is present, LTR is optional.

- ka pete jìko matira ~ màtira** ‘you will exit the entrance room’  
 you exit(fut) ICP entrance room
- à mēsho jìto Pikkà ~ Pikkà** ‘she returns to Fika (routinely)’  
 you return(hab) ICP Fika
- lòmi jìto māla ~ màla** ‘that she arrive (subjunctive) at the farm’  
 arrive(sjn) ICP farm
- risshi jìshi wolwòli ~ wòlwòli indi** ‘go under the bed!’ (f.s. imperative)  
 enter(imp) ICP under bed

**3.1.5. ko ‘tens’+number and dibu ‘thousand’+number.** The ‘ten’s’ from 20-90 have the form **ko**+Unit (“Unit” = one of the numbers 1-9), e.g. **ko bòlou** ‘twenty’. In the numbers **ko pòd’fo** ‘forty’ and **ko bònùm** ‘ninety’, the numbers **pòd’fo** ‘four’ and **bònùm** ‘nine’ undergo LTR. Likewise, **dibu** ‘1000’ conditions LTR on numbers indicating multiple thousands, e.g. **dibu bònùm** ‘9000’.

**3.2. Syntactic environments where LTR does not apply.** LTR applies across boundaries between items that comprise syntactic phrases, the main types being those in §§3.1.1-5. LTR does not apply across large syntactic boundaries, such as those between clauses, or boundaries between words or phrases which themselves do not form some kind of syntactic constituent. Thus, LTR does not apply to the underlined items in the examples below.

- ñ jì tà mā ’yàla-ko ī barkà** ‘I hope that your grain has prospered’  
 I prog hoping grain-your do(cpl) prosperity (subject of clausal complement to a verb)

<b>Dàshiti</b> <u>lāwò</u> <b>àdà ndài</b> <b>jìto.</b> well then child dog come(sjn) ICP	‘Well then, the child of the dog came.’ (subject following clausal connector)
<b>dewu</b> <b>òshi</b> <b>ye</b> <u>ngòratò</u> leave(cpl) goat PRM tied(stative)	‘he left the goat tied up’ (stative complement of direct object)
<b>alànshìri</b> <b>à</b> <b>jì</b> <b>mèce</b> <u>lèdì-lèdì</u> chameleon aux prog walking slowly-slowly	‘the chameleon is walking slowly’ (manner adverb following direct object)
<b>ndètti</b> <u>pòtì</u> <b>Lìtìrìn</b> come(imper) day-of Monday	‘come on Monday’ (temporal adverb following verb)
<b>Ina mā</b> <b>èlen-na-n</b> <b>ye</b> <u>kòm</u> me indeed bring(cpl)-me-vent PS cow	‘as for me, A COW brought me’ (sentence final focused subject)

There are environments, however, where the elements in question arguably form syntactic constituents, but where LTR does not apply. In §§3.2.1-6 we present constructions where the syntactic construction itself does not allow LTR across constituents. In §4, we discuss word classes that do not undergo and/or do not condition LTR. Some of these cases, such as presentatives (§4.2.3), could perhaps be included in the present section.

**3.2.1. Non-clitic subject+verb.** Pronominal clitic subjects condition LTR on their host verb (§3.1.2), but nominal subjects and third person pronominal subjects do not condition LTR on either verbs or non-verbal predicates. These facts correlate with the observation, supported by considerable cross-linguistic evidence, that the syntactic boundary between subject and verb is a large one. The underlined words in the examples have failed to undergo LTR even though the phonological conditions for LTR are met.

<b>kùshi</b> <u>rèwe</u> <b>là</b> <b>gà</b> <b>àmpàni</b> baobab tree that with usefulness	‘a baobab is a tree that is useful’
<b>òshi</b> <u>lòkkìdū</u> <b>gà</b> <b>gà</b> <b>zòri</b> goat entangle(cpl) at in rope	‘the goat got tangled in the rope’
<b>sùbà-no</b> <u>shàppū</u> <b>jìni</b> shirt-my fade(cpl) ICP	‘my shirt has faded’
<b>zònge</b> <u>lèi</u> <b>lāwò-to</b> <b>bāwulo</b> hyena bear(sjn) child-her seven	‘and the hyena bore her seven children’
<b>ishi</b> <u>nòssū</u> <b>gà</b> <b>bòn-no</b> he rest(cpl) in house-my	‘he rested in my house’
<b>dàshi</b> <b>ishi</b> <u>rìrìme</u> <b>màte</b> <u>ndài</u> <b>bònò</b> well he be calm(sjn) they go(sjn) home	‘well, he calmed down and they went home’

**3.2.2. Verb+subjective complement.** A transitive verb conditions LTR on a direct object noun (§3.1.3), and an intransitive verb of motion conditions LTR on a locative goal (§3.1.4). In contrast, an intransitive verb does not condition LTR on a subjective complement, even though the subjective complement can be immediately postverbal with no other overt marking.

