

Prosody of declaratives and questions in Rere (Koalib)*

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This paper introduces the prosodic system of declarative sentences and questions in Rere (Koalib), a Niger-Congo language of Sudan. The system is characterized by pitch raising and lowering, which target boundary positions and particular tones. Declaratives utterances are marked by a final L% boundary tone. This has different effects depending on the size of the utterance and the final tone type, lowering a final sequence of high tones and causing a pitch fall on the final syllable. Polar questions are marked by a final low-toned clitic. The low-tone of the clitic blocks H tone lowering found in corresponding declaratives, and a H% raises the rightmost H tone of the question if one is present. Upsweep affects a series of high tones, and pitch raising also marks the boundary between the verb and a post-verbal subject. Finally, a high tone added at the left edge of the verb marks wh-ex-situ questions as well as other similar constructions.

Keywords: Rere, polar questions, wh-questions, final lowering, upsweep, boundary tones

1 Introduction

Rere is a Niger-Congo language spoken in the Nuba Mountains of the Republic of Sudan. The language is more commonly known as Koalib (ISO 639-3 kib). Quint (2009) presents the phonology of Koalib, drawing primarily from a dialect he identifies as Rere. However, the term Koalib appears to be an exonym (from Sudanese Arabic kawālib), and the second author of this paper, who is a native speaker, prefers to use Koalib to refer to the people rather than the language. We therefore use the term Rere here in accordance with this preference.¹ In Rere, the language is referred to as [ɨrɛːrɛ], where the ɨ- is a noun class prefix. Rere is part of the Heiban family of languages which includes Moro, Ebang, Otoro, Tira, among others, previously classified as Kordofanian (Schadeberg 1981, 1989), although recent research suggests Kordofanian may not be a unified genetic entity (Dimmendaal 2018). Kordofanian languages, like many other Niger-Congo languages, have extensive noun class systems with concomitant concord and agreement on other words.

Tone plays a major role in the Rere language. In addition to lexical contrasts, there is an extensive grammatical tone system of aspect and person marking in verbs, and tone is also

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¹Quint (2009) lists several other subgroups/dialects of Koalib, namely Guran, Gumbri, Ondona, and Nyugur.

used in the nominal system to mark case. In this paper, we illustrate the effects of phrasal tone or intonation overlaid over this system in neutral declaratives, polar questions and in-situ and ex-situ content or wh-questions. We show how both pitch raising and lowering are attested, and that these processes may specifically target particular tones. In addition, ex-situ wh-questions are indicated, in part, by a high tone added at the left edge of the verb. All examples presented in the paper were produced by Titus Kubri Kajo Kunda, the second author, who was born and raised in Kwandaŋ in the Abri area of the Nuba Mountains. The analysis presented pertains to his speech, but we cannot make claims as of yet to its generality with respect to other speakers. Section 2 presents a brief introduction to lexical and grammatical tone in the language. Section 3 presents the prosody of declarative utterances, with discussion of pitch lowering and raising. Section 4 discusses the prosody of yes/no or polar questions. Section 5 addresses both the structure and prosody of in-situ and ex-situ wh-questions. Section 6 summarizes the main findings.

2 Lexical and grammatical tones

Rere has three lexical tones: high H, low L, and falling HL as illustrated by these minimal pairs (Quint 2009:129).²

- (1) a. ηwóŋ H ‘saliva’
 b. ηwòŋ L ‘eggs’
 c. ηâw HL ‘water’
 d. ηàw L ‘femininity, womanhood, beauty’

Figure 1 illustrates (1a-c) as pronounced in utterance-initial subject position before a low-toned verb in a carrier phrase: X ηŋàw ‘X is/are good’. The onset of the words were not included in the pitch tracks here because the onset has been found not to reflect the actual tone contour and introduces ‘erratic pitch patterns’ to the tone contour (Zhang 2001). Note that the H tone is realized with a rise in this position. This is not construed as an initial L% boundary tone, but as inclination, a steady pitch rise that is also observed in sequences of H tones throughout the language. See section 3.2 for discussion.

²Abbreviations: ACC = accusative, CL = noun class, FOC = focus, HAB = habitual, IPFV = imperfective, O = object, PFV = perfective, PL = plural, POSS = possessive, POST = postposition, PRF = perfect, Q = question marker, REC = recent perfect, REL = relative clause, REM = remote perfect, SG = singular

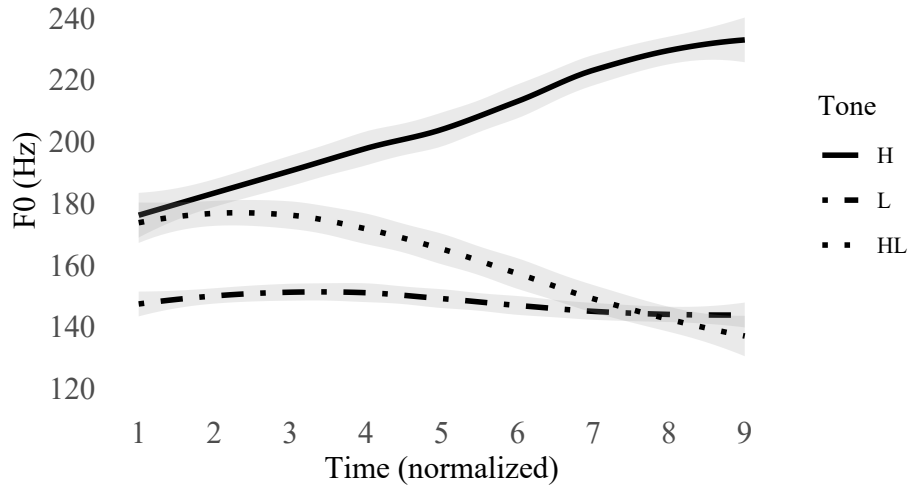


Figure 1: F0 track of Rere lexical tones

In noun roots, the HL falling tone appears to be restricted to the final syllable, either a closed syllable or a long vowel, such as *kérô*: ‘nest’. It can appear word medially in verbs, also on a long vowel or closed syllable, ex. *kwêrné* ‘s/he will finish’. This might suggest that HL can only appear on heavy syllables and is a combination of H and L tones. However, the falling tone can appear on open short syllables on affixes word-finally. For example, the instrumental/comitative suffix *-Cê* (C = noun class concord) has falling tone: *lâr-lê* ‘with the rope’, which contrasts with final vowels with H or L tone: *lârtgé* ‘they will invite’ and *lè:lè* ‘termite’. This suffix also contrasts tonally with other nominal affixes such as the accusative case suffix *-né* as in *kòtò-né* ‘gourd-ACC’ or *-è* as in *lò:m-è* ‘fish-ACC’. Due to these contrasts, one must conclude that HL is a distinct tone from H and L, even if its distribution within nominal and verbal stems favors heavy syllables. See Quint (2009) for further discussion of tone distribution.

Tone is also used to express grammatical distinctions in verbs. Aspectual categories are differentiated by affixes as well as by tone patterns. For example, the recent perfect and remote perfect both have a prefix *m-*, but have different tone patterns. Remote perfect is all low-toned, while recent perfect has a low-toned prefix and lexical tone on the stem, either LH, HH or HL.

(2)	REMOTE	RECENT	
a.	<i>kwò-m-bèrtà</i>	<i>kwò-m-bèrté</i>	‘s/he has wiped’
b.	<i>kwò-m-mètè</i>	<i>kwò-m-mété</i>	‘s/he has helped’
c.	<i>kwò-m-lègòdà</i>	<i>kwò-m-légòdà</i>	‘s/he has closed’

Subject and object marking on verbs is also distinguished by tone for some forms: *lí-ɲ-jí-búblí* ‘They (CL1) will wrestle us.’ vs. *lí-ɲ-ɲì-búblí* ‘We excl. will wrestle them (CL1)’. In the first example, the class agreement marker *lí-* refers to the subject ‘they’³, and the

³Noun classes are labeled based on the initial consonant of the noun and class agreement, in this case class ‘l’ for the human plural class.

ɲ- prefix to a 1st person object. ɲí- indicates a plural object. In the second example, the interpretation of these markers is switched, which occurs when the object is 3rd person. li- refers to the 3rd person plural object ‘them’ and the ɲ- to a 1st person subject. ɲ- carries a H tone when marking an object, but L tone when marking a subject, which accounts for the tone differences between the forms.

In nouns, accusative case marking can employ tone either as the sole marker of a case distinction or accompanying a suffix: kò:ɾò ‘plant-NOM’ vs. kó:ɾò ‘plant-ACC’ or ʈɪɲén ‘dog-NOM’ vs. ʈɪɲén-ù ‘dog-ACC’. These are just two of the many ways to mark accusative case in Rere (Quint 2011; Boychev 2013). See section 3.1 for discussion of the effect of tone lowering on case-marked nouns.

This brief introduction to lexical and grammatical tone illustrates a few of the ways that tone is used in the language. In the rest of the paper we will examine how intonation affects these tones and how additional tones associated with questions are manifested.

3 Prosody of declaratives

Rere is an SVO pro-drop language, although the SVO order can be changed in questions, relative clauses, focus cleft constructions and when the object is previously mentioned in the discourse and referenced by a verbal noun class agreement marker (See section 5 for more details on wh-questions). Declarative neutral assertion sentences in Rere are generally characterized by maintenance of a steady pitch range, rather than pitch declination or tone-terracing. The following sentence is all low-toned. We show the phonetic transcription in the first line and the morphological breakdown and phonemic transcription in the second line. Apart from minor perturbations due to stops, the F0 of the L targets are similar throughout the utterance, as seen in Figure 2.⁴

- (3) [kwònàɲènà ɲèɖà]
kwì-nàɲènà ɲèɖà
CLkw-want.PFV CLɲ.cow
‘She wanted a cow.’ (Figure 2)

⁴Rere has a number of segmental processes that are reflected in the transcriptions in this paper. The vowel of the class agreement prefix, which we transcribe as [ɪ], is rounded to [ʊ] when preceded by the class marker kw. Rere also has cross-word vowel assimilation, regressive voice assimilation, and lenition (voicing and/or spirantization of stops) in non-phrase initial position, dependent on speech rate. See Quint (2009) for discussion of some of these processes.

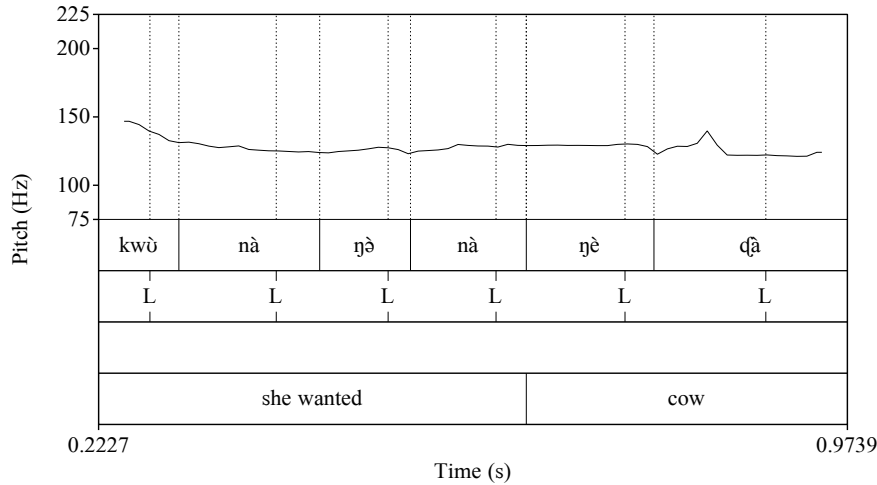


Figure 2: F0 track of (3) ‘She wanted a cow.’

3.1 Pitch lowering

Pitch can fall in utterance final position, a phenomenon known as *final lowering* (Lieberman and Pierrehumbert 1984). Quint (2009:146) also notes this effect in Rere, attributed to a pause. The following example sentence in (4) is all low-toned except for two H tones on the final prosodic word jí:ðì=ná. As seen in Figure 3, the first H tone reaches its target, then the penultimate syllable shows a pitch drop from the H tone, and this continues with the final syllable [na] to about 94Hz, much lower than the other L tones in the sentence, which average about 120Hz. The final syllable also has creaky phonation. Creaky phonation can accompany lowered pitch, but does not otherwise appear, so we assume that pitch lowering causes creak and not the reverse. This type of final lowering can be analyzed as a boundary tone L% serving to mark the end of the utterance. It lowers the final H tone to a pitch lower than the other L tones in the utterance. Underlying final low tones can also be lowered; however the lowering of low tones is optional, as seen in Figure 2 where there is no pitch drop.

