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BOLE INTONATION

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Abstract: Bole is a Chadic language spoken in Yobe and Gombe States in northeastern Nigeria. The Bole tone system has two contrasting level tones, high (H) and low (L), which may be combined on heavy syllables to produce phonetic rising and falling tones. The prosody of intonation refers to lexical tones and the overall function of the utterance. Bole does not have lexical or phrasal stress, and intonation does not play a pragmatic role typical of stress languages, such as pitch raising to signal focus. The paper discusses intonation patterns of several phrasal types: declarative statements, yes/no questions of two types, WH-questions, vocatives, pleas, and lists. Certain interactions of intonation with tone apply to most of these phrase types: downdrift (esp. of H following L) across a phrase, phrase final tone lowering (extra lowering of phrase final L and plateauing of phrase final H after L), and boosting of H in the first HL sequence of a phrase. Special phrase final pitch phenomena in yes/no questions and pleas are described as appending extra-high (XH) and HL tones respectively. The last section discusses XH associated with ideophonic words, arguing that such words have lexical H tone which is intonationally altered to XH phrase finally.

0. Background

Bole is a Chadic language spoken in Yobe and Gombe States in northeastern Nigeria.¹ According to the classification of Newman (1977), Bole is a West Chadic language of the “A” subbranch.

Various aspects of the Bole tone system have been described in Lukas (1969), Gimba (1998), Schuh and Gimba (ms-a, 2005), and Yu (2009). Bole has contrastive high (H) and low (L) tones, and many word pairs are distinguished only by tone,² e.g. **āwe** HH ‘jujube’ vs. **àwè** LL ‘cat’, **gāre** LH ‘granary’ vs. **gārè** HL ‘lizard’, etc. H+L can occupy the first and second moras of heavy syllables to give a falling tone, e.g. **zâr** ‘joint’, and L+H can be similarly combined to give a rising tone, e.g. **nēm** ‘hippopotamus’ (cf. **nem** ‘near’ with H tone).

¹ Research on Bole has been supported by three grants from the US National Science Foundation: BCS-9905180 (1999-2001, Russell Schuh, Principal Investigator), BCS-0111289 (2001-2004, Russell Schuh, Principal Investigator), BCS-0553222 (DEL program, 2006-2009, Russell Schuh, Principal Investigator). Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of NSF. We would like to thank Sun-Ah Jun for her careful reading and helpful comments on the first version of this paper.

² Bole citations are in standard Bole orthography, supplemented with diacritics marking tone and vowel length, which are not part of the orthography. The following segmental symbols differ from those of the IPA: c = IPA [tʃ], j = IPA [dʒ], sh = IPA [ʃ], y = IPA [j]. Low tone (L) is marked with a grave accent (à), falling tone (F) = H+L on one syllable is marked with a circumflex accent (â), rising tone (R) = L+H on one syllable is marked with a hachek (ă), vowel length is marked with a macron (ā), high tone (H) is unmarked.

Bole intonation must be understood in the context of Bole tones, but intonation has phonological and functional properties distinct from properties of lexical and grammatical tone. Differing intonational patterns provide the only distinction in most cases between declarative statements and *yes/no* questions comprising the same word or words. Intonational patterns are all properties of the INTONATIONAL PHRASE, without reference to syntactic structure. Put another way, an intonational pattern falls out automatically from (1) the overall function of the utterance (declarative statement, *yes/no* question, vocative, etc.) and (2) the tonal makeup of the utterance. A corollary of this is that Bole does not use prosodic processes (pitch raising, increase of amplitude, etc.) for pragmatic or contrastive focus, as English would in ‘BAMOI bought it’ (in answer to the question ‘who bought the ram?’), ‘BAMOI bought a ram (not MADU, as you had thought)’, ‘Bamoi BOUGHT a ram (he didn’t STEAL it)’, ‘(surprisingly) Bamoi BOUGHT A RAM!’, ‘Bamoi bought a RAM (answering the question, “What did Bamoi buy?”)’. These functions are expressed by syntactic means or are not overtly marked at all.

In this paper, we consider intonational patterns in eight types of constructions. Section 1 discusses *declarative statements*. Section 2 discusses *yes/no questions*, which are distinguished from declarative statements only by intonation, and §3 discusses intonation of *yes/no* questions ending in the particle **ɗo**, which carries the expectation of an affirmative answer. Section 4 discusses the intonation of *word questions* (*WH-questions*), which have essentially the same intonational properties as declarative statements. Section 5 discusses two pragmatically governed utterances, *vocatives* and *pleas*, generally realized on proper names. Section 6 discusses *list intonation*. Section 7 discusses *ideophones* and *ideophonic adjectives*, word classes that bear extra-H tone when utterance final. We conclude that this tonal realization is best accounted as an intonational phenomenon rather than a lexical property of ideophones and ideophonic adjectives *per se*. All the illustrative utterances can be heard and/or downloaded from http://www.humnet.ucla.edu/humnet/aflang/Bole/Papers/Bole_intonation.html

1. Declarative Statement Intonation

Declarative statement intonation superimposes three main pitch components on the underlying pattern implied by the sequence of H and L tones of the utterance. The most immediately noticeable is DOWNDRIFT, an overall downward tilt in the pitch in any utterance with at least one HLH sequence (§1.1). The second is PHRASE FINAL LOWERING, an extra lowering of the pitch of syllables at the end of an intonational phrase (§1.2). The third is H BEFORE L RAISING, whereby the H of the first HL sequence in an utterance rises to an extra high pitch (§1.3). A possible intonational pattern that correlates with phrase initial H clitics followed by H is discussed in §1.4. Discussion of declarative statement intonation will refer to Figures 1-10, which show F0 (fundamental frequency) tracings for utterances spoken with natural statement intonation.³ Figures 1-8 show three-syllable words exemplifying all possible combinations of H and L over three syllables.⁴ Figures 9-10 show six-syllable utterances with alternating sequences of H and L tones, Figure 9 beginning on a H tone, Figure 10 beginning on a L.