**à d̀òwa mb̀ùk̀ùm** ‘he will become blind’  
 aux become(fut) blind person

**m̀èm̀ù à bongiro ̀òshi** ‘the man turns into a goat’  
 person aux turn into(hab) goat

**3.2.3. Verb+focused object.** A transitive verb conditions LTR on a direct object noun (§3.1.3). Bole has *in situ* questioned and focused constituents, i.e. except for subjects, questioned or focused constituents take the same linear position in a sentence as their non-questioned or non-focused counterparts would take.<sup>9</sup> Questioned or focused direct objects thus occupy immediate post-verbal position. Consider the following sentences. Of interest are the tones of **l̀àẁò** ‘child’, which are LL in citation form.

Neutral declarative statement (LTR applies)

**ita à k̀òna l̀àẁò Bamoi** ‘she will take Bamoi’s child’  
 she aux take(fut) child Bamoi

Questioned object

**ita à k̀òna l̀àẁò l̀ò? = ita à k̀òna l̀àẁò l̀ò? = ita à k̀òna ye l̀àẁò l̀ò?**  
 she aux take(fut) child who she aux take(fut) CP child who  
 ≠ \***ita à k̀òna ye l̀àẁò l̀ò?**  
 ‘whose child will she take?’

Focused object (as in answer to the question above)

**ita à k̀òna (ye) l̀àẁò Bamoi (sayà l̀àẁò Madù sa)**  
 she aux take(fut) CP child Bamoi but child Madu not  
 ‘she will take BAMOI’S CHILD (but not Madu’s child)’

In the neutral declarative statement, **l̀àẁò** ‘child’, the direct object, undergoes LTR as expected. In the example with a questioned object directly following the verb, LTR is optional.<sup>10</sup> A “clefting particle” (CP) **ye** can precede any questioned or focused constituent. If the clefting particle is present, LTR cannot apply.

In the third example, with focused object, LTR does not apply, whether or not the clefting particle is present. In effect, then, ABSENCE of LTR shows that the object is focused. In the case of the questioned subject **l̀àẁò l̀ò?** ‘child of who?’, the presence of the question word **l̀ò** in the noun phrase makes it clear that the phrase is questioned. Hence, from a functional point of view, application (or non-application) of LTR has no effect on interpretation.

It is worth noting that with no overt noun or pronoun subject in preverbal position (always an option with third person subject), the sentence **à k̀òna l̀àẁò l̀ò?** (with LTR applied to **l̀àẁò**) would be ambiguous between ‘whose child will s/he take?’ and ‘who will take the child?’, the latter interpretation having a post-posed questioned subject, **l̀ò**, and a non-questioned/non-focused direct object, with LTR applied as in a neutral declarative statement. However, the sentence **à k̀òna l̀àẁò l̀ò?**, with NON-application of LTR to **l̀àẁò l̀ò**, has only the reading ‘whose child will s/he take?’, parallel to the sentence above with focused object.

<sup>9</sup> Questioned or focused subjects are phrase final—cf. the last example in §3.2.2. Whether other questioned and focused constituents are *in situ* in terms of PHRASE STRUCTURE, as distinct from linear order of words, depends on one’s approach to syntactic theory. At this point we refer only to linear order, returning to issues of phrase structure in §5.

<sup>10</sup> The LTR facts here apply only if the questioned noun phrase has a common noun, such as **l̀àẁò**, as its head. Question words themselves, such as **ỳallà** ‘which one?’, never undergo LTR regardless of syntactic configuration (§4.4).

**3.2.4. Intransitive verb of motion+questioned or focused locative goal.** In §3.1.4 we showed that a locative goal following an intransitive verb of motion undergoes LTR. Parallel to direct objects of transitive verbs, questioned or focused locative goals do not undergo LTR.

Q: **ka koba kòri lò?** ‘whose farm will you head for?’  
 A: **ñ kòba kòrìno** (sayà kòriko sa) ‘I will head for MY farm (not your farm)’

Q: **màte à lòma màtira yàllà?** ‘which entrance hut will they arrive at?’  
 A: **à lòma màtira Bulamà** ‘they will arrive at the WARD HEAD’S ENTRANCE HUT’

**3.2.5. Noun+post-nominal modifier.** Bole is a highly consistent head initial language. All noun modifiers thus follow the head noun in a noun phrase. The head noun of a noun phrase does not condition LTR on post-nominal modifiers of any type.

Noun+Determiner: **temka màinê** -/-> \***temka mainê** ‘these sheep’  
**mi’y’ya màd’fî** -/-> \***mi’y’ya mad’fî** ‘certain people’

Noun+Numeral: **temka pòd’fo** -/-> \***temka pod’fo** ‘four sheep’

Noun+Adjective: **tèmshi pètìla** -/-> \***tèmshi pētìla** ‘white sheep’

Noun+Id. Adjective: **mìd’i mèlèlè** -/-> \***mìd’i mēlèlè** ‘stretched-out python’

Noun+Relative Clause:  
**’yàla là Bamoi kàppuwò yê** -/-> \***’yàla là Bamoi kàppuwò yê**  
 g, corn that Bamoi plant(cpl) the  
 ‘the guinea corn that Bamoi planted’