- (4) [t̪irà t̪ùnd̪əðì jí:ðìnà]
 t̪irà t̪-ùnd̪əðù jí:ðì=ná
 CLt.girl CLt-cut.PFV CLj.meat-POST
 ‘The girl cut up meat.’ (Figure 3)

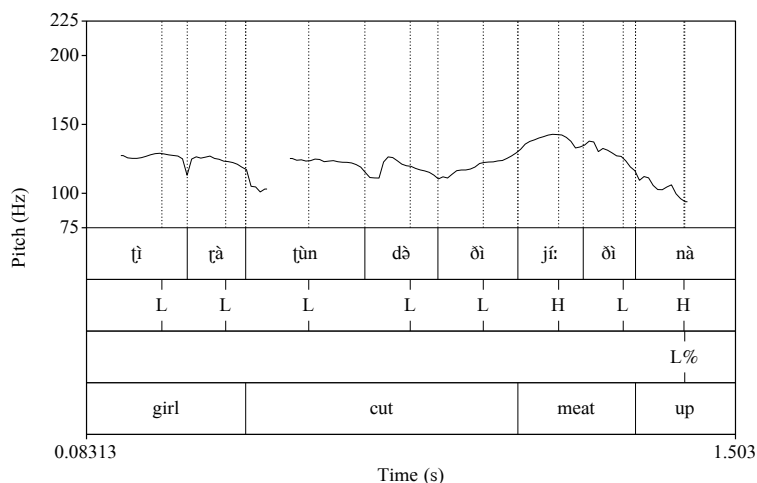


Figure 3: F0 track of (4) ‘The girl cut up meat.’

If the final word in a declarative utterance ends in a sequence of H tones that are linked autosegmentally, these H tones are all lowered. Here we illustrate the LHHH habitual form of the verb ‘cough’ in three different contexts. If the verb occurs alone as in (5a), pitch drop is found on the final syllable only. This is the intonational pattern when words are pronounced in isolation or in citation form. In (5b), in contrast, there is an overt subject. In this case, lowering of H tones applies to all the Hs of the verb. We illustrate this with a H-toned subject to indicate that it is only the tones of the final word that are affected. If the subject is L-toned, the same effect applies. Finally, if another word or phrase follows, such as an adverb in (5c), the LHHH tone pattern of the verb is fully realized. These sentences are illustrated with pitch tracks in Figures 4 and 5.

- (5) a. [kwòtǐ̀dùlǐ̀]
 kwì-tǐ̀-ǎ̀dùlǐ̀
 CLkw-HAB-cough.HAB
 ‘He coughs.’ (Figure 4)
- b. [kwór kwòtǐ̀dùlǐ̀]
 kwór kwì-tǐ̀-ǎ̀dùlǐ̀
 CLkw.man CLkw-HAB-cough.HAB
 ‘The man coughs.’ (Figure 4)
- c. [kwór gwòtǐ̀dùlǐ̀ ɕʰóŋɕʰək]
 kwór kwì-tǐ̀-ǎ̀dùlǐ̀ ɕʰəkɕʰək
 CLkw.man CLkw-HAB-cough.HAB every.day
 ‘The man coughs every day.’ (Figure 5)

Figure 4 shows the distinction between the word in isolation in (5a) on the left of the graph, and the same word preceded by a nominal subject (5b) on the right. These were

recorded separately but combined in a single graph to show the contrast. For (5a), H tone is maintained on two syllables followed by pitch drop on the last to a level much lower than the initial L tone. For (5b), there is falling pitch after the high-toned subject to the low tone target of the first syllable of the verb, followed by a series of low tones, and a slight fall on the last one.

Figure 5 shows the same verb in non-final position. The sequence of H tones on the verb are produced fairly flat with a slight inclination. The adverb has HL tone, so the penultimate H is unaffected by final lowering. There is no apparent dip in the last syllable caused by a L%, so it is not indicated.

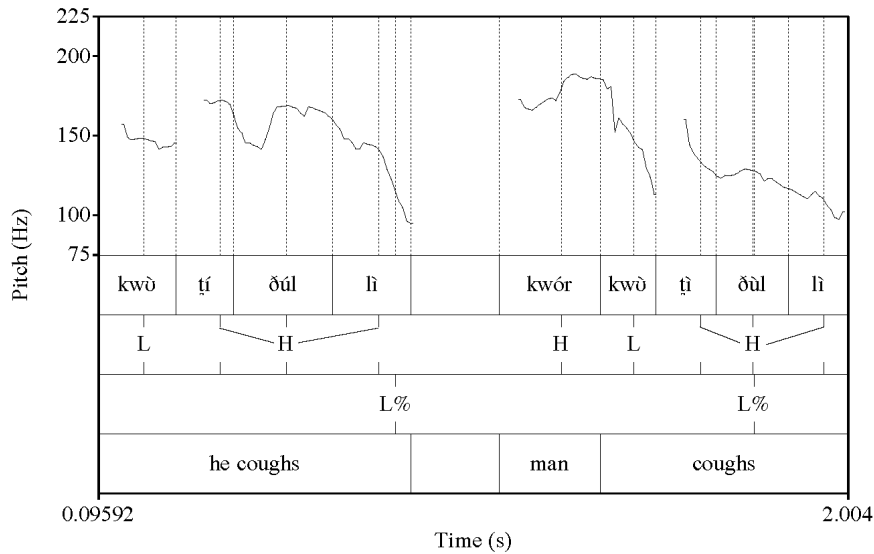


Figure 4: F0 track of (5a) 'He coughs.' vs. (5b) 'The man coughs.'

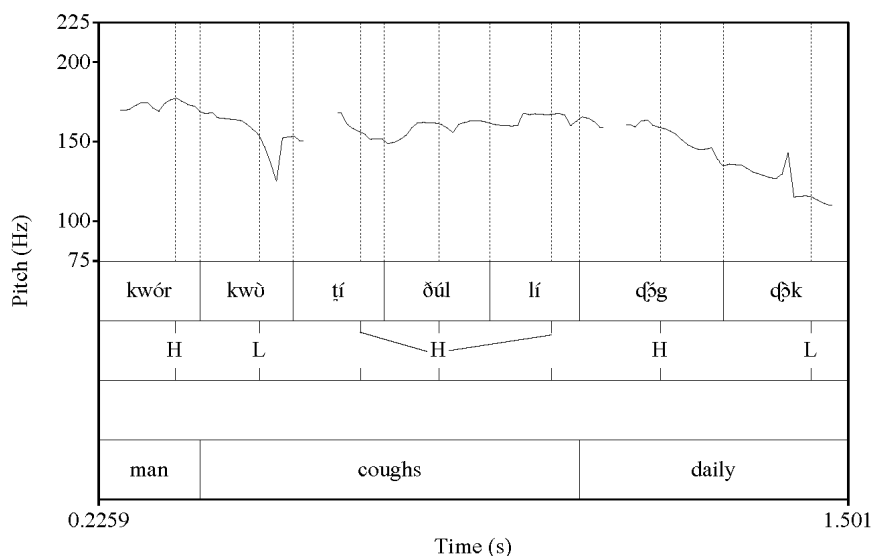
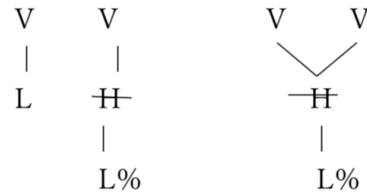


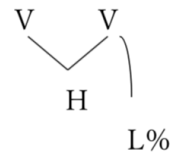
Figure 5: F0 track of (5c) ‘The man coughs every day.’

Final lowering of sequences of Hs could be analyzed by means of a phonological rule that changes an autosegmental H to a L in utterance final position. However, we also need to account for the isolation pattern where only the final H tone is affected, and for the fact that L tones can optionally lower in final position, too. We therefore propose that lowering is due to a L% that has different attachment properties depending on the type of tone and the type of utterance. First, all final H tones obligatorily lower in multi-word utterances. We attribute this to the L% attaching to a H tone specifically rather than the tone bearing unit (TBU), and overwriting the H. If the H tone is multiply linked, all the Hs are lowered (diagram a in Figure 6 and the pitch track on the right in Figure 4). Second, the isolation pattern is attributed to the L% attaching to the final TBU of the prosodic word. This pulls the pitch of the H attached to that TBU down and can create a lowered tone or a falling contour, but it does not affect preceding H tones linked to other TBUs (diagram b in Figure 6 and the pitch track on the left in Figure 4). Third, the optional lowering of a final L tone in multi-word utterances is attributed to a L% optionally attaching to the final TBU or to the final L (the effect will be the same) (diagram c in Figure 6). For examples of this kind of lowering, see the left pitch track in Figure 15 or the pitch track in Figure 18. Although this analysis is very similar to one in which there is a phonological rule that changes a H to L, it has two advantages. First, all the final lowering effects are due to a L% attached at the right edge of utterances. Second, the effect of a L% phonetically is a final pitch drop which pulls the pitch of the final TBU lower. Sequences of H tones lowered by L% show this effect, and they do not seem to exhibit the flat pitch observed with sequences of low tones in final position. If a H changed to a L by rule, we would have to add an additional L% to account for the extra final pitch drop, but in an obligatory fashion for lowered H tones but optionally for L tones. As all final H tones under the current analysis are lowered by L%, this additional pitch drop is accounted for. The three patterns are illustrated in Figure 6.

- a. H-lowering – multi-word utterances (obligatory)



- b. H-lowering – isolation (obligatory)



- c. L-lowering – multi-word utterances or isolation (optional)

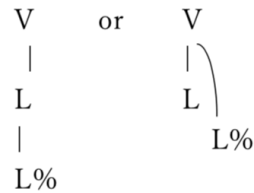


Figure 6: Illustration of L% attachment

The lowering effect on H-toned final words can also be observed with bisyllabic object nouns in final position. The tone patterns LL, LH and HH are all realized as LL utterance-finally when following a low-toned verb, but HL is unaffected. These tone patterns are the accusative tone patterns and may not necessarily match the tone of the nominative forms.

(6)	ACC. TONE	NON-FINAL	FINAL		
a.	LL	ʔà:ʔà	ʔà:ʔà	‘shepherd’	Figure 7
b.	LH	jàɲná	jàɲnà	‘bodies’	Figure 8
c.	HH	lá:mín	là:mìn	‘finger’	Figure 9
d.	HL	kó:rò	kó:rò	‘plant’	Figure 10

In Figures 7-10, we show these nouns following an all L-toned verb, with and without a final adverb *kìlìgìn* ‘yesterday’, which itself has LLH tone, but is realized as [gìlìgìn] with all low tone in final position.⁵ The LL noun ʔà:ʔà ‘shepherd’ shows no change with and without the following adverb in Figure 7.

⁵This word can also be pronounced without the second vowel as [gìlìgìn].

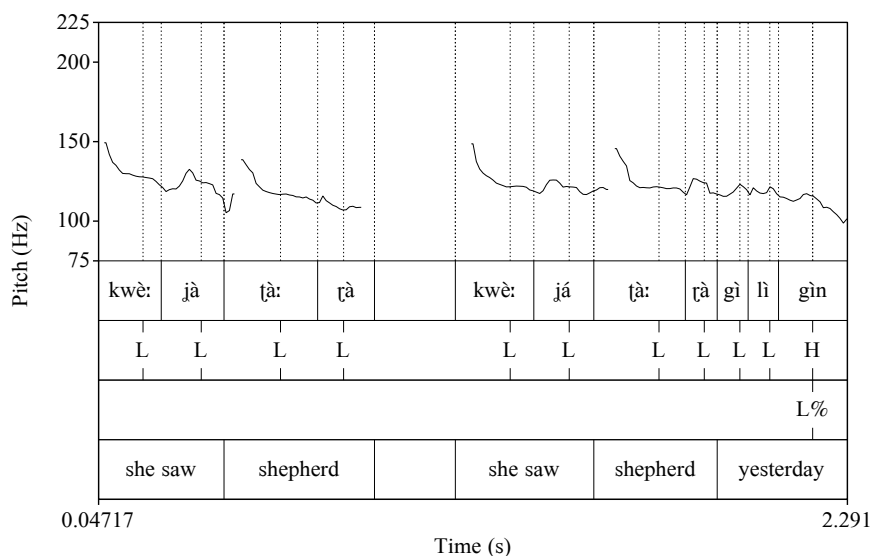


Figure 7: F0 track of (6a) ‘S/he saw a shepherd.’ vs. ‘S/he saw a shepherd yesterday.’

When the adverb is present, the noun *jàɲná* has LH tone. Following the H tone, the F0 gradually falls on the adverb to approximately the same level as the L tones earlier in the utterance, with a final pitch drop, as seen in the pitchtrack in Figure 8. In utterance final position, however, the same word *jàɲná* is realized with no H tone as LL. There is also a pitch drop on the final syllable, indicating that the L% can pull the syllable lower.

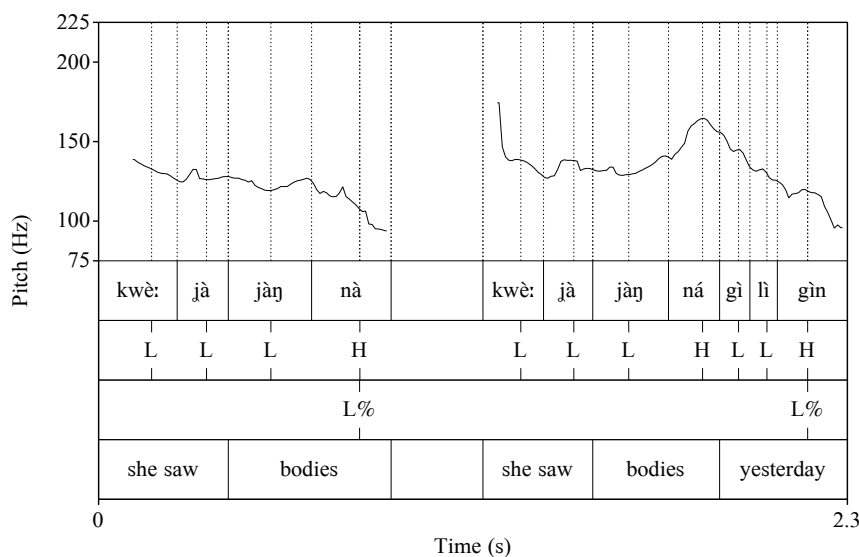


Figure 8: F0 track of (6b) ‘S/he saw bodies.’ vs. ‘S/he saw bodies yesterday.’