³ Illustrations of intonation patterns are of a male speaker recorded on a Sony MiniDisk recorder. Digitization to 44.1 kHz .wav files was done with Audacity for some files and Praat for others. Sound analysis was done using Praat. The graphics are EPS files created by Praat and edited in Adobe Illustrator.

⁴ Fig. 2 **bambutò** is the name of a type of grass used to make brooms and also the name for such brooms; Fig. 4 **zògìna** is the potherb *Gynandropsis pentaphylla* (Hausa **gasaya**); Fig. 5 **bùkùlò** is the speckled pigeon *Colomba guinea*; Fig. 6 **gàbàga** is hand-woven cotton cloth; Fig. 8 **gùskinà** is the burnt crust of staple food that forms inside a cooking pot.

In the figures, the pitch of the vowel at approximately the center of each syllable is the pitch that is salient for the overall intonational pattern. Many of the words contain syllables beginning in voiced obstruents, which create a downward perturbation at syllable margins. Conversely the voiceless obstruents in Figure 5 (**bùkùlò**), Figures 8 and 9 (**gùskìnà**), and Figure 10 (**gòjjuntùn...**) perturb the pitch upward.

Figure 1. HHH **gombira** ‘okra’

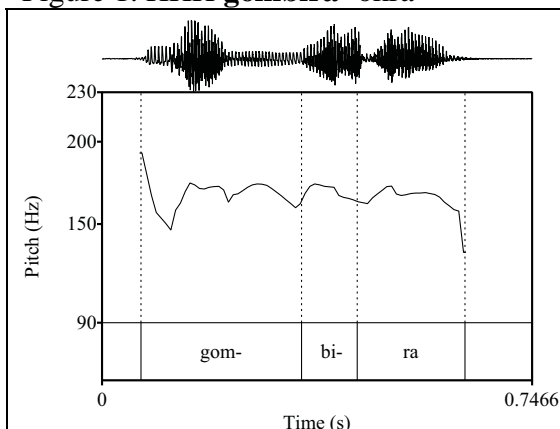


Figure 2. HHL **bambutò** ‘broom’

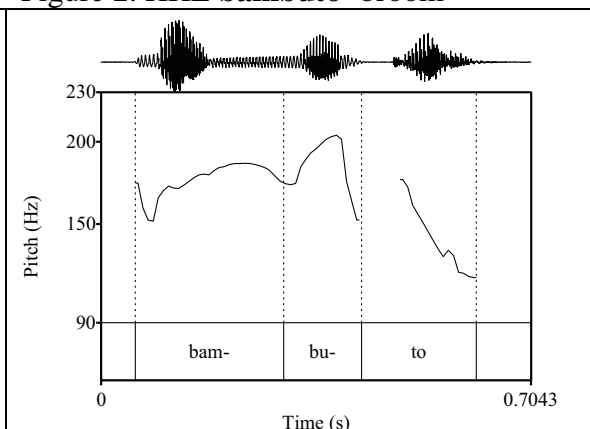


Figure 3. HLL **mongorò** ‘mango’

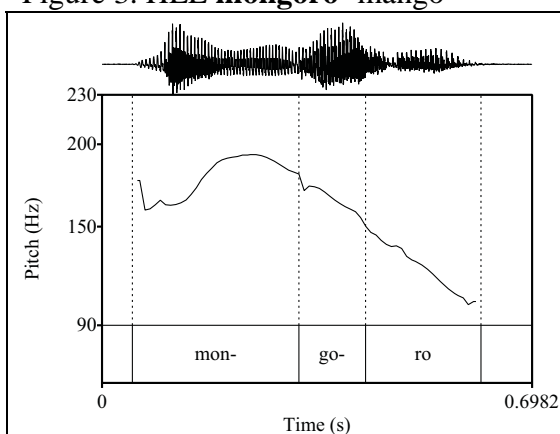


Figure 4. HLH **zogina** type of herb

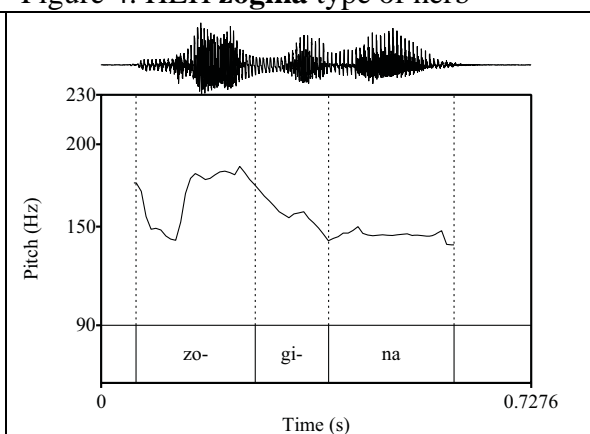


Figure 5. LLL **bùkùlò** ‘pigeon’