Noun+an-phrase meaning ‘one that has..., one that does...’:  
**òshi àni balum mōd’fî** -/-> \***òshi ani balum mōd’fî** ‘a goat that has one horn’  
 goat that-has horn one

Constructions with post-nominal adjectives and ideophonic adjectives can include a linking morpheme **ñ**.<sup>11</sup> If the noun ends in a vowel, the linker is attached as the coda of the final syllable of the noun, and if the noun ends in H tone, the syllable with the **-n** coda has falling tone, e.g. **tèmshî-n pètìla** ‘white sheep’, **mìd’i-n mèlèlè** ‘stretched-out python’. Since the linker **ñ** bears L tone, a construction with the linker does not include the environment for LTR on the adjective or ideophonic adjective. Gimba (1998:28) proposed that it was the underlying presence of the L tone of the linker that blocked LTR, even if the linker were not overt. This explanation, however, does not take into account the fact that LTR fails to take place between a noun and ANY post-nominal modifier. It therefore seems reasonable to suggest that it is the structural properties of the noun phrase that account for non-application of LTR between a noun and a post-nominal modifier, including a post-nominal adjective or ideophonic adjective. On the other hand, determiners, numerals, and the relative clause conjunction (**là/yà**) never undergo LTR (see §4), whereas adjectives and ideophonic adjectives can undergo LTR when used in genitive-like constructions, e.g. **jinge pētìla** (< **pētìla**) ‘catching sight of whiteness’, **ùdi nyancàṅ** (< **nyàncàṅ**) ‘misaligned teeth’. Thus, it remains an unresolved question as to

<sup>11</sup> This linking **ñ** is identical to the linker in Noun+Locative/Temporal adjuncts discussed in §3.1.1. They may or may not be etymologically related, but they are functionally distinct.

whether or not the failure of LTR to apply to a noun+post-nominal modifier has a single explanation or multiple explanations.

**3.2.6. Adjective+post-adjectival modifier.** Adjectival phrases may include post-adjectival modifiers, none of which undergo LTR. Such modifiers will be ideophones, ideophonic adjectives used as adjective modifiers, or more general manner adverbs. All true ideophones that can modify adjectives begin with H tone and hence cannot be checked for LTR, but a number of ideophonic adjectives and the general manner adverb **rànkata** ‘very, a lot’, which would otherwise be subject to LTR, show that it does not apply in this environment.

<b>pàtà d’òle kèrkèr</b>	‘small stubby tail’
tail small short & stubby (id.adj.)	
<b>sìri tèccèm</b>	‘big and broad-buttocked’
<b>gàram pàrtàtâ</b>	‘tall and strong’ ( <b>gàraŋ</b> ‘tall’)
<b>gàrar rànkata</b>	‘very tall’

#### 4. Word Classes and Morphemes that Are Exceptions to LTR

Section 3.1 lists environments where LTR always applies when the phonological conditions are met. There are, however, classes of words that never undergo LTR, even in the environments listed in §3.1. We discuss these word classes in §4.1. Likewise, there are classes of words and suffixes that never condition LTR even though they appear in the same syntactic environments seen in §3.1 where words would condition LTR. We discuss these in §4.2.

##### 4.1. Word classes that do not undergo LTR

**4.1.1. Proper names.**<sup>12</sup> Compare the following examples, where the proper names all begin with L tone, to the respective environments in §3.1:

N+N genitives:	<b>tèmshi Kàkkàba</b>	‘Kakkaba’s sheep’
	<b>ìdi Ùmmà</b>	‘Umma’s eye’
	<b>ngorwa Màmmedi</b>	‘Mammadi’s guests’

Monomoraic prep.:	<b>ñ onu dōdo</b>	} ‘I gave money	} {to Kakkaba to Umma to Mammadi}
	<b>ñ Kàkkàba</b>		
	<b>ñ Ùmmà</b> <b>m Màmmedi</b>		

Verb+DO:	<b>ñ bòla Kàkkàba</b>	‘I will find Kakkaba’
	<b>à dǎ Ùmmà</b>	‘he will leave Umma’
	<b>à sowa Màmmedi</b>	‘he will touch Mammadi’

**4.1.2. Determiners.** The only determiners with a phonological shape that would be subject to LTR are the plural demonstratives **màinê** ‘these’ and **màinā** ‘those’ and the plural indefinite **màd’fî** ‘some’. These do not undergo LTR when modifying a noun, a property shared with all other post-nominal modifiers (§3.2.5). These determiners also fail to undergo LTR when used pronominally in canonical LTR environments. The word **an** ‘one who has..., one who does...’, rather than a noun, illustrates N+N genitive to avoid a potential reading where the demonstrative is a modifier of the noun rather than the head of its own phrase.

<sup>12</sup> The failure of proper names to either undergo or condition LTR was first noted in Gimba (1998).

N+N genitive: <b>am màinê</b>	‘one who has these’
Monomoraic prep.: <b>ko màinā</b>	‘from those’
<b>onū dōdo mí màđđī</b>	‘he gave money to some of them’
Verb+DO: <b>ñ dǎ màinā</b>	‘I will leave those’
<b>m̄ mōya màinê</b>	‘I will observe these’
<b>ñ ngàđa màđđī</b>	‘I will eat some of them’

In contrast to these demonstratives in pronominal usage, personal pronouns beginning with L tone (**mǎ** ‘you (pl)’, **màte** ‘them’) DO undergo LTR. The only environments where this possibility arises is where the pronoun is the direct object of a verb bearing the totality extension or an indirect object pronoun clitic. Personal pronouns are bound clitics in all other functions where they follow their host.