The same effect is observed with the HH noun *lá:mín* ‘finger’. In utterance final position, *lá:mín* is realized as LL, with a final pitch drop. When followed by the adverb, however,

the HH noun shows higher tone on the second of the two Hs, and then the pitch descends sharply on the adverb, as seen in Figure 9. This raising effect is upsweep or inclination and is indicated with a H% (see section 3.2 for more details).

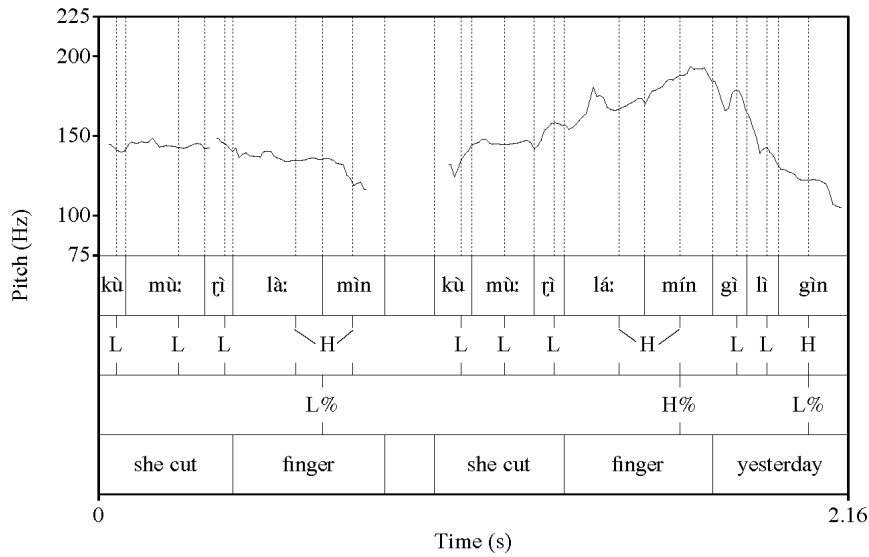


Figure 9: F0 track of (6c) ‘S/he cut a finger.’ vs. ‘S/he cut a finger yesterday.’

Finally, consider the realization of HL nouns. Whether there is a final adverb or not, the pitch contour HL is unaffected, as seen in Figure 10. This shows that only H tones on the final syllable, and any adjacent preceding H tones on the same word, can be lowered. Or, to put it another way, assuming sequences of H tones to be connected autosegmentally on the final word, a final H autosegment becomes L. In Figure 10, the final L-toned syllable drops to a lower pitch than the preceding L tones, so we posit a L%. As stated previously, L tones in final position are optionally marked by L%, and this example shows such an effect.

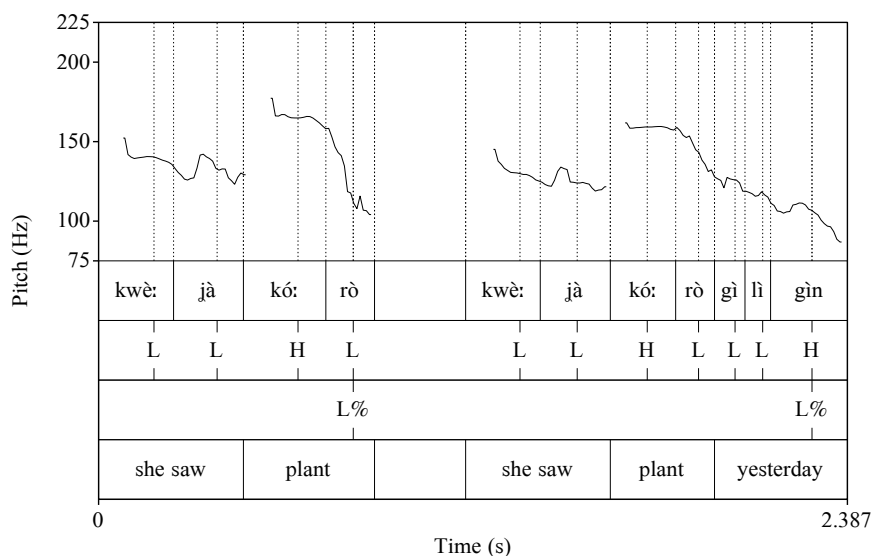


Figure 10: F0 track of (6d) ‘S/he saw a plant.’ vs. ‘S/he saw a plant yesterday.’

The patterns of the four nouns in final and medial position are summarized in Figure 11 and 12 with F0 normalized. The distinction between HL and the other three tone patterns HH, LL and LH is clear in Figure 11. Note that the lowered HH pattern is still higher than the LL, so it is not absolute neutralization, at least not for this particular example. In contrast, the forms are all distinguished in medial position in Figure 12. The HH noun with the rising pattern ends higher than the H of the LH. This is upsweep, as will be discussed in Section 3.2.

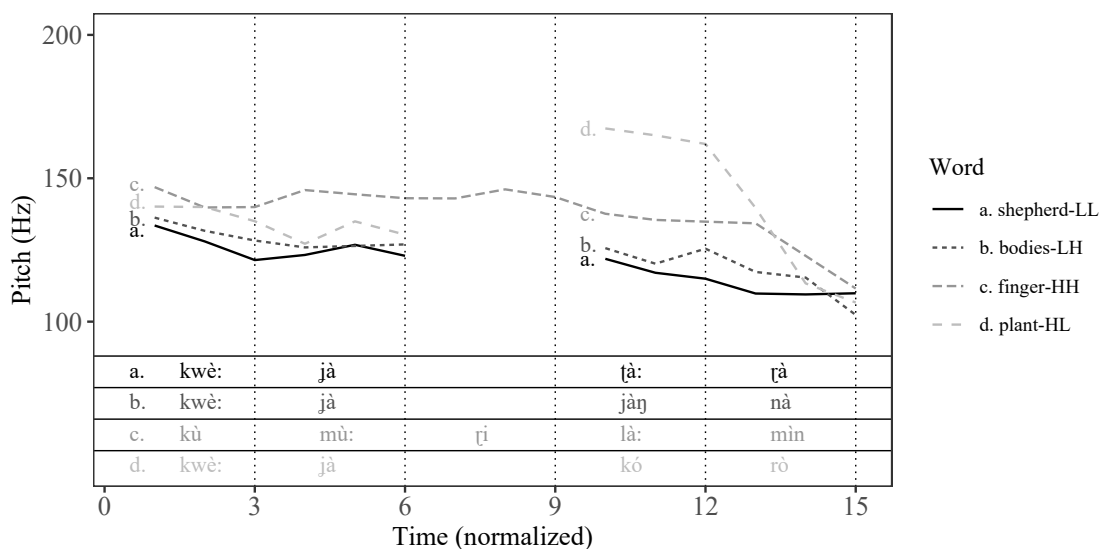


Figure 11: Tone neutralized in word-final position

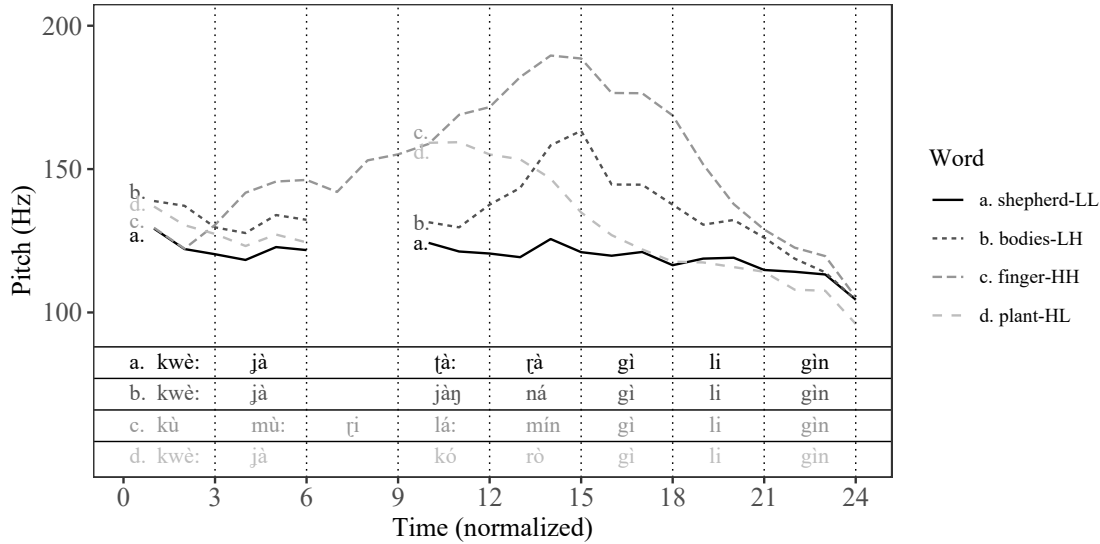


Figure 12: Tone preserved in word-medial position

We assume that the HH nouns have a H tone that is linked autosegmentally to both vowels, and this accounts for the fact that both vowels are lowered in final position. However, this is not the case for all nouns with a sequence of final H tones. There is a distinction between nouns that end in H tone that co-occur with the accusative suffix *-á* and those that have no suffix or co-occur with a different H-toned accusative suffix, such as *-é* or *-ɲí*. When in non-final position, all the nouns in (7) have a LH-H pattern, but in final position they differ: either LH-L with *-á* or LL-L with other suffixes. We attribute this behavior to a difference in autosegmental representation. We propose that the *-á* suffix has its own H tone, whereas the other suffixes are toneless and receive their surface tone either from spreading from the noun stem, or from an overall accusative LH tone melody assigned to the whole noun, including the suffix.⁶ When final lowering applies to the noun, only the rightmost H autosegment lowers, which is just the high tone of the suffix in the case of *-á*, but is both final high tones in the case of the other nouns.

(7)	NON-FINAL	FINAL		NON-FINAL	FINAL	
a.	ɲèmáw-á	ɲèmáw-à	‘medicine’	kètáb-é	kètáb-è	‘book’
b.	kìráw-á	kìráw-à	‘lion’	kòtò-ɲé	kòtò-ɲè	‘gourd’
c.	kàráð-á	kàráð-à	‘belt’	kùrmán-í	kùrmán-ì	‘spider’
d.	tùrmún-á	tùrmún-à	‘world’	kìrbá-ɲí	kìrbà-ɲì	‘roof’

The distinction between autosegmentally-linked H tones and sequences of H tones also appears in verbs. There are two kinds of H-toned verbs, those that are the result of spreading H tone, like the habitual, and those that combine H tones from different morphemes. These latter do not behave the same way as the habitual forms with respect to final lowering.

⁶Quint (2009:18) transcribes ‘medicine man-ACC’ as *kèmáò-á* (same root as ‘medicine’, with different noun class) which would explain the lowering affecting only the final H. However, Titus does not pronounce these words with a contour tone, but with a steady high pitch.

For example, the verb lí-ŋ-métç-í ‘they will help you (SG)’ contains several morphemes (CLL-2SGO-help-IPFV), each of which contributes H tone. When this word occurs either in isolation or when preceded by a L-toned subject such as làw ‘women’ or a H-toned subject such as lór ‘men’, only the final vowel is lowered: [lór líŋmétçì] ‘the men will help you (SG)’ or [làw líŋmétçì] ‘the women will help you (SG)’. This suggests that the H tones are not fused to create an autosegmental link, and the final H tone shows independence from the others. In contrast, the sequence of H tones in the habitual are the result of H-tone spreading, so they all lower together.⁷

While perfective verbs are normally all low-toned, a 1st person H-toned subject marker induces H-tone spreading across the word. We tested such a verb in combination with a H-toned object to see if the final object lowered following an all H-toned verb that was the result of spreading.

- (8) [ɲígwípúðú ŋwá:mín]
 ɲí-gwí-púðú ŋwá:mín
 1SG-CLkw-hit.PFV CLŋw.fingers
 ‘I hit fingers.’⁸ (Figure 13)

One might have expected lowering to apply just to the object, as it does if the preceding verb is low-toned. However, it seems to induce lowering in both words. Indeed a comparison with Figure 9, which illustrates the same noun following a low-toned verb, shows a very similar pitch range for both words. This could indicate either that the two words have autosegmentally fused their H tones so the L% affects them both, or that the L% may link to both H tones within a verb phrase. We also do not discount the possibility that this is not tone lowering on the verb but is actually suppression of upsweep. We shall see in section 3.2 that pitch raising due to upsweep occurs with sequences of H tones, particularly in nominal constituents (see Figure 9 for an example). If both words were lowered or if upsweep that would normally affect high tones were suppressed in the verb, the result would be similar: flat tone across the utterance until the final fall. It is not always possible to compare pitch tracks and Hz measurements across utterances since a speaker’s voice may have a lower or higher pitch range at different times. In this particular example, the pitch range is similar to both lower H-toned ranges and higher L-toned ranges, resulting in ambiguity as to the analysis. We leave this issue open for future research and indicate the extended effects of the L% with a question mark.