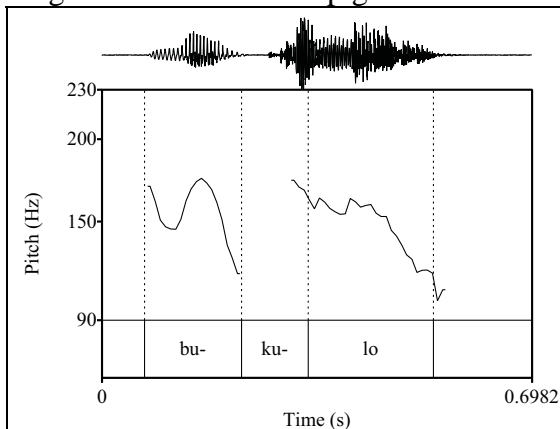


Figure 6. **gàbàga** LLH ‘cotton cloth’

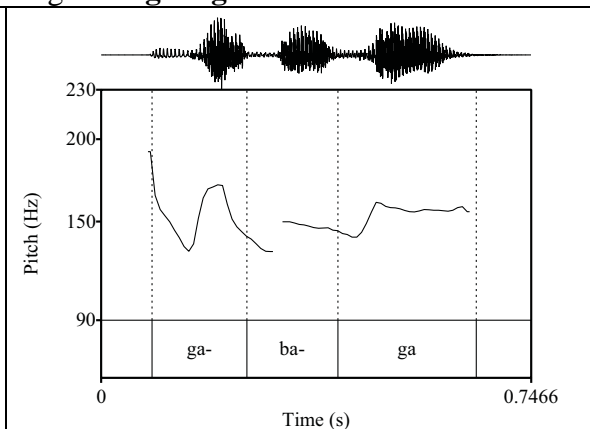


Figure 7. LHH *bèrewa* ‘gazelle’

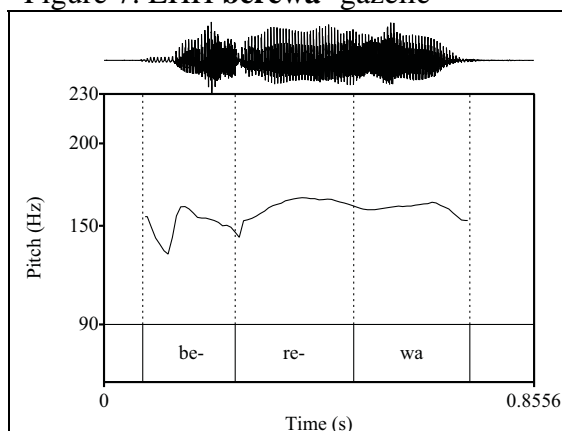


Figure 8. LHL *gùskinà* ‘burnt crust in pot’

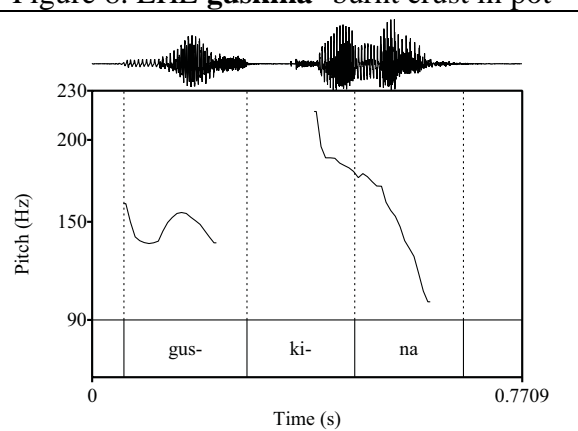


Figure 9. HLH LHL
mu gòjjun gùskinà
‘we bought burnt crust’

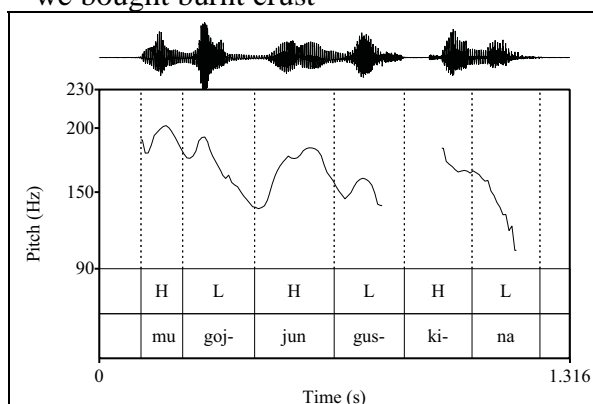
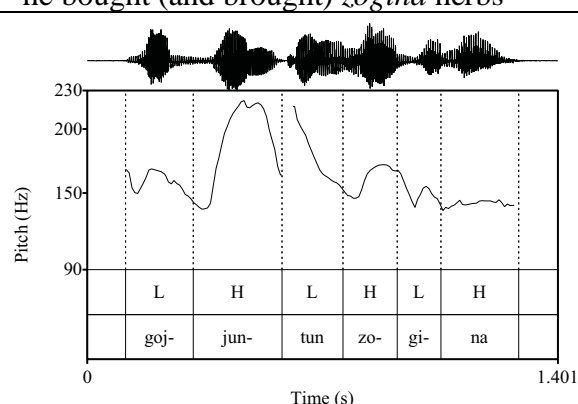


Figure 10. LHL HLH
gòjjuntùn zogìna
‘he bought (and brought) *zogìna* herbs’



1.1. Downdrift

Downdrift is a phenomenon, essentially universal in languages having only two level tones, whereby in a sequence H_1LH_2 , tone H_2 bears lower pitch than H_1 . The six-syllable utterances in Figures 9 and 10 illustrate downdrift. In Figure 9, which begins on a H tone, the H syllables **mu**, **-jun-**, **ki-** descend in stepwise fashion. The L syllables **gòj-**, **gùs-**, **-nà** also descend, but not to the marked extent of the H syllables (§1.2 discusses the descending movement on the final L syllable). In Figure 10, the H syllables **jun-**, **zo-**, and **-na** also descend, but the pitch differentiations between the successive H’s are exaggerated as compared to those in Figure 9. Reasons for this are discussed in §§1.2-3. As in the utterance in Figure 9, the L’s in Figure 10 also descend, but to a lesser extent than the H’s. Of the three-syllable utterances in Figures 1-8, only Figure 4 **zogìna** has the HLH required for downdrift. See §1.2 for further discussion.