<b>à bòla-ti mǎ</b> (< <b>mǎ</b> )	‘he will find you all’
aux find(fut)-tot you(pl)	
<b>bò ngàđà-ti mate</b> (< <b>màte</b> )	‘in order to eat them up’
<b>à ngòrà-to mate</b>	‘he will tie them for her’
aux tie(fut)-her(IO) them	

**4.1.3. Numbers.** The numbers with a phonological shape that would be subject to LTR are **pòđđo** ‘four’ and **bònùm** ‘nine’. Section 3.1.5 cited the numbers **ko pòđđo** ‘forty’ and **dibu bònùm** ‘9000’ as cases where LTR takes place. However, these numbers do not undergo LTR when modifying a noun, a property shared with all other post-nominal modifiers (§3.2.5), nor do they undergo LTR in other canonical LTR environments. Note in the second example below that ‘from nine’ would be homophonous with ‘90’ were it not for LTR applying in the latter case but not the former.

N+N genitive: <b>am pòđđo</b>	‘one that has four’
Monomoraic prep.: <b>ko bònùm kapa bimbadi</b>	‘from nine to ten’
Verb+DO: <b>ñ dǎ pòđđo</b>	‘I will leave four’
<b>m̄ mōya bònùm</b>	‘I will look at nine’

**4.1.4. Question words.** All question words in Bole have a phonological form that would fit the environment for LTR:<sup>13</sup> **lò** ‘who?’, **lè** ‘what?’, **yàllà** ‘which (one)?’, **àu** ‘where?’, **sòttò** ‘when?’, **tàn** ‘how?’. None of these words undergo LTR in any environment.

N+N genitive: <b>tèmshi lò?</b>	‘whose sheep?’
<b>bàni yàllà?</b>	‘which one’s house?’ (cf. <b>bònò yàllà?</b> ‘which house?’)
<b>bàdi yàllà?</b>	‘which one’s knife?’ (homophonous with ‘which knife?’)

<sup>13</sup> As noted in §3.1, the question words **lò** ‘who?’ and **lè** ‘what?’ are the only monomoraic L tone words in Bole, aside from a couple of prepositions, which would always follow an LTR-blocking boundary. One can therefore not be certain whether failure of these words to undergo LTR is because of their membership in the class of question words or because their single mora is not “big” enough to accommodate the H resulting from LTR plus their lexical L. The Fika dialect of Bole does tolerate phrase final F(alling) tone on the monomoraic syllable of the Previous Reference Marker (PRM) **yê** “the”, and the Gadaka dialect realizes many words with final F on light syllables, suggesting that it is class membership rather than phonological shape that accounts for non-application of LTR to **lò** and **lè**.

Monomoraic prep.: **ko sòttò?** ‘from when?’  
**ń àu?** ‘via where?’

Verb+DO: **à dǎ lò?** ‘who will he leave?’  
**ka moya yàllà?** ‘which one will you look at?’

**4.1.5. The word *min* ‘...& Co., ...and others’.** The word (or perhaps clitic) **mìn**, meaning ‘etc., X and others, ones like X, X & Co.’ does not undergo LTR.

N+N genitive: **sōni mìn Bamoi** ‘Bamoi & Co.’s honey’  
**àni mìn kùmbà** ‘one who has things like trays’

Monomoraic prep.: **ka onū dōdo mí mìl lò?** ‘who all did you give money to?’

Verb+DO: **ń wòra mìn kùtè** ‘I will scoop out sorghum, etc.’

## 4.2. Morphemes and words that do not condition LTR

**4.2.1. Proper names.** Proper names do not undergo LTR (§4.1.1) nor do they condition LTR on a following word.

**Kàkkàba Pikkà** ‘Kakkaba of Fika’  
**Tùràre Pikkà** ‘Turare of Fika’  
(cf. **tùràre Pikkà** ‘perfume of Fika, Fika-type perfume’, with a common noun)

**4.2.2. Prepositions of more than one mora.** There are a number of prepositions with more than one mora. In contrast to prepositions of one mora (§3.1.2), prepositions of more than one mora do not condition LTR.<sup>14</sup>

**mana tèmshi** ‘like a sheep’  
**kapa Pikkà** ‘up to Fika; except Fika’  
**lē àdà** ‘even a dog’  
**ńko làwò** ‘for (the sake of) a child’  
**bù’ùm dō pètìlà** ‘black or white’  
**tamànin kòmshine bāwulo** ‘about seven cows’

**4.2.3. The presentatives *èssē* ‘here ... is’, *àssā* ‘there ... is’.** The presentatives, which are non-verbal words historically related to the demonstratives **oshē/oshà** ‘this/that (f)’, do not trigger LTR on their complements.