⁷Note that the habitual is not completely H-toned as it begins with a L tone.

⁸Note that in earlier examples, the singular of ‘finger’ was used, which is CLL. In this example, the plural is used, which is CLŋw, so the singular and plural begin with different consonants.

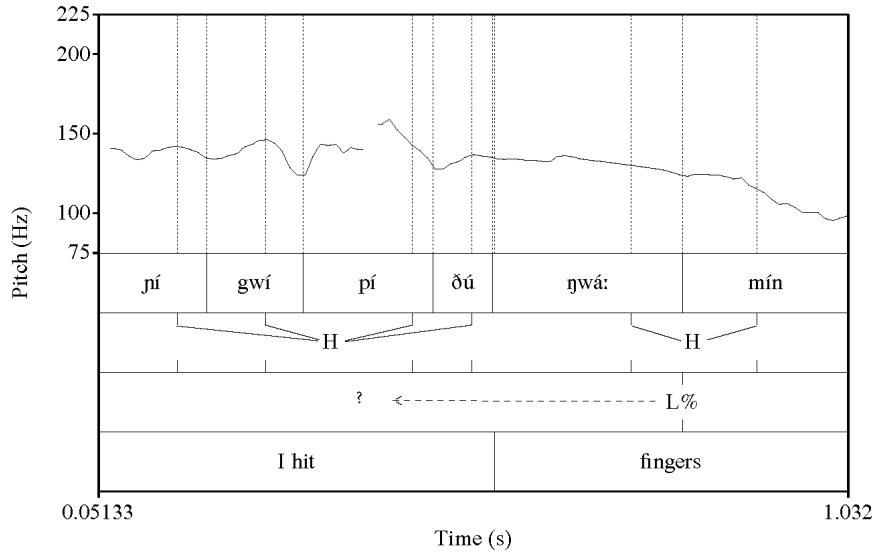


Figure 13: F0 track of (8) ‘I hit fingers.’

As for nominals, when a H-toned noun is followed by a H-toned modifier, H-tone lowering only applies to the final vowel of the post-nominal modifier. We assume that this is the result of citation prosody, which is the same as a single verb forming an utterance. Producing a nominal or nominal phrase in isolation is either the result of asking someone to say the words as an illustration, or as a response to a question. Either way, they do not seem to have the same prosody as full sentences.

Similar lowering effects of strings of final Hs are attested in other languages, such as Kukuya (Paulian 1975; Hyman 1987), Chilungu (Bickmore 2004) and Kipare (Odden 1986). Hyman (2014) shows that there are three patterns of final H lowering: i) H on final TBU is lowered, ii) final autosegmentally linked H in same word is lowered, or iii) H on final TBU is lowered and all preceding adjacent H TBUs are lowered. The first pattern, which targets only the final H tone, is attested in Kombe, e.g. *ì-káyī* ‘leaf’ vs. *ì-káyī ndjîrà* ‘that’s a leaf’ (Elimelech 1976), as cited in Hyman (to appear), who suggests it could be analyzed as a boundary L% tone. The second pattern, in which the final string of linked H tones in a word is affected, is attested in Kukuya. Final H tone sequences are lowered to mid before a pause, e.g. *màbágá* ‘show knives’ is realized as *màbāgā* before a pause. As in Rere, HL patterns are unaffected: ex. *kìkàrà* ‘paralytic’ is realized with a HL pattern prepausally. The third pattern is attested in Kipare (Odden 1986) and Jumjum (Andersen 2004), and can affect more than one H toned word in a row. In Kipare, a string of downstepped H tones across multiple words are all lowered to L in utterance-final position. Odden analyzes this as the OCP applying to fuse the H tones together so they are all treated as a single autosegmental H (although see Herman (1996) for a different analysis of Kipare final lowering). Bickmore (2004) shows that in Chilungu, a prepausal input /*tú-chí-lí-lúk-ísh-á*/ undergoes downstep of the root and following Hs, so that the final downstepped Hs are almost identical to a string of prepausal L tones, ex. *tú-chí-lí-lúk-ísh-à* ‘we are still weaving a lot there’ versus *tú-chí-lí-^llúk-ísh-á* ‘we are still vomiting a lot there’. The penultimate and antepenultimate

tones are realized at a similar pitch in both verbs, but it is the final syllable that distinguishes the forms. The lowered H tone is realized at a similar pitch to the preceding lowered tones, but the final L tone is realized much lower. Bickmore concludes, therefore, that the lowering effect is phonetic rather than phonological. However, it could be that the downstepped H effect is phonological, but that the L% targets a final L tone only, and is not realized on the downstepped H. In the case of Rere, we have proposed that final lowering is due to a L%, which can either attach to the final TBU (with H or L tone) or directly to a final H tone, causing it to lower. If the final H tone is autosegmentally-linked to more than one TBU, it will lower all of high tones. It also appears that final lowering can affect more than one word with H tone as in Jumjum, although the data are somewhat inconclusive.

3.2 Pitch raising

Rere exhibits pitch raising of H tones, whereby sequences of H tones are raised incrementally to a final super-high peak, a type of inclination or ‘upsweep’ similar to that attested in Baule (Leben and Ahoua 1997). In an SV(O) sentence, a H-toned subject shows a rise towards a peak on the final H. This holds true for single word H-toned subjects as well as larger noun phrases. The sentences in (9) compare LL, HL, HH and LH subjects.

- (9) a. [jèɕà jìjàw]
 jèɕà j-ìjàw
 CLj.cow CLj-be.good.PFV
 ‘The cows are good.’ (Figure 14)
- b. [kágà kìjàw]
 kágà k-ìjàw]
 CLk.foot CLk-be.good.PFV
 ‘The foot is good.’ (Figure 14)
- c. [lá:mín lìjàw]
 lá:mín l-ìjàw]
 CLl.finger CLl-be.good.PFV
 ‘The finger is good.’ (Figure 14)
- d. [jà:rí jìjàw]
 jà:rí j-ìjàw
 CLj.ash CLj-be.good.PFV
 ‘The ashes are good.’ (Figure 14)

Figure 14 shows the pitch tracks for the sentences in (9). The HH subject starts slightly lower than the HL word, but exhibits a rise to the second H tone, peaking late in the word. In contrast, the LL tone is flat. It can sometimes be difficult to distinguish HH and LH, but the latter generally begins lower so the rise is steeper, as the word ‘ashes’ does in this figure. Some HL words exhibit a flat high pattern when in initial subject position. The noun ʈó:nòr ‘boy’ and the word áðà ‘what’, for example, show this pattern. (See Figures 26 and 27 in the wh-question section in Section 5 for examples). Such examples do not exhibit the pitch rise from the first syllable to the second syllable as seen with underlying HH words. We do not currently have an explanation for why certain nouns do this and others do not.

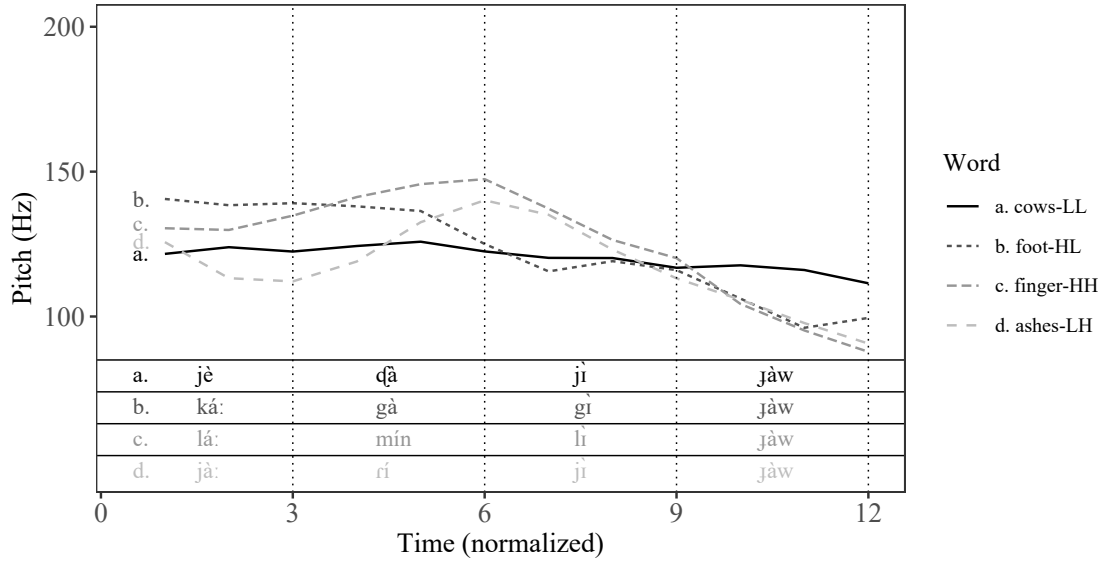


Figure 14: Tone contrasts in subject position

The upsweep can extend across more than one word, as observed in a longer H-toned subject. The inalienable possessive ‘my fathers’, which is H-toned, can optionally be followed by a H-toned possessive adjective *r-í:ní* in (10).

- (10) [rérónérí (r-í:ní) r-ìjàw]
 rérón-érí (r-í:ní) r-ìjàw
 CLR.father-1POSS (CLR-1SGPOSS) CLR-be.good.PFV
 ‘My fathers are well.’ (Figure 15)

The pitch track in Figure 15 shows the H-toned noun without the possessive adjective *r-í:ní* on the left and with it on the right. The F0 holds relatively steady and then rises up to a peak on the final syllable of the subject in both examples. This is particularly clear in the form with the possessive adjective on the right, where the noun has flat tone compared to the same noun with no following adjective on the left. In both cases, after the peak is reached at the end of the subject, F0 descends sharply for the low-toned verb. We analyze this as a H% associated to the final H-toned TBU in the sequence. This is the target that the other H tones gradually raise towards.

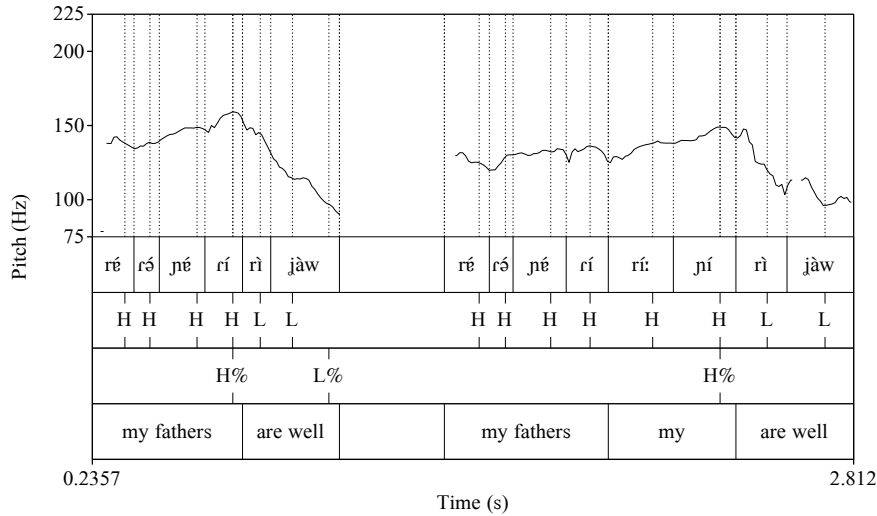


Figure 15: F0 track of (10) ‘My fathers are well.’

Upsweep can also affect objects, as was seen in Figure 9 with the HH word *lá:mín* ‘finger’, and in the following example.

- (11) [léɲéɹí gwómétɕí ðà̀r̀ə̀ɲá̀ló ɲò̀r̀p̀ò̀]
léɲ-éɹí gwú-métɕ-í ɬà̀r̀ə̀ɲ-á̀ló ɲò̀r̀p̀ó̀
CLgw.mother-1SGPOSS CLgw-help-IPFV CLɬ.father-2SGPOSS tomorrow
‘My mother will help your father.’ (Figure 16)

In the pitch track for (11) in Figure 16, we see that the pitch raises to a peak on the all H-toned subject, but the H-toned verb shows flat pitch. The object begins with low tones but then rises to a peak on the last syllable of the object, again showing that two H tones in a row have inclination. This example shows that upsweep does not just occur before low-toned words, but also occurs before another high-toned word, so this is not raising of Hs in anticipation of a following L, as in Yoruba (Connell and Ladd 1990; Laniran and Clements 2003). This example also suggests that inclination occurs within constituents such as noun phrases, as the subject shows the inclination, but the pitch plateaus on the verb rather than rising to a peak on the last TBU. A similar contour was observed on the verb in Figure 5, which shows a slight inclination, but not as sharp as for nominals. Verbs can exhibit inclination, but tend to do so when in initial position. More research would be needed to determine which syntactic and prosodic units are subject to upsweep.