1.2. Phrase final lowering

Downdrift, as defined in §1.1 with reference to H_2 of a H_1LH_2 sequence, requires at least one HLH sequence in the intonational phrase. Intonational phrases comprising all H or

all L tones also “drift down”, but in ways significantly different from each other and from utterances with “real” downdrift. Figures 11-12 illustrate such utterances.

Figure 11. H HH HHH
mu gojjo gombira ‘we buy okra’

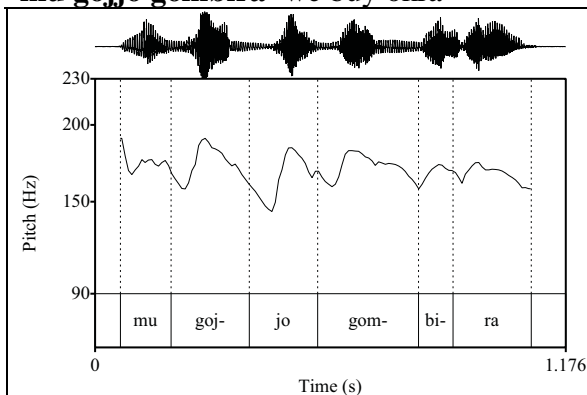
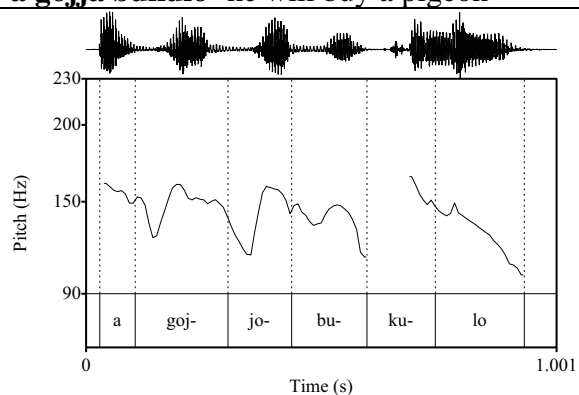


Figure 12. L LL LLL
à gòjjà bùkùlò ‘he will buy a pigeon’



Not surprisingly, the pitch space occupied by the utterances in Figures 11-12 is essentially complementary, with the pitch peaks of the all-H utterance in Figure 11 staying above 160 Hz, and those of the all-L utterance in Figure 12 staying below 160 Hz.⁵ Both utterances descend in pitch, but the all-L utterance to a greater degree than the all-H utterance (compare Figures 1 and 5 respectively for a similar distinction). The pitch difference between the beginning and end points of the all-H utterance is about 20 Hz at most (for the raised H of the second syllable in Figure 11, see §1.4). Impressionistically, the entire utterance sounds like it is pronounced on a single pitch. It seems likely that the slight declination is associated with a decrease in energy from the beginning to the end of the utterance and is not, *per se*, an intonational phenomenon in the sense of conveying information relevant to meaning or lexical tone.

On the other hand, the pitch difference between the beginning and end of the all-L utterance in Figure 12 is over 40 Hz and impressionistically is quite salient. A simple decrease in energy cannot explain this much pitch lowering and the sharp falling contour on the last syllable. We consistently see these distinctions across utterances ending in a series of H's vs. a series of L's. Were we to call intonational patterns illustrated in Figures 11-12 (and Figures 1 and 5) “downdrift”, we would expect series of phrase final H's and L's to start at different pitch levels but to otherwise behave in the same way. They do not, and hence we consider these phrase final patterns to be intonational phenomena distinct from downdrift (Lieberman and Pierrehumbert 1984)..

Aside from phrases consisting of all H, the end of an intonational phrase is marked by a greater lowering of both L and H tone than would be found phrase medially. The following lowering effects mark the end of a declarative intonational phrase:

- A sequence of L's at the end of a phrase descends on progressively lower pitches (see Figures 3, 5, and 12).
- The pitch of a phrase final L syllable drops to extra low pitch and has a falling contour (see Figures 3, 5, and 12 for a final L syllable following a L and Figures 2, 8, and 9 for a final L syllable following a H).

⁵ The onset of the syllable –kù- in Figure 12 has been perturbed upward by the voiceless obstruent, but the pitch of the vowel peak is about 159 Hz.

- A phrase final H following L rises slightly at most and may stay on the same pitch or even drop lower than the preceding L. Figures 4, 6, 7, and 10 illustrate a final H at about the same pitch as, or only slightly higher than a preceding L. Figures 13-14 show a final H that is even lower than a preceding L.