**èssē sàrò yê** ‘here’s the grass’  
**àssā òshi** ‘there’s a goat’

**4.2.4. Verbs bearing the ventive extension.** The ventive extension has several suppletive allomorphs in complementary distribution by verbal TAM (Lukas 1970-72, Gimba 2000). None of the ventive allomorphs trigger LTR.

<sup>14</sup> An apparent exception to the failure of bimoraic prepositions to trigger LTR is **pai** ‘toward’, e.g. **pai māla** ‘toward the bush’ (< **māla**). This seems to be a remnant of the fact that **pai** is nominal in origin—cf. **payyā** ‘over there’ with **pai**-deictic suffix. This is comparable to Hausa **wajen** ‘toward’, essentially a preposition in modern Hausa, derived from **waje** ‘direction’.

Future:	<b>à ngòràkō tèmshi</b> (*temshi)	‘he will tie and bring a sheep’
Habitual:	<b>à ngoràkō tèmshi</b>	‘he ties and brings sheep’
Subjunctive:	<b>ngòrutu tèmshi</b> <b>ngòrit-to tèmshi</b>	‘he should tie and bring a sheep’ ‘he should tie and bring a sheep for her’
Imperative:	<b>ngòrittī tèmshi</b> <b>ngòràttā tèmshi</b>	‘tie and bring a sheep!’ (sg) ‘tie and bring a sheep!’ (pl)

LTR does not take place after the completive ventive, but in this case, it is the underlying but suppressed completive suffix **-wo ~ -go ~ -ko**, described in §3.1.3, that blocks LTR, not the ventive directly: /**ngòru-n-gò tèmshi** (tie-vent-cpl sheep)/ → [**ngòru-n tèmshi**] ‘he tied and brought a sheep’.

**4.2.5. The class C and D verbal suffix -na.** Verb classes C and D, the two classes with mono-consonantal roots, form their regular verbal nouns and their future verb forms by adding a suffix **-nà/-na**. Objects of verbs bearing this suffix do not undergo LTR.

<b>à yīna tèmshi</b> (*temshi)	‘he will stab a sheep’ (class C verb)
<b>à wēna tèmshi</b>	‘he will get a sheep’ (class D verb)

This suffix has variable tone, i.e. it has L tone in phrase final position (**à rīnà** ‘he will enter’) but H elsewhere (**à rīna sa** ‘he will not enter’). This cannot be the reason for its failing to condition LTR, however, because other words with variable tone do condition LTR, e.g. **ottò** ‘food’ but **otto sātò** (< **sātò**) ‘morning food, breakfast’. Failure to condition LTR is also not a general property of verbal suffixes. Class C and D verbs add a suffix **-sho** in the habitual that does condition LTR, e.g. **à wēsho temshi** (< **tèmshi**) ‘he gets sheep’.

**4.2.6. Imperative agreement suffixes.** The first person plural imperative comprises the second person plural imperative, marked by the vowel **-a**, plus a first person plural agreement suffix **-mu**. Similarly, all second person imperatives of class C and D verbs can optionally add agreement suffixes. All these agreement suffixes block LTR.

<b>ngòrā-mu tèmshi!</b> (*temshi)	‘let’s tie a sheep!’
<b>wekko tèmshi!</b>	‘get a sheep!’ (masculine singular)
<b>weshi tèmshi!</b>	‘get a sheep!’ (feminine singular)
<b>wakku tèmshi!</b>	‘get a sheep!’ (plural)
(cf. alternative forms <b>we temshi!</b> (m or f sg), <b>wa temshi!</b> (pl) ‘get at sheep!, with LTR)	

Blockage of LTR is not a general property of pronominal verbal suffixes. Verbs with indirect objects pronouns do condition LTR (§3.1.3).

## 5. Toward An Analysis of Low Tone Raising

The subsections of §3 present a list of environments where LTR does and does not apply, but these sections have not attempted to provide an analysis that might account for why LTR applies or fails to apply as it does. In this section, without attempting a full-fledged analysis based in any particular version of syntactic theory,<sup>15</sup> we suggest the

<sup>15</sup> The analysis that we present is in the spirit of X-bar theory, and our proposed syntactic heads, “little np” and “little vp” (generalizable as “little xp”), comprise a level of structure similar to  $\bar{N}$ ,  $\bar{V}$ , etc.



There are a number of cases involving NP's where the application or non-application of LTR can differentiate meaning. In all these cases, structural differences account for the semantic and phonological differences.

N+N genitive vs. N+Adjective

**tèmshi mondù** (with LTR) 'sheep of the woman'

**tèmshi mòndù** (no LTR) 'female sheep'

The word **mòndù** can be a noun meaning 'woman', in which case it can participate in a genitive phrase with a preceding noun, as in the first example. It can also be used as an adjective meaning 'female', in which case it heads an adjective phrase, whose boundary blocks LTR, as in the second example. Other adjectives, such as **pètìlà** 'white' can be used nominally to refer to the quality expressed by the adjective, i.e. 'whiteness'. In principle, therefore, other adjectives could participate in constructions such as the examples here, but pragmatically such phrases are unusual.