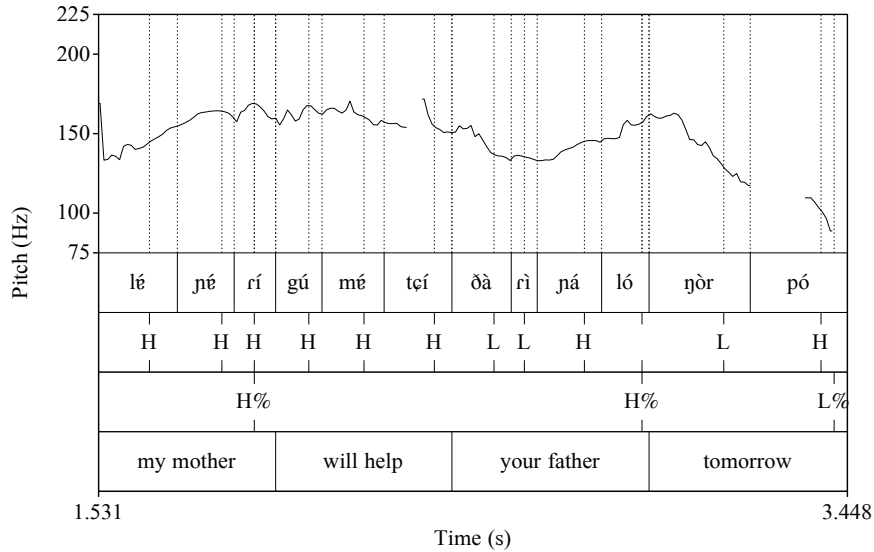


Figure 16: F0 track of (11) ‘My mother will help your father’

In the upsweep examples presented so far, it has always been the final H tone in the noun phrase that is the highest peak. One could therefore analyze these as a H% associated with the final H tone of the subject. Conjoined nouns show that this is not the case; it is the final H in a sequence within a constituent that is the highest peak. Consider the following sentence in which a HH noun is conjoined with a LH noun by the H-toned conjunction ná. If it were the final H in the noun phrase that received the H%, one would expect the second noun to show the highest peak. However, it is the H tone of the conjunction which does. It is 190Hz compared to 170Hz for the H tone of the LH noun. This shows that upsweep applies to sequences of H tones and the H% induces a peak on the final one.

- (12) [tíjén ná kàgró lìtìndrè]
 tíjén ná kàgró lì-tì-ndr-é
 CLt.dog and CLk.chicken CLL-HAB-sleep.HAB
 ‘The dog and the chicken sleep.’ (Figure 17)

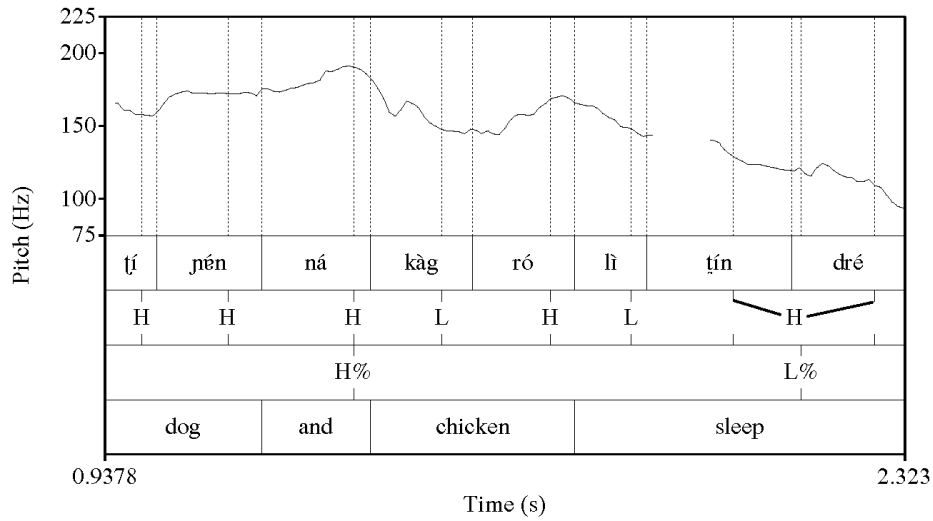


Figure 17: F0 track of (12) ‘The dog and the chicken sleep.’

If two low-toned nouns are conjoined with a H-toned conjunction *ná*, the two nouns remain flat, with a H tone only on the conjunction. There is no pitch raising at the end of the second noun, nor is there any indication that the H tone of the conjunction is raised beyond a standard H target, so no H% is indicated. This demonstrates clearly that pitch raising applies only to H tones, and only to a sequence of H tones within a constituent.

- (13) [tòròm ná àɲwòn lɪjàw]
 tòròm ná àɲwòn l-ìjàw
 CL_t.star and CL_w.sun CLL-be.good.PFV
 ‘The star and the sun are beautiful.’ (Figure 18)

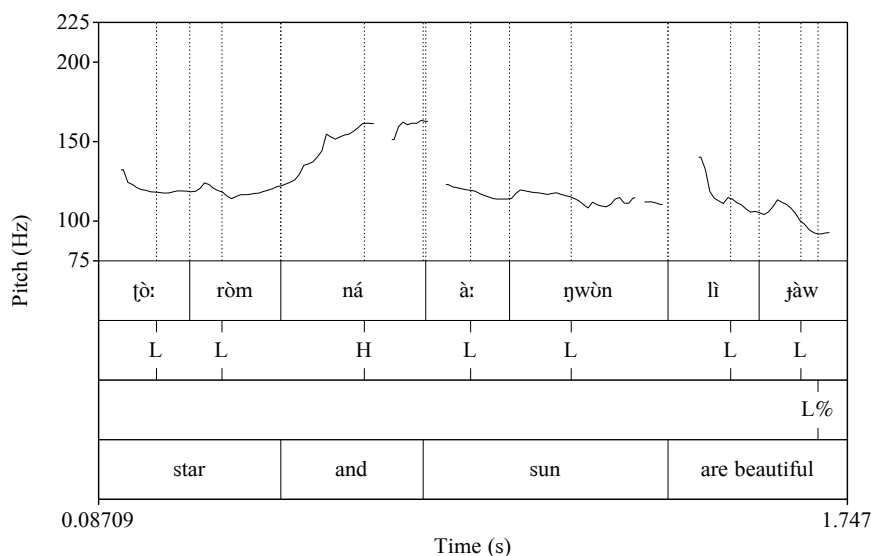


Figure 18: F0 track of (13) ‘The star and the sun are beautiful.’

In conclusion, declarative neutral assertive sentences in Rere show both pitch lowering and pitch raising. Pitch lowering is of two kinds. First, there is a lowering effect that targets a single H or a sequence of autosegmentally linked H tones at the end of the utterance. Second, there is an optional pitch drop on the final syllable. This affects whatever tone occurs on the final syllable and is the pattern that applies to words in isolation. As for pitch raising, there is an upsweep effect such that a sequence of H tones is successively raised to a peak. This occurs primarily in nominal constituents and can affect a sequence of H-toned words.

(14)	TARGET	ANALYSIS	POSITION
Final H-lowering	H	L%	Final autosegment H in utterance-final word
Final lowering	H, [L], L	L%	Utterance-final syllable
H-raising	H	H%	Rightmost syllable of sequence of Hs

With these patterns in mind, we now turn to the realization of questions in Rere, both polar questions and wh-questions.

4 Prosody of yes/no (polar) questions

Yes/no (or polar) questions in Rere have a final =à question marker that associates to the final word in the question, as shown in (15). In (15a), the final word is an adverb. In (15b), the question marker attaches to a relativized verb as part of a standard greeting. If the final word ends in a vowel, a vowel sequence is found, or, if the final vowel is also [a], a long [a:] is produced, as in (15c).

(15)	a.	[kwè:là	βáβràŋà]
		kw-è:là	pábràŋ=à
		CLkw-go.PFV	quickly=Q

‘Did she go quickly?’

- b. [lìmèndàré ηwà:rò ηwí-jàwà]
 lì-m-èndàré ηwà:rò ηwí-jàw=à?
 CLL-PRF-sleep.REC CL_{ηw}.sleep CL_{ηw}-be.good.REL.PFV=Q
 ‘Did they sleep well?’

- c. [kwòm-w-ó: ηèç[à:]
 kw-ò-m-w-ó: ηèç[à=à
 CLkw-PRF-milk-REC CL_{ηw}.cow=Q
 ‘Did she milk the cow?’

Similar question markers are found in related languages. In Moro the question marker is also =à (Rose and Piccinini 2017). In Tira, Stevenson (2009) reports that it is =ε but our recent work on Tira has found it is =à (Himidan Hassen, p.c.). In Dagik, the question marker is =â:, or =ka (tone not indicated) if the word is consonant final (Vanderelst 2016). In Lumun it is =ì (Smits 2017). Riialand (2007) also reports numerous Niger-Congo languages with a final question particle -a with low tone. The addition of the question marker blocks the final H tone lowering seen in corresponding declarative utterances because the final tone-bearing unit of the utterance in the question is the L-toned question particle and not a H tone. In addition to the question marker, polar questions exhibit pitch raising of a H tone that occurs before the question marker. This pitch raising specifically targets H tones; L tones in the same position are unaffected. In this manner, it is similar to the H upswing effect.

In the following sentences, the object kíɽèr ‘edible root’ is marked with an accusative suffix -é. In the polar question in (16b), the high-toned suffix is followed by the low-toned =à, which results in a long vowel [ê:] and the two tones combine to form a falling tone. In the declarative, the final H tone of the suffix is lowered by the final lowering process, but in the question, the presence of the =à marker blocks this lowering, as the H tone is no longer the last tone in the word.

- (16) a. [kwàw kwòmànò kíɽèrè]
 kwàw kw-ò-mànò kíɽèr-é
 CLkw.woman CLkw-cook.PFV CLk.root-ACC
 ‘The woman cooked the edible root.’ (Figure 19)

- b. [kwàw kwòmànò kíɽèrê:]
 kwàw kw-ò-mànò kíɽèr-é=à
 CLkw.woman CLkw-cook.PFV CLk.root-ACC-Q
 ‘Did the woman cook the edible root?’ (Figure 20)

Let’s compare the two pitch tracks. In the declarative, the final H tone is lowered. The pitch track shows a drop on the last vowel due to the L%.

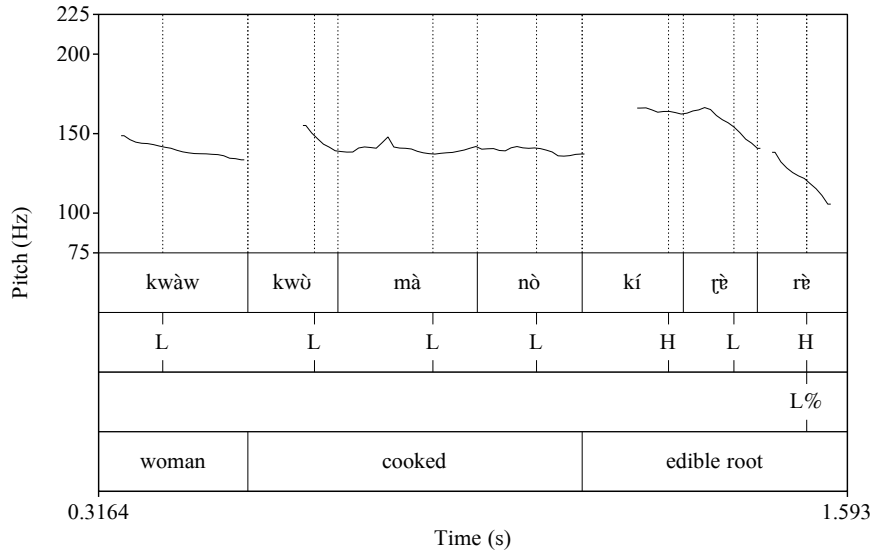


Figure 19: F0 track of (16a) ‘The woman cooked edible root.’

In the polar question, on the other hand, the final H tone is realized higher than the preceding one with a rise up to a high peak on the final syllable before the question marker. We analyze this as a H% boundary tone, similar to what is attested in Embosi (Rialland and Aborobongui 2017). This H% seeks out the rightmost H tone on the final word. This is similar to the H% notation employed for upsweep, but the distinction between the two is that the question H% can attach to a single H tone, whereas upsweep H% attaches to the last H in a sequence. A L% may also occur in polar questions, but it is optional, like it is in declaratives. In this example, there is a final falling tone, but no extensive pitch drop due to a final L%. Note that the final vowel of the question is also longer (171ms) than the final vowel of the declarative (118ms), reflecting the fusion of the accusative suffix and the question marker.

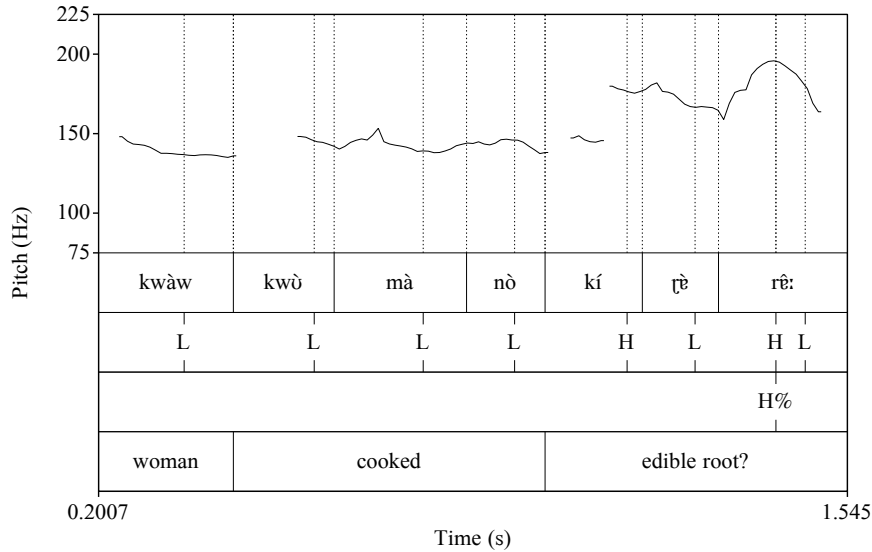


Figure 20: F0 track of (16b) ‘Did the woman cook edible root?’