Figure 13. LHLH

Àbu d'òle 'Abu is small'

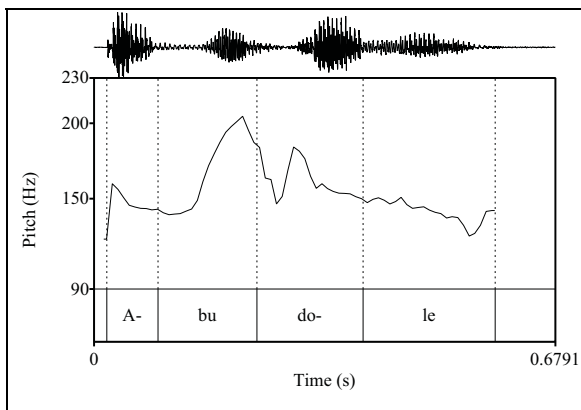
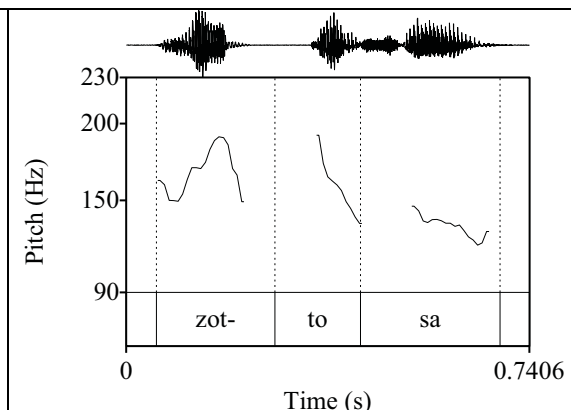


Figure 14. HLH

zotò sa 'it's not a wrapper'



The last bulleted point requires two further comments. First, the phrase final H may be associated with any number of syllables. Figure 15 illustrates a series of two H syllables following a L tone. Figure 16 illustrates a sequence of three H syllables following the L on **-tùn**. In making the transition from the preceding H to L, the syllable **-tùn** is pronounced as a descending contour, with the end of the syllable falling slightly below the pitch of the H syllable **gom-**, but the vowel of the syllable **-tùn** is slightly higher in pitch than the /H/ syllable **gom-**. Once the pitch register for /H/ has been set, all the H syllables stay at that register, with the slight declination typical for a phrase final string of H's noted in the discussion of Figure 11.⁶

Figure 15. LHL LHH

gòjjuntùn bèrewa
'he bought (and brought) a gazelle'

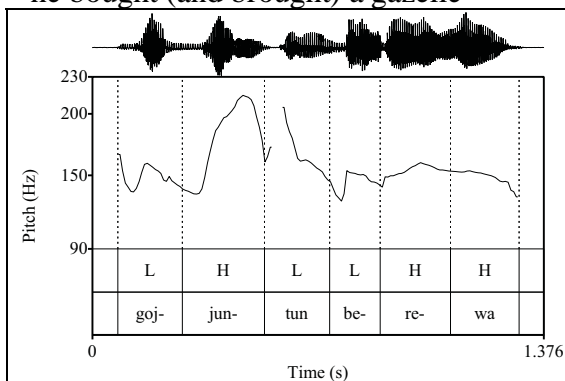
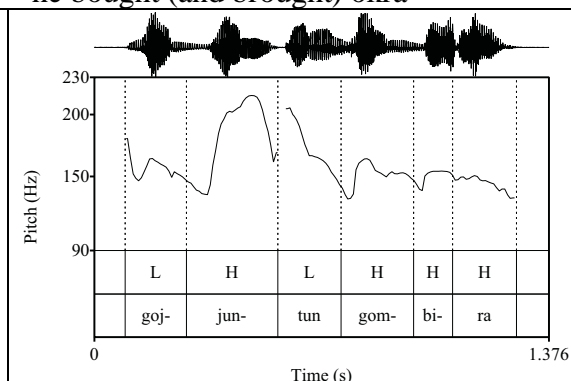


Figure 16. LHL HHH

gòjjuntùn gombira
'he bought (and brought) okra'



⁶ From a phonological point of view, one might argue that global lowering of a sequence of phrase-final H syllables results from applying the Obligatory Contour Principle (OCP) (Leben 1978), i.e. these syllables comprise a domain associated with a single H tone. The intonational phenomenon of downdrift (§1.1) affects this single H, automatically lowering the entire domain.

Second, non-raising of phrase final H after L requires that there be at least one H earlier in the phrase. That is, if the phrase is phonologically %LH (where % = beginning of an intonational phrase and the L and/or H may range over domains greater than one syllable—see fn. 6), the H will always rise in pitch, as shown in Figures 17-19. The difference in realization of a final H in %L___ vs. %HL___ is shown in Figures 19 and 20, where the three syllables of the phrase ...**gà dōdo** ‘...has money’ are realized more or less on a level pitch after H tone **Bamoi** but with a significant rise in pitch on **dōdo** where the preceding syllables of **Àjji gà...** are all L. From a phonological point of view, this makes sense: without a pitch change, nothing in the phrase provides a cue as to phonological register. If the tones of the LH sequence remained at the same pitch as they generally would in a %HLH phrase, there would be nothing to distinguish %LH from %HH, since, without a rise in pitch between the L and H, the entire phrase would be pronounced at essentially the same pitch throughout.

Figure 17. LLL HHH
à gòjjà gombira ‘he will buy okra’

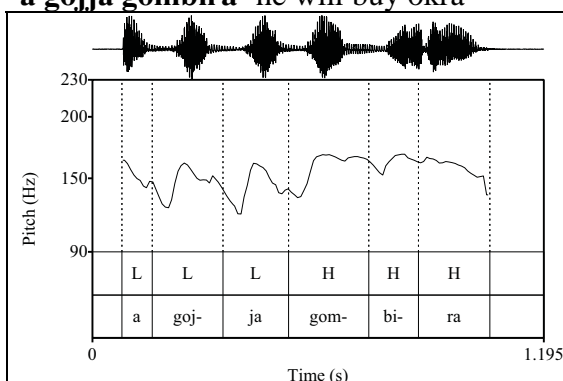


Figure 18. LHH H
àmmano sa ‘it’s not my water’