N+N genitive vs. N+**an** phrase

**òshi ani ûi** (with LTR) 'goat of a pregnant woman' ("goat-of haver-of pregnancy")

**òshi àni ûi** (no LTR) 'pregnant goat' ("goat haver-of pregnancy")

Phrases headed by the words **an** (m), **àni** (f), **ànìn** (pl) can stand on their own as noun phrases or can be postnominal modifiers of nouns. The first example illustrates the former case, with the structure  $[_{NP} [_{np} \text{òshi} [_{NP} \text{àni...}]_{NP}]_{np}]_{NP}$  parallel to that of reading (b) of the example above, with LTR applied. The second example, with LTR not applied, illustrates **àni** in a phrase used as a post-nominal modifier, viz.  $[_{NP} [_{np} \text{òshi}]_{np}]_{AnP} \text{àni...}$ .

N+N genitive vs. N+locative or temporal modifier

**àmma aushi** (with LTR) 'river water', i.e. a type of water ("water-of river")

**àmma àushi** (no LTR) 'water (in the) river'

**am Pikkà** (with LTR) 'Bole person', i.e. person originating in Fika, a Fika-ite

**am Pikkà** (no LTR) 'person of Fika', i.e. someone resident in Fika

**otto Lìtìrìn** (with LTR) 'food (for) Monday(s)', i.e. the type eaten on Mondays

**otto Lìtìrìn** (no LTR) 'food (from) Monday', i.e. reference to when it was cooked

This meaning distinction, discussed in §3.1.1, and concomitant (non-)application of LTR, has a structural explanation if locative and temporal nouns can occupy an adjunct phrase within an NP parallel to the respective phrase types in a verb phrase, e.g.

$[_{NP} [_{np} \text{àmma}]_{np}]_{LocP} \text{àushi}]_{LocP}]_{NP}$   
 $[_{NP} [_{np} \text{otto}]_{np}]_{Temp} \text{Lìtìrìn}]_{Temp}]_{NP}$

This phrase structure may provide an insight as to why phrases with locative and temporal nouns as N<sub>2</sub> can take the linking morpheme /**n̄**/, as discussed in §3.1.1, viz. the presence of the locative or temporal adjunct within its own phrase provides a site for INSERTING /**n̄**/ rather than an /**n̄**/ always being present but potentially "silent". This suggests a similar explanation for the linking /**n̄**/ used with adjectives, discussed in §3.2.5. This formative /**n̄**/ is required when adjectives are used pronominally (**m̀ pètìlà** 'a white one'), and with numbers, it forms ordinals (**m̀ pòd̀d̀o** 'fourth'). Rather than viewing /**n̄**/ as a "linking" morpheme, we might view it as the head of certain phrase

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at the end of the NP. However, a surface cooccurrence constraint in Bole prohibits successive **yê**'s, thus leaving a single **yê** of ambiguous scope or of dual function.

types, whose presence is obligatory or optional depending on the phrase type and the context.

**5.2. LTR within adjective phrases (AP).** Post-adjectival modifiers do not undergo LTR. Parallel to the analysis of NP's in §5.1, we propose that post-adjectival modifiers head a phrase following the adjective rather than combining with the adjective to form a head. We use “adverb phrase” (AdvP) as a cover term for post-adjectival phrases, though there are probably several types of post-adjectival phrases (ideophone phrase, manner phrase, etc.), each with its own properties.<sup>18</sup>

[<sub>AP</sub> [<sub>A</sub> **gàraŋ** ]<sub>A</sub> [<sub>AdvP</sub> **rànkatà** ]<sub>AdvP</sub> ]<sub>AP</sub> → [**gàrar r̀ankatà**] ‘very tall’

**5.3. LTR within verb phrases (VP).**<sup>19</sup> LTR applies between a verb and a “neutral” direct object or a locative goal but not between a verb and a subjective complement or between a verb and a questioned or focused object or locative goal. The proposal at the beginning of §5 that LTR operates only between words that, together, form the head of a phrase seems less easy to justify the case of V+DO than N+N genitives (§3.1.1) or Clitic+Host (§3.1.4). Cross-linguistic evidence, however, does suggest there is a closer syntactic bond between verb and direct object than between verb and other arguments. In nominalized constructions in Miya, for example (Schuh 1998:255-257), V+DO uses a “direct genitive” typical of compounds whereas V+Subject uses a “linked genitive” typical of alienable possessives. Parallel to the phrasal head “little np” that we proposed for genitive phrases that head an NP, we propose “little vp” for the phrase V+DO that heads a VP. Other post-verbal phrases are outside little vp. We must propose that intransitive verbs of motion + locative goals also make up little vp in order to account for LTR within such phrases. A subjective complement following an intransitive non-motion verb falls outside the little vp. For verbs that can be used transitively with a direct object or intransitively with a subjective complement, we thus get phonological differences related to the two meanings.