If the final word is L-toned, its tone is unaffected, and the H tones on the preceding word are realized in a similar manner to those in the declarative. Thus, the overall prosody of the declarative and question are the same if the final word lacks H tone, providing evidence that the H% targets H tones. This can be demonstrated with the following pair, where the adverb *tàtàp* is low-toned.

- (17) a. [lìmèndàré ηwà:rò ηwíjàw tàtàp]
 lì-m-èndàré ηwà:rò ηw-íjàw tàtàp
 CLL-PRF-sleep.REC CL_{ηw}.sleep CL_{ηw}-be.good.REL.PFV totally
 ‘They slept really well.’ (Figure 21)
- b. [lìmèndàré ηwà:rò ηwíjàw tàtàβà]
 lì-m-èndàré ηwà:rò ηw-íjàw tàtàβ=à
 CLL-PRF-sleep.REC CL_{ηw}.sleep CL_{ηw}-be.good.REL.PFV totally=Q
 ‘Did they sleep really well?’ (Figure 22)

The maximum peak on the rightmost H tone is similar for both the declarative and the question examples in Figures 21 and 22. The only difference between the two is that the question does not show a final syllable pitch drop due to the L%. This is not a consistent distinction, however, as other polar questions do show pitch drop on the final syllable.

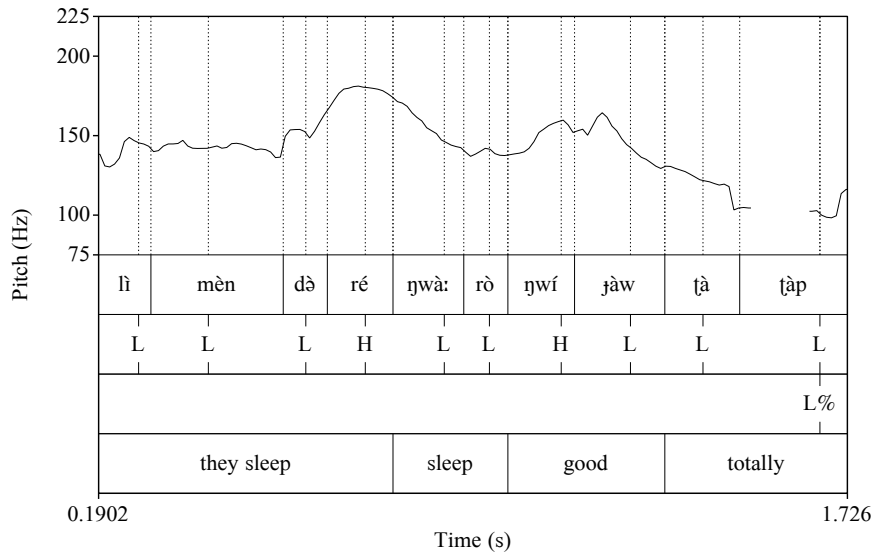


Figure 21: F0 track of (17a) ‘They slept really well.’

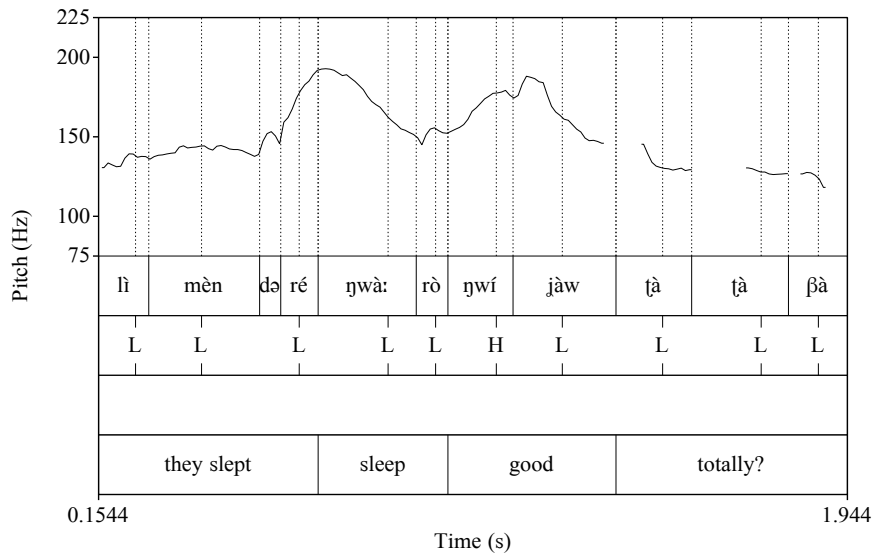


Figure 22: F0 track of (17b) ‘Did they sleep really well?’

With respect to final words with a HL tone pattern, raising does appear to affect the H. Consider the sentences in (18a) and (18b) and the corresponding pitch tracks in Figure 23. For the HL word ηâw ‘water’ the maximum pitch level on the H is 20Hz higher in the question than in the declarative. Furthermore, the addition of the question marker causes the HL pattern to be stretched out so the original contour is not confined to the first syllable. This example shows that H tones that are not part of the final syllable with the question marker are still raised in polar questions.

- (18) a. [kwè:jà ñâw]
 kw-è:jà ñâw
 CLkw-see.PFV CLñ.water
 ‘She saw water.’ (Figure 23)
- b. [kwè:jà ñâwà]
 kw-è:jà ñâw=à
 CLkw-see.PFV CLñ.water=Q
 ‘Did she see water?’ (Figure 23)

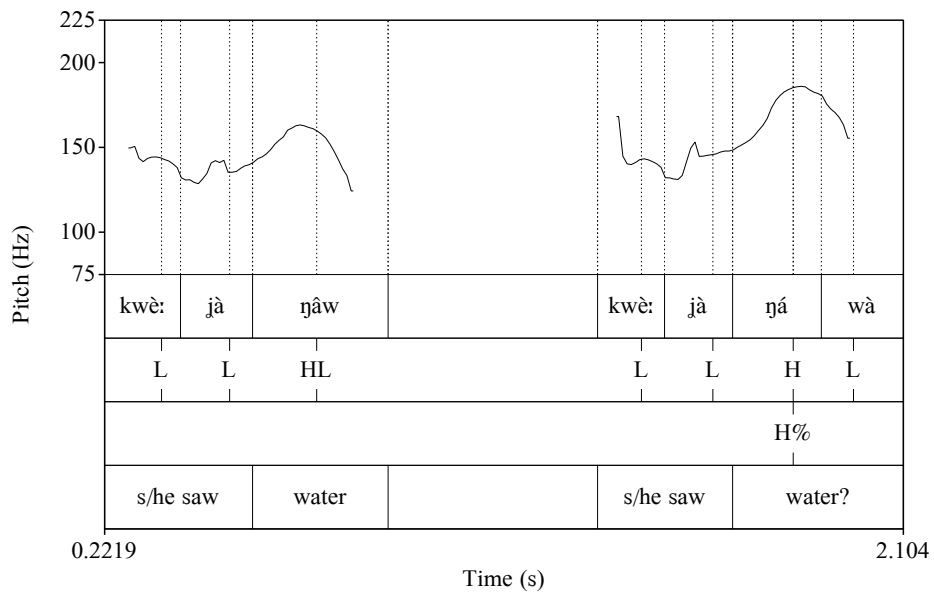


Figure 23: F0 track of (18a) ‘S/he saw water.’ vs. (18b) ‘Did s/he see water?’

The word ñâw ‘water’ forms a minimal pair with ñàw ‘beauty’ as in (19a) and (19b). With ñàw ‘beauty’ there is no pitch raising (Figure 24), but the question shows a larger fall than the declarative, the reverse pattern of what was observed with ‘Did they sleep really well?’ (Figure 22). Therefore, pitch drop due to final lowering is not a marker of either questions or declaratives exclusively, but can appear on either.

- (19) a. [kwè:jà ñàw]
 kw-è:jà ñàw
 CLkw-see.PFV CLñ.beauty
 ‘She saw beauty.’ (Figure 24)
- b. [kwè:jà ñàwà]
 kw-è:jà ñàw=à
 CLkw-see.PFV CLñ.beauty=Q

‘Did she see beauty?’ (Figure 24)

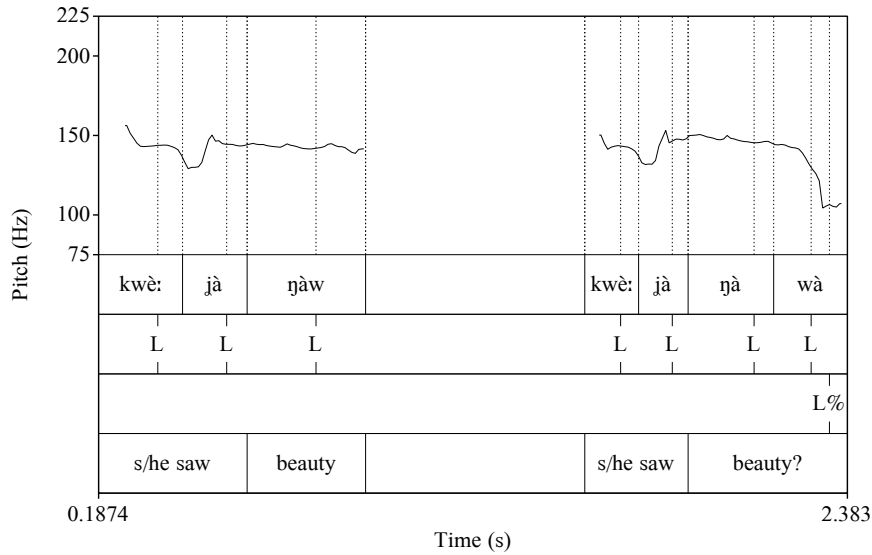


Figure 24: F0 track of (19a) ‘S/he saw beauty.’ vs. (19b) ‘Did s/he see beauty?’

It should also be noted that H-toned subjects show pitch raising as they do in declaratives. In both statement and question, the pitch of the second H tone of the subject *ɲíɲén* is over 25Hz higher than the pitch of the first H tone in Figure 25, corresponding to examples in (20). As with the previous polar questions, the H tone of the HL object *ɲí:nì* in the question is much higher than that of the declarative.

- (20) a. [ɲíɲén ɲìmɾɛ̀ɲé ɲí:nì]
 ɲíɲén ɲì-m-ɾɛ̀ɲé ɲí:nì
 CLɲ.dog CLɲ-PRF-kill.REM CLɲ.rabbit
 ‘The dogs killed the rabbits.’ (Figure 25)
- b. [ɲíɲén ɲìmɾɛ̀ɲé ɲí:nìà]
 ɲíɲén ɲì-m-ɾɛ̀ɲé ɲí:nì=à
 CLɲ.dog CLɲ-PRF-kill.REM CLɲ.rabbit=Q
 ‘Did the dogs kill the rabbits?’ (Figure 25)

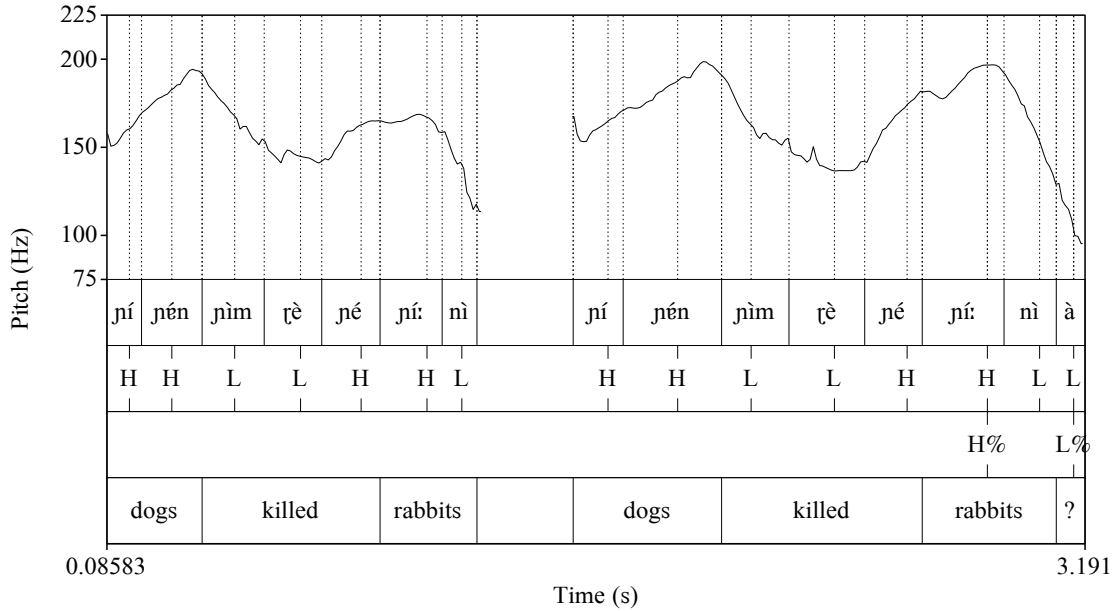


Figure 25: F0 track of (20a) ‘The dogs killed rabbits.’ vs. (20b) ‘Did the dogs kill rabbits?’