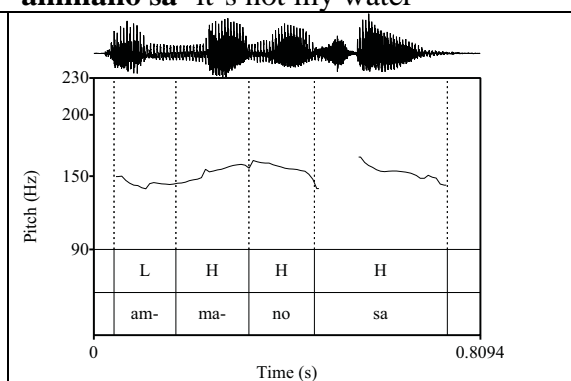


Figure 19. LL L HH
Àjji gà dōdo ‘Aji has money’

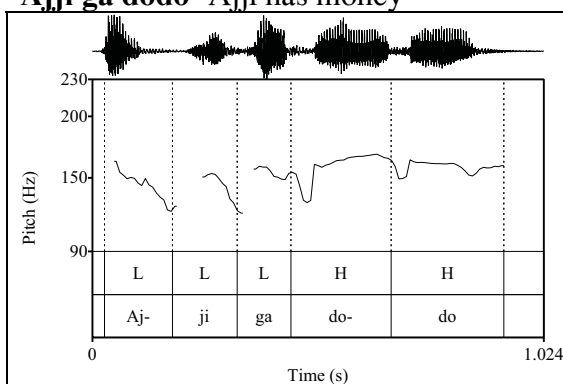
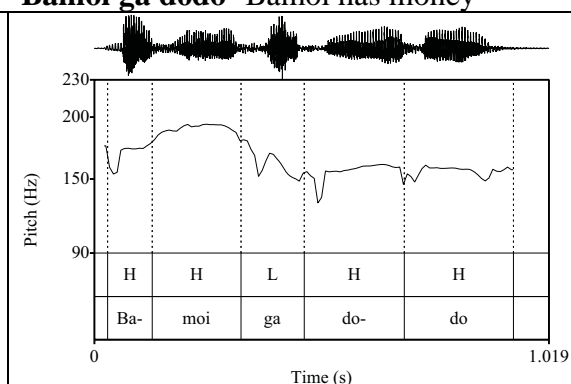


Figure 20. HH L HH
Bamoi gà dōdo ‘Bamoi has money’



To summarize the main thrust of this section, the end of a declarative intonational phrase is signaled by a *lowering of voice pitch from that predicted by phonological tone*: phrase final L undergoes EXTRA LOWERING of L tone; phrase final H in a %HLH% sequence undergoes NON-RAISING; phrase final H in a %LH% sequence is subject only to the lowering effect of DOWNDRIFT, i.e. the H rises, though it does not rise to the level it would take were it phrase initial.

1.3. Raising of H in the first HL sequence of an intonational phrase⁷

In an utterance with at least one HL sequence, the pitch of the H of the first such sequence is boosted above the “normal” pitch level for H. The fact that actual pitch RAISING takes place is most immediately evident when a H precedes the raised H, as in Figure 2 **bambutò** ‘broom’ above and in Figure 21 **gòjjun mongòrò** and Figure 22 **Àbu sīrì** below. In the latter utterances, the underlined syllables are spoken on a higher pitch than the preceding H, whereas in utterances such as those in Figures 1, 7, 12, or 23 below, phrase final strings of H tones remain on about the same pitch or descend.

Figure 21. LH HLL
gòjjun mongòrò ‘he bought a mango’

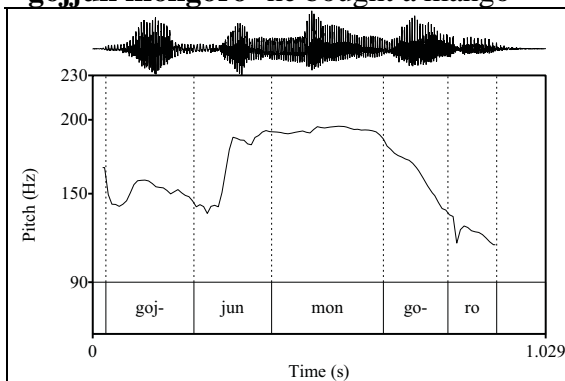


Figure 22. LH HL
Àbu sīrì ‘big Abu’

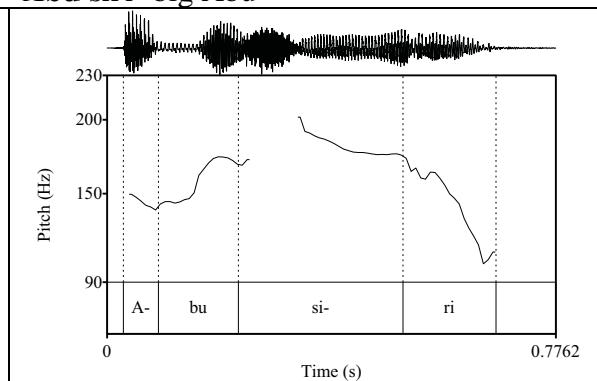


Figure 23. LH HHH
gòjjun gombira ‘he bought okra’