**mè̀mù à bongiro òshi** (with LTR) ‘the man turns the goat’  
 man aux turn(hab) goat  
 ... [<sub>VP</sub> [<sub>vp</sub> **bongiro** ]<sub>vp</sub> [<sub>NP</sub> [<sub>np</sub> **òshi** ]<sub>np</sub> ]<sub>NP</sub> ]<sub>VP</sub>

**mè̀mù à bongiro òshi** (no LTR) ‘the man turns into a goat’  
 ... [<sub>VP</sub> [<sub>vp</sub> **bongiro** ]<sub>vp</sub> [<sub>NP</sub> [<sub>np</sub> **òshi** ]<sub>np</sub> ]<sub>NP</sub> ]<sub>VP</sub>

Verbs with questioned or focused direct objects raise structural issues. Consider the following sentences with the direct object **tè̀mshi** ‘sheep’:

**mu bòla tè̀mshi Bamoi** (with LTR) ‘we will find Bamoi’s sheep’  
 we find(fut) sheep Bamoi (neutral S with LTR between verb and DO)

Q: **mă bòla tè̀mshi yàllà?** (no LTR) ‘which sheep will you find?’ (Q object)

= **mă bòla tè̀mshi yàllà?** (with LTR)

A: **mu bòla tè̀mshi Bamoi** (no LTR) ‘we will find BAMOI’S SHEEP’ (F object)

<sup>18</sup> In principle, the head of the AP should be “little ap”, parallel to little np in NP and little vp in VP to be discussed below. However, there do not seem to be structures that are more complex than a simple adjective that could head an AP.

<sup>19</sup> We do not discuss the non-application of LTR between a verb and adjunct phrases, such as manner or temporal adverbs, or between a direct object and a following phrase. The presence of large phrase boundaries that would block LTR between such constituents seems uncontroversial.

Questioned constituents and their focused counterparts in Chadic languages generally occupy parallel syntactic structures. A focused direct object in Bole does not undergo LTR. A questioned object likewise can resist LTR, but alternatively it can undergo LTR. Kenstowicz (1985), describing object focus in Tangale, which is closely related to Bole, notes comparable phonological phenomena to the (non-)operation of LTR in Bole correlating with V+neutral DO vs. V+focused DO. Kenstowicz proposes that although both neutral and focused direct objects are immediately post-verbal, focused direct objects have undergone string vacuous movement away from the verb and into a sentence-final Focus Phrase (FP). Such an account fits well with our proposal that LTR takes place between constituents that form the head of a phrase. If the second of those constituents (in this case the NP that forms the head of little *vp* with V) is in FP rather than little *vp*, then the syntactic condition for LTR is not met. Optionality of LTR, as illustrated in the example question above, would be a result of choosing between movement to FP or relying on pragmatics for the proper interpretation.

Kenstowicz (1985) notes that ALL questioned and focused phrases are sentence final in Tangale, a fact that would follow from all such phrases occupying a string final FP, which right-branches from the sentence root node. The facts of Bole suggest a similar account. In Bole, resistance to LTR by questioned and focused constituents is not confined to V+DO. For example, in phrases headed by a monomoraic preposition, questioned complements do not undergo LTR, e.g. **ko kòrì lò?** ‘from whose farm?’, not \***ko kòrì lò?**, because the structure is actually [<sub>PP</sub> **ko** [<sub>NP</sub>  $\emptyset$  ]<sub>NP</sub> [<sub>FP</sub> **kòrì lò** ]<sub>FP</sub>.

#### 5.4. Clitic+host vs. comparable constructions where the first element is not a clitic.

There are two principal environments where clitics condition LTR on their hosts (§3.1.2). Each of these environments have syntactic counterparts where LTR does not take place.

##### Subject+Verb

**shi wallaj jìshi** (clitic subject with LTR) ‘you (f) escaped’  
**uwwa wàllan jìsu** (noun subject with no LTR) ‘the goats escaped’

##### Preposition+complement

**ko Pikkà** (monomoraic preposition with LTR) ‘from Fika’  
**har Pikkà** (bimoraic preposition with no LTR) ‘(all the way) to Fika’

We have proposed that LTR applies between elements which, together, comprise a phrasal head, a configuration that is not feasible for Subject + Verb or Preposition + Complement, and the non-application of LTR between nominal subject + verb and bimoraic preposition + complement seem to confirm our hypothesis about structure.

For phrases comprising pronominal clitic subject + verb and monomoraic preposition + complement, we propose a phonological explanation rather than a syntactic one. Bole, like other Chadic languages, has an antipathy to free monomoraic words.<sup>20</sup> To avoid using free monomoraic words, first and second person subject pronouns, all of which are monomoraic except **mă** ‘you (pl)’,<sup>21</sup> and monomoraic prepositions are cliticized to a following host. LTR applies within the resultant clitic phrase. In these cases, then, LTR looks to the close morphophonological nexus rather than to the syntactic structure.

**5.5. Problematic cases: word and morpheme classes that do not undergo and/or condition LTR.** The types of words listed in §4.1 that do not undergo LTR are proper names, determiners, numbers, question words, and **min** ‘...& Co.’. Proper names have

<sup>20</sup> There are only two monomoraic words in Bole that can be used without some kind of complement or affix, viz. **lo** ‘meat’ and **’ya** ‘thing’, and the latter is rarely used in unbound contexts.