Rialland and Aborobongui (2017) note that Embosi, as well as other Bantu languages, mark polar questions with a HL%. In Embosi, the H% portion of the boundary tone raises the rightmost H tone of the utterance to superhigh, even if the rightmost H tone is not part of the final word. In Rere the effect is more restricted, and only a H on the final word appears to be raised. This requires the boundary tone to align specifically with a H tone. Otherwise, it remains unrealized. In Rere, there is no L% that is specifically part of question prosody, although there can be the optional L% that also marks declaratives. The H% and L% can combine to form the high rise and pitch drop seen in Figure 25.

In conclusion, polar questions in Rere are indicated using two mechanisms: a low-toned segmental question marker =à, attached to the last word in the question, and pitch raising of the rightmost H tone of the word to which the question marker attaches. If there are no H tones on the final word, there is no observable pitch raising. L tones are unaffected. This pattern is similar to the analysis of upsweep, in that a H% requires a lexical/grammatical H tone to attach to in order for it to be realized.

5 Structure and prosody of wh-questions

Rere employs two wh-question formation strategies: in-situ and ex-situ. The wh-phrase that appears in-situ remains in the same position as the questioned constituent. In ex-situ questions, the wh-phrase is displaced from its canonical position to the left edge of the sentence. In this section, we discuss the basic structure of wh-questions and their prosody.

5.1 Wh-in-situ questions

Rere has wh-in-situ questions for non-subjects. In-situ questions show the same SVO word order as declarative sentences. An example of an object in-situ question with its declarative counterpart is shown in (21):

- (21) a. [tʰó:ŋóɾ tʰííjé çìrìm]
 tʰó:ŋòɾ tʰí-tʰ-íjé çìrìm
 CLt.boy CLt-HAB-eat.HAB CLkw.corn.ACC
 ‘The boy eats corn.’ (Figure 26)

- b. [tʰó:ŋóɾ tʰííjá:ðàŋ]
 tʰó:ŋòɾ tʰí-tʰ-íjé áðà-ŋ?
 CLt.boy CLt-HAB-eat.HAB CLkw.what-ACC
 ‘What does the boy eat?’ (Figure 27)

The wh-phrase is optionally marked with the accusative case suffix -ŋwò or -ŋ and appears post-verbally. In the production of this particular example, the final vowel of the verb and initial vowel of the wh-word undergo fusion to produce a long [a:]. The wh-in-situ questions have the same prosodic contours as the corresponding declarative neutral assertion sentences. This can be seen in the following pitch tracks comparing the two sentences in (21). There is no distinctive pitch raising or lowering contrasting the two. Note that the word tʰó:ŋòɾ ‘boy’ is one of the HL nouns that is often realized with flat H pitch in subject position.

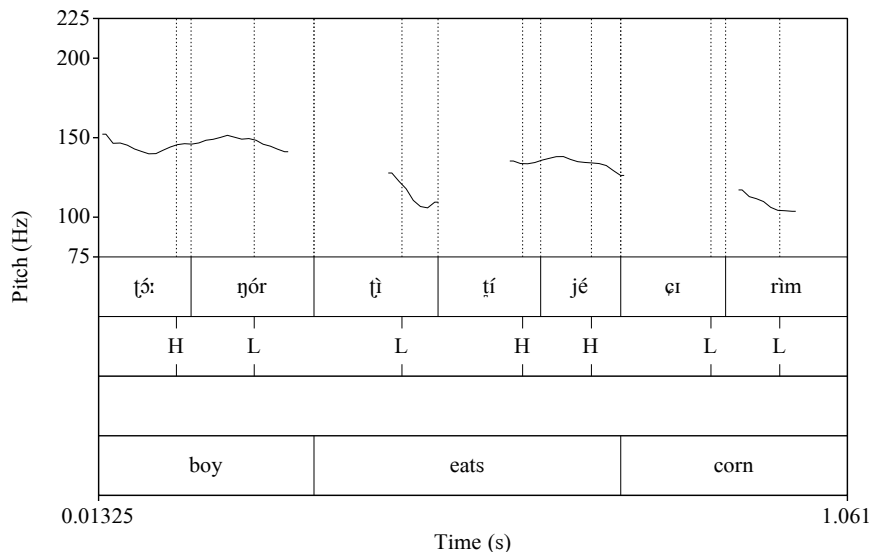


Figure 26: F0 track of (21a) ‘The boy eats corn.’

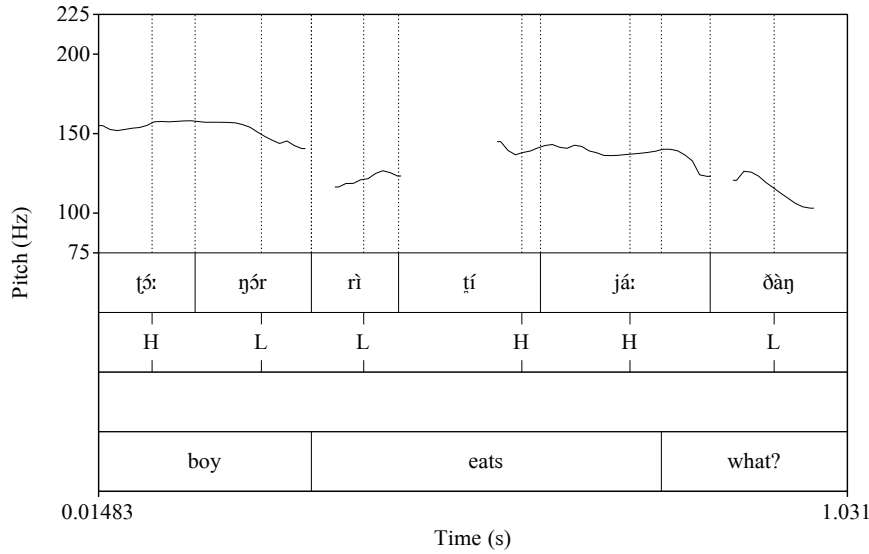


Figure 27: F0 track of (21b) ‘What does the boy eat?’

5.2 Wh-ex-situ questions

In wh-ex-situ questions, the wh-phrase appears in initial position of the question, shown in (22). Subject questions like (22b) can only be ex-situ, a pattern also attested in the related language Moro (Rose et al. 2014). Non-subject interrogative expressions can be either in-situ or ex-situ. The examples in (22c-d) are ex-situ.

- (22) a. [ṭó:ṣór ṭè:jà ṭò:ròmì]
ṭó:ṣòr ṭ-è:jà ṭò:ròm-ì
CLṭ.boy CLṭ-see.PFV CLṭ.star-ACC
‘The boy saw a star.’
- b. [éjjé (kwòrò) kwé:jà ṭò:ròmì]?
éjjé (kw-òrò) kw-é:jà ṭò:ròm-ì?
CLkw.who CLkw-FOC CLkw-see.PFV CLṭ.star-ACC
‘Who saw a star?’
- c. [áḍà (kwòrò) kwé:jà ṭó:ṣòr]?
áḍà (kw-òrò) kw-é:jà ṭó:ṣòr?
CLkw.what CLkw-FOC CLkw-see.PFV CLṭ.boy
‘What did the boy see?’
- d. [ṭáitcàn (kwòrò) é:jà ṭó:ṣòr ṭò:ròmì]?
ṭáitcàn (kw-òrò) é:jà ṭó:ṣòr ṭò:ròm-ì?
CLkw.when CLkw-FOC see.PFV CLṭ.boy CLṭ.star-ACC
‘When did the boy see a star?’

The *wh*-phrase in this initial position is not case-marked. It triggers noun class agreement with the verb, referred to as *wh-agreement* (Chung and Georgopoulos 1988; Chung 1994). This occurs in argument questions as in (22b) and (22c), where the verb is marked for class *kw*-, agreeing with the *kw*- class of the *wh*-word, instead of class *t*- of the subject ‘boy’ as the verb does in the declarative in (22a). Adjunct *ex-situ* *wh*-questions, as in (22d), block noun class agreement from appearing on the verb. There is also optional focus marking following the *wh*-phrase in both argument and adjunct questions. Focus marking is formed by the template /C-oro/ where C refers to the noun class agreement consonant. Finally, in *wh-ex-situ* non-subject questions, (22c) and (22d), the subject appears after the matrix verb. A similar pattern of post-verbal subject in *wh-ex-situ* questions is attested in the Bantu language Kilega (Carstens 2005; Kinyalolo 1991).

In terms of tone, *ex-situ* questions are marked with a grammatical H tone that appears on the left edge of the verb stem. In the declarative sentence, (22a), there is a L tone at the left edge of the verb, as the verb is in the perfective form, which is all low-toned. In the *wh*-questions, (22b-d), there is a tone change in the verb where the initial tone-bearing unit bears a H tone, overwriting the L tone at the left edge of the verb in the declarative sentence. Quint (2009) indicates a falling tone in this position, but in our recordings, it seems to be a H tone. The presence of this H tone, in addition to the focus marker, is what indicates that the subject *wh*-questions are *ex-situ*. In addition to the H tone at the left edge of the verb, there is also a H tone at the right edge of the verb when the subject is post-verbal. This occurs in (22c) and (22d). We assume that this H tone marks the boundary between the verb and the subject, and we analyze it as a H% unspecified for tone target. We will show shortly that it also raises a H tone at the end of the verb. Therefore, the low-toned verb *è:jà* is realized with two H tones, each with a different source and function.

The grammatical H tone at the left edge of the verb also appears in other \bar{A} -movement constructions, namely relative clauses and focus cleft constructions, as shown in the following examples of an object relative (23a) and an object cleft (23b). As in the *wh-ex-situ* questions, the verb agrees in noun class with the argument to its left, while the subject occurs post-verbally. The verb has a H tone at the left edge to mark the \bar{A} -movement construction as well as a H tone at the right edge to mark the boundary with the following subject.

- (23) a. [típén kírà tɛːjá kwó:r tìβ̀èrlò]
 típén kì-t-à t-é:jà kwó:r tì-β̀èrlò
 CL_t.dog REL-CL_t-REL CL_t-see.PFV CL_{kw}.man CL_t-bark.PFV
 ‘The dog that the man saw barked.’
- b. [típén tìndr tɛːjá kwó:r]
 típén tì-ndr t-é:jà kwó:r
 CL_t.dog CL_t-FOC CL_t-see.PFV CL_{kw}.man
 ‘It was the dog that the man saw.’

\bar{A} -movement is marked by tonal changes on the verb in other Niger-Congo languages, e.g. Asante Twi (Korsah and Murphy 2019) and Bamileke Medumba (Keupdjio 2020), but they differ in realization. In Asante Twi, H tone overwrites L on the verb, and in Medumba, a HL

tone melody overwrites the lexical tone on the verb.⁹ In the closely related language, Moro, there is a high-toned verb prefix that indicates \bar{A} -movement constructions, \acute{e} - with subject constructions and \acute{o} - with non-subject constructions (Rose et al. 2014), whereas main clause declaratives have a low-toned prefix \grave{a} -.

In imperfective, recent perfect, remote perfect, and habitual non-subject wh-ex-situ questions, the subject does not appear after the verb, but in the middle, splitting the verb in two (24b). The subject (which can be any length) appears after the noun class agreement marker and any other prefixes, such as aspect or pronominal markers, while the verb root and any suffixes appear after the subject. The grammatical H tone that appears at the left edge of the verb in wh-ex-situ questions is realized on the prefix complex in these cases (shown in a box in Figure 29). Note that there is an epenthetic vowel [ʊ] that follows the perfect marker m- in these examples, and is assumed to receive its tone from the preceding vowel. The rest of the verb root follows and is all low-toned, as expected.

- (24) a. [kwór gwòmè:jà t̀ò:ròm r̀âtç]
 kwór kẁ-̀m-è:jà t̀ò:ròm r̀âtç
 CLkw.man CLkw-PRF-see.REM CL̀t.star.ACC already
 ‘The man had seen the star already.’ (Figure 28)

- b. [áǎ́ gwómú kwór è:jà r̀âtç]
 áǎ̀ kẁ-̀m- kwór è:jà r̀âtç
 CLkw.what CLkw-PRF CLkw.man see.REM already
 ‘What had the man seen already?’ (Figure 29)

⁹Both languages differ from Rere in terms of tone marking when there are embedded clauses, which we do not have the space to discuss in detail here. In a nutshell, in Medumba the HL tone appears on the lexical verb in the lowest clause from which an element is extracted (auxiliaries have different patterns), in Asante Twi, H appears on verbs in both clauses, and in Rere H appears only in the highest clause, even if the ‘gap’ originates in a lower clause.