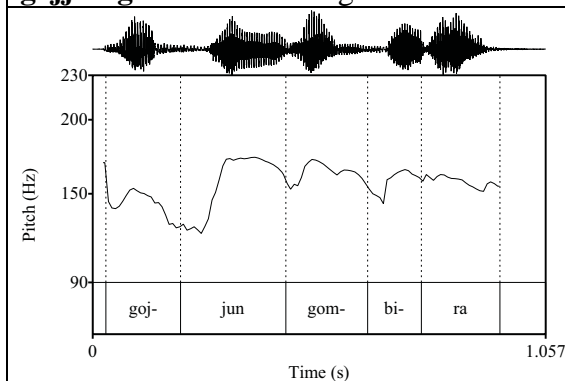
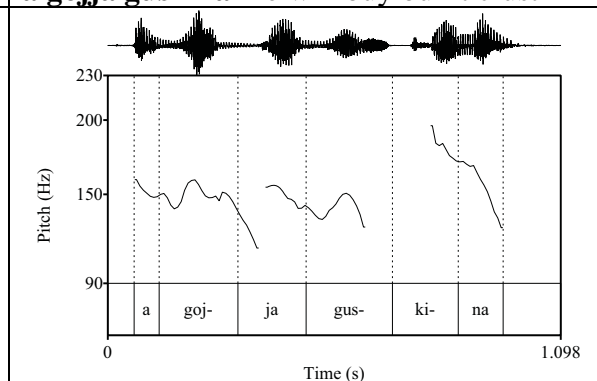


Figure 24. L LL LHL
à gòjjà gùskinà ‘he will buy burnt crust’



The same intonation pattern raising a H in the first HL sequence applies to a phrase initial H before a L as to the H of a medial LHL sequence. Utterances such as those in Figures 1-2 and 11 show that for this speaker, the pitch register for phrase initial H is set somewhere between 170 and 180 Hz when the next syllable is also H. However, when H is the first H preceding a L, the pitch of that H rises well above 180 Hz. This is the case

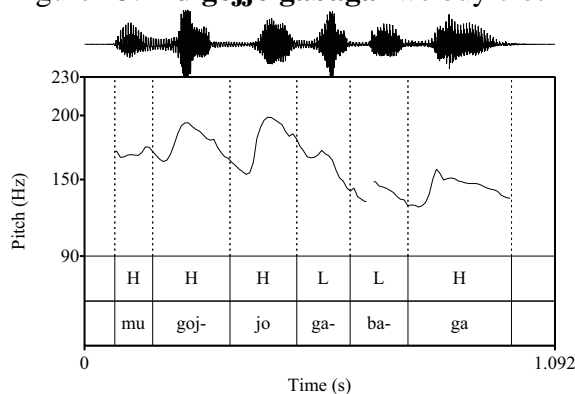
⁷ Newman (2000:612-613) briefly describes a similar, if not the same phenomenon for Hausa. The observations for Bole here differ somewhat from those of Newman for Hausa. Most importantly, he implies that H raising applies only to the second H of a *phrase initial* HHL string (or perhaps to the last H before a L in a phrase initial sequence of H syllables of any length). In Bole, H raising applies to the first HL sequence anywhere in an intonational phrase, whether after L or H. Newman also seems to imply that raising of H is related to the syntactic positioning of the H, whereas in Bole, H raising is blind to syntactic structure.

both where HL comprise the first two syllables of the phrase (Figures 3, 4, 9) and when a L precedes the first H (Figures 8, 10, 13). Even in a utterance where the HL sequence is phrase final preceded by a long string of L's, as in Figure 24, the H is raised to a higher pitch than would be expected for a H late in an utterance (compare Figure 24 with Figures 9 and 10, which illustrate utterances with HL sequences that are not the first such sequences in the phrase).

Note in addition the following points with respect to raising the H of the first HL sequence of an intonational phrase:

- If one or more H syllables precede the first HL sequence, all the H's are raised, with the one preceding the L at the highest pitch. Figure 21 illustrates this for a medial HHL sequence (-**jun mongò**-). Figure 25 illustrates it for phrase initial HHHL sequence (**mu goj-jo gà**-). The upglide in pitch to the apex before L is the mirror image of the downglide of a phrase final string of H's (e.g. Figure 11), and like downgliding, which may be viewed as a natural phonetic by-product of decrease in energy from the beginning to the end of the utterance rather than a intonational pattern *per se* (§1.1), upgliding of H's as in Figures 21, 22, and 25 may be a phonetic by-product of an energy increase of H tone(s) preceding a L.

Figure 25. **mu gojjo gàbàga** 'we buy cloth'