<sup>21</sup> Cliticization of **mă** to the verb must be analogical with the other first and second person pronouns. This is the only bimoraic formative that behaves in this way.

special properties in many languages. For example, in Bole, in addition to neither undergoing nor conditioning LTR, they comprise the only type of word that allows lexical Rising tone. In effect, a proper name seems to be a sort of “nominal island” with its tonal properties locked in.

Question words may have the same island-like property as proper names, though there are alternative explanations for each of the question words. The words **lò** ‘who?’ and **lè** ‘what?’, as pointed out above, are the only monomoraic words that are potential undergoers of LTR. Hence, there is no independent test for whether such words would undergo LTR. The only environments for the words **sòttò** ‘when?’ and **àu** ‘where?’ are environments where LTR would not take place under any circumstances, viz. these words would always be heads of temporal or locative phrases in VP’s or temporal or locative N<sub>2</sub> in N+N genitives (see discussion in §3.1.1). The interrogative determiner **yàllà** ‘which (one)?’ behaves like other determiners, none of which undergo LTR (see immediately below).

There is also a likely structural explanation for resistance of LTR by determiners and numbers. These words may all be used pronominally in addition to use as nominal modifiers. In pronominal use, there is always a known referential head, i.e. in phrases like **ñ kòna màinê** ‘I will take these’ or **ñ kòna pòdđo** ‘I will take four’, there are contextually supplied referents to which **màinê** and **pòdđo** refer. It is therefore reasonable to assume that they always head a phrase within an NP, even though they may be the only overt element of the NP. The structures for the verb phrases of the two example sentences would thus be the following:

[<sub>VP</sub> [<sub>VP</sub> **kòna** [<sub>NP</sub> Ø [<sub>DP</sub> **màinê** ]<sub>DP</sub> ]<sub>NP</sub> ]<sub>VP</sub> ]<sub>VP</sub>  
 [<sub>VP</sub> [<sub>VP</sub> **kòna** [<sub>NP</sub> Ø [<sub>NumP</sub> **pòdđo** ]<sub>NumP</sub> ]<sub>NP</sub> ]<sub>VP</sub> ]<sub>VP</sub>

Evidence for a structural explanation for the failure of LTR to apply to numbers, rather than a lexical explanation as for proper names, is the fact that in compound numbers like **ko pòdđo** ‘forty’ and **dibu ßònùm** ‘9000’, **pòdđo** and **ßònùm** do undergo LTR internal to the number phrase (§3.1.5), and these are just the cases where the numbers could not plausibly be post-nominal modifiers.

The remaining word that does not undergo LTR is **min** ‘& Co’. We note the kinship of this word with determiners and suggest that, like determiners used pronominally, it is preceded by a Ø head whose referents are implied by the translation ‘& Co’.

Turning to word classes that do not condition LTR, we listed proper names, multi-moraic prepositions, presentatives, ventive suffixes, the class C and D verbal noun and future suffix **-na**, and imperative person agreement suffixes. As suggested above, proper names seem to be “tonal islands”. Under this characterization, it is not surprising that they would fail to condition LTR in the same way that they fail to undergo LTR. Section 5.4 provides an explanation for why multi-moraic prepositions do not condition LTR, viz. they head a prepositional phrase and are separated from the complement NP by a large phrase boundary. Unlike monomoraic prepositions, they do not undergo phonological cliticization to the next word. Presentatives may have a similar explanation. Though the exact structure of presentative sentences such as **èssē làwò** ‘here’s the child’, **èssē inà** ‘here I am’ is uncertain, there is clearly a fairly large boundary between the presentative and its complement, as shown by the fact that a personal pronoun complement, as in the second example, is an independent pronoun rather than a pronoun clitic (\***èssē-nò**).

The remaining LTR blockers—ventive suffixes, the **-na** verbal noun suffix, and imperative agreement suffixes—are all verbal suffixes, but blockage of LTR is not a general property of verbal suffixes. At this time we have no account for the fact that LTR fails to apply after these particular suffixes but not others.

## 6. Conclusion

The application of Low Tone Raising depends on a combination of phonological, morphological, and syntactic factors. The *sine qua non* for LTR is the requirement that a word initial L tone must follow a syllable bearing H tone, and the L syllable cannot have a modally voiced obstruent as onset. Relatively exhaustive lists of syntactic constructions that bring constituents together to form the phonological configuration for LTR show that LTR is sensitive to the nature of the syntactic environment as well as the phonologically environment. Section 5 argues that LTR applies only between elements that together form the head of a phrase. In some cases, morphological and/or syntactic adjustments are necessary to “close up” constructions that would otherwise have large syntactic boundaries (cliticization of pronoun subjects to verb and monomoraic prepositions to their complements, grouping verbs and nominal direct objects). Certain words and word classes fail to undergo and/or condition LTR. In some cases, principled structural explanations exist (determiners and numbers being part of larger phrases with empty heads), but in other cases one appears to have to resort to lexical stipulation (proper names, certain verbal suffixes). In short, a restricted combination of phonological, morphological, and syntactic factors account for nearly all cases where LTR applies, but a small amount of residue remains as having to be lexically stipulated.

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