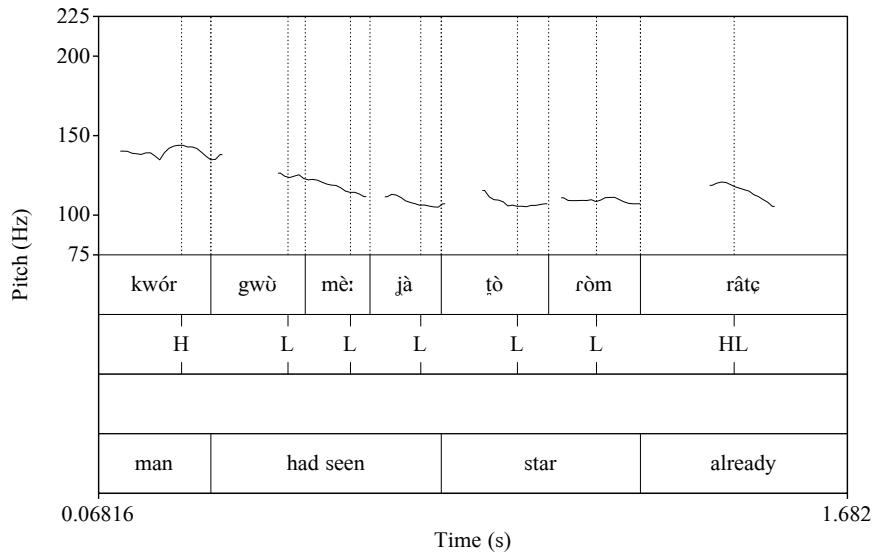


Figure 28: F0 track of (24a) 'The man had seen the star already.'

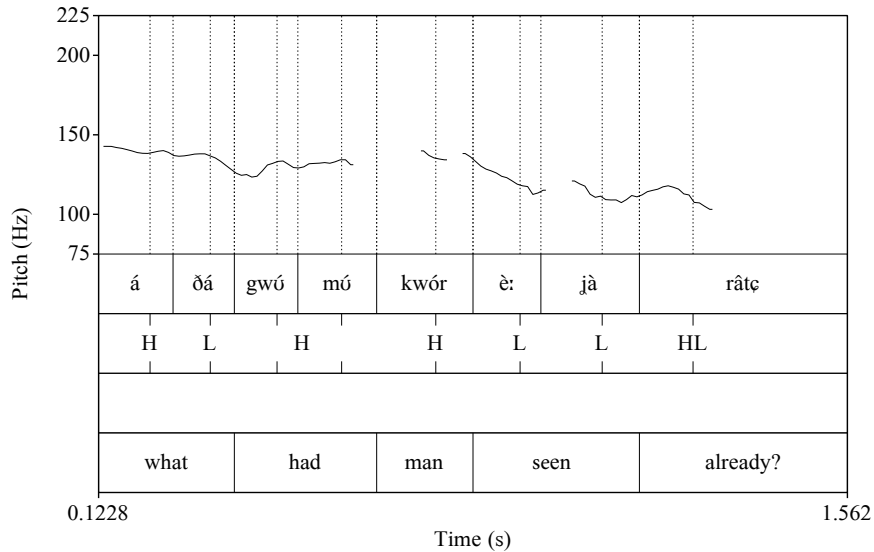


Figure 29: F0 track of (24b) 'What had the the man seen already?'

While most verbs begin with a low tone, the imperfective verb form begins with a H tone. It has the pattern HLH, HHL or HHH, depending on verb class. The verb 'eat' is a short root, so the HLH pattern is realized as HH. What happens to the grammatical H tone marking wh-ex-situ questions in this case? When the verb is split in the wh-ex-situ question, the H tone of the imperfective tone pattern is realized on the class agreement prefix kwù- and the verb root is low-toned because it occurs utterance finally (25b). This indicates that there is no special tone pattern associated with the wh-ex-situ question if the verb aspectual tone

already begins with H tone. The H tone on the noun class agreement prefix is not raised higher. Therefore, we can conclude that the grammatical H tone that marks wh-ex-situ questions replaces a L tone, but does not induce additional pitch raising at the left edge on existing H tones. It is not an intonational boundary tone.

- (25) a. [tʰɔ:ŋɔ́r tʰíjé çìrìm]
 tʰɔ:ŋɔ̀r tʰí-jé çìrìm
 CLt.boy CLt-eat.IPFV CLkw.corn
 ‘The boy will eat corn.’ (Figure 30)
- b. [áðà (kwòrò) kwú tʰɔ:ŋɔ́r jè]
 áðà (kw-òrò) kwú tʰɔ:ŋɔ́r jé
 CLkw.what (CLkw-FOC) CLkw- CLt.boy eat.IPFV
 ‘What will the boy eat?’ (Figure 31)

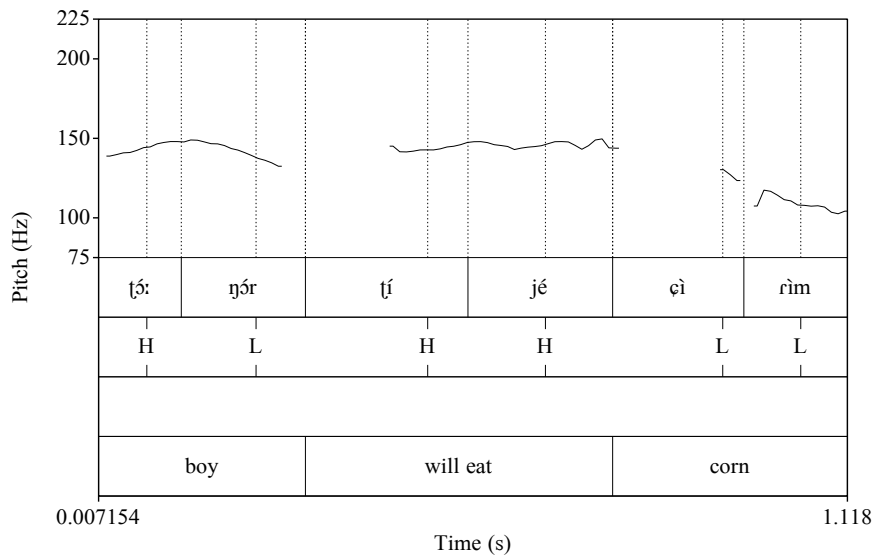


Figure 30: F0 track of (25a) ‘The boy will eat corn.’

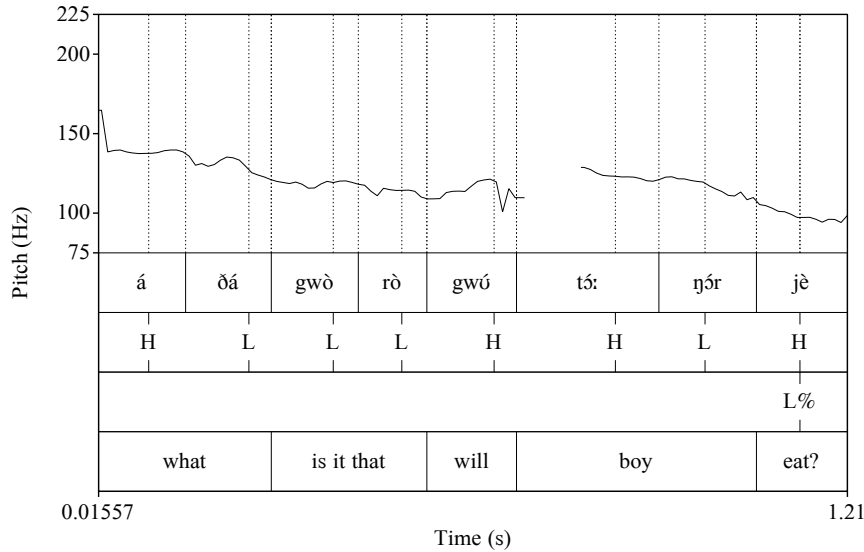


Figure 31: F0 track of (25b) ‘What will the boy eat?’

The H% tone that marks the boundary between the end of the verb and the post-verbal subject appears on low-toned perfective and progressive forms because all other main finite verb forms are split in two in *wh-ex-situ* questions, with the subject appearing after the prefixes and before the verb root. Because of the low tone patterns on perfectives and the split behavior of the other verb forms, it is not possible to ascertain if a verb ending in a H tone would show additional pitch raising in a *wh-ex-situ* question before a subject, as such a configuration does not occur. Nevertheless, a subject can appear post-verbally when the object is a 3rd person previously mentioned in the discourse. In such a construction, the class agreement prefix is interpreted as the object, and the subject appears post-verbally, as in object \bar{A} -movement constructions. The perfective, which would normally have all low tones, is realized with the grammatical tone pattern LHH in this sentence, which is due to the object marking. The question is whether the second of the two H tones is realized higher before the subject, and the answer is yes, as seen in Figure 32. Since verbs do not generally show such sharp inclination, we surmise that the boundary between the verb and the post-verbal subject is marked by general pitch raising that not only raises a final L tone, but also affects H tones. We indicate this with H%.

- (26) [ɲìndàðéjì kèràw t̩:ɲórà]
 ɲì-ndàðé-jì kèràw t̩:ɲór-à
 CLɲ-give.PFV-PL.O CLk.doctor CLt̩.boy-ACC
 ‘The doctor gave them to the boy.’ (Figure 32)
 (‘them’ refers to medicine, which is CLɲ)

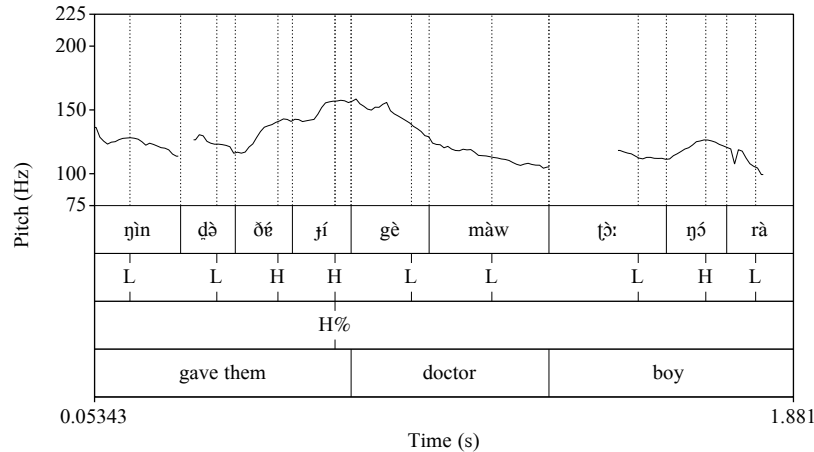


Figure 32: F0 track of (26) ‘The doctor gave them to the boy.’

6 Summary and conclusion

We now summarize the tone patterns that appear in declaratives, polar questions and wh-questions in Rere. Beginning with the non-boundary tone marking, there is the H tone that appears at the left edge of the verb in wh-ex-situ questions (section 5.2). This H tone overwrites the L tone on the verb that partially expresses the aspect and person combinations in a declarative. However, there is no effect on a H tone in the same position, so this syntactic marking can be analyzed as the addition of a H tone, rather than a pitch range register effect. In addition to grammatical tone that expresses syntactic movement, pitch raising can also mark the boundary between syntactic constituents, namely between the subject and the verb when the subject is post-verbal (section 5.2). The verb-subject order is required in non-subject \bar{A} -movement constructions or when a 3rd person object is marked on the verb. This can affect both H and L tones. Pitch raising can also indicate a polar question, and raises the rightmost H of the final word (section 4). Finally, upsweep is another kind of pitch raising that affects sequences of H tones, raising to a peak on the final H (section 3.2). The four kinds of raising are summarized below. The syntactic grammatical tone raises a L tone, and is the only raising pattern that changes L tones specifically. Intonational tones target H tones only (27b,c) or all tones (27d). SH stands for super-high (raised high).

(27)	RAISING	TARGET	RESULT	POSITION
a.	\bar{A} -construction	L	H	Initial syllable of verb
b.	Verb-subject	H, L	SH, H	Final TBU of verb
c.	Polar question	H	SH	Rightmost H of final word
d.	Upsweep	H	SH	Rightmost H TBU of sequence of H toned TBU

Finally, there are three kinds of final lowering, all of which occur in utterance-final position and are analyzed as due to a L% (section 3.1). One kind of lowering targets a final H or sequence of H tones obligatorily. The second targets the final H TBU when the word

is pronounced in isolation. And the third case optionally lowers a final L tone. In each case, the final TBU shows a pitch drop, indicated with SL for super low. We model the attachment of the boundary tone as either association to a tone or to a tone bearing unit (Figure 6).

(28)	FINAL LOWERING	TARGET	RESULT	POSITION
a.	H-tone lowering	(H)H	(L)SL	Final word(s) of utterance
b.	H-tone lowering (isolation)	(H)H	(H)SL	Final syllable of utterance
c.	L-tone lowering	L	SL	Final syllable of utterance

This article contributes to the description of prosody in Kordofanian languages, and to our understanding of intonation in tone languages in general. We have shown that Rere uses high tone to mark a syntactic construction, specifically the uppermost clause of a wh-ex-situ question, and indeed \bar{A} -movement constructions in general. Rere also has a H-tone lowering process that targets the final H tone sequence of an utterance, lowering these tones to L, which we analyze as due to a L% boundary tone. Pitch raising can target a H tone that occurs at the right edge of a sequence of Hs. It can also target a H tone on a final word of polar questions, as well as raise the final tone of the verb when it precedes a subject. We analyze these as boundary tones that are unspecified or specified for particular tone targets. While the data are drawn from a single speaker, significant headway has been made in describing the prosodic system. Future work should examine these patterns with more speakers and in a greater variety of constructions.

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