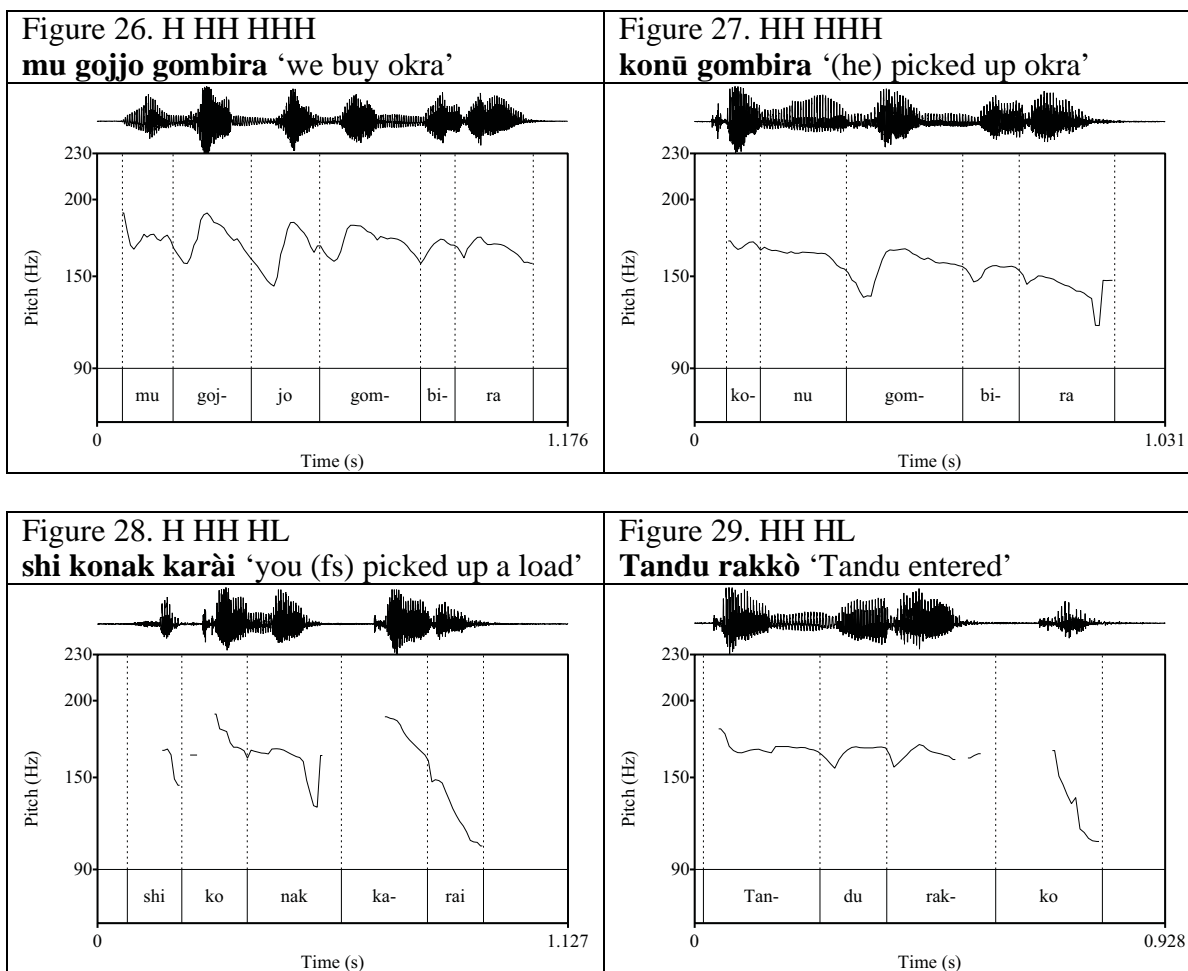
- As is the case for intonational phenomena in general, raising H in the first HL sequence applies at any point in an intonational phrase where the environment is met, regardless of syntactic structure. For example, in Figure 21 the raised H is the first syllable of a direct object after a verb whereas in Figure 25, the raised H is the final syllable of a verb before a direct object. In Figure 13, the raised H is the final syllable of a subject noun followed by an adjectival predicate whereas in Figure 22 the raised H is the first syllable of an adjectival predicate. The raised H may even be internal to a single word pronounced as an intonational phrase on its own (Figures 2 and 8).

1.4. A possible intonational effect of phrase initial clitics

In the utterances **mu gojjo gombira** 'we buy okra' in Figure 11, with all /H/ tones, and **mu gojjo gàbàga** 'we buy cloth' in Figure 25, with an initial series of three H syllables, the pitch rises from the H on the initial clitic **mu** 'we' to the first syllable of the verb, **goj-**. This cannot be identified as the same phenomenon as raising H before L (§1.3) for two reasons. First, raising of the first H before a L results in a greater rise in pitch than the rise of the underlined H in a %HHH... sequence. Second, the rise for H in the first HL sequence takes place anywhere in an utterance (cf. Figure 19, for example) whereas the

rise in %HHH... takes place only in utterance initial position—non-initial sequences of H's stay at the same level or even decline.

The examples cited both start with a H clitic subject pronoun, **mu** 'we', followed by a verb with initial H. In checking a few other utterances beginning with a sequence of three or more H's, it appears that the rise on the second H may be related to this morphosyntactic fact. In the following pairs of diagrams, the one on the left begins with a clitic (**mu** 'we', **shi** 'you (fs)') and the one on the right begins with a substantive.



In the examples with initial clitics, the clitic begins on a slightly lower pitch than the syllable of the host, whereas in those that begin with a substantive word (verb and noun respectively), the first two syllables are at approximately the same pitch. Note, moreover, that the wave forms show that the lower pitch on the clitics correlates with less amplitude than that seen on the first syllable of the respective substantives.

Bole prosodic phenomena, in general, refer only to tone and intonation. The intonational patterns discussed in §§1.1-3 make no reference to syntax, and stress is not an independent prosodic feature of Bole. Even in the initial syllable sequences **mu goj-...** and **shi ko-...** in Figures 26 and 28, one does not hear the cues of stress-based iambs that one would hear, for example, in English. It may well be that clitics, at least in phrase initial position, are subject to "reduction in prominence" in ways not well-described using only the parameters of tone and stress.

The remarks in this section are based on a small amount of data, not controlled, for example, for segmental context, and available data is not entirely consistent in showing patterns like those illustrated in Figures 26-29. We leave the suggestions here to be tested in further research.

2. “Yes/No Question” Intonation

Intonation is the only feature distinguishing a declarative statement from a yes/no question with the same propositional content. Yes/no question intonation has two main properties:

- The overall pitch register of a yes/no question is at a higher pitch level than would be that of a comparable declarative statement, and there is no downdrift.
- An extra H (XH) tone is appended to the end of a yes/no question. This docks to the final syllable of the question, resulting in a rising contour that starts at the level of the pitch register that the syllable would take without the appended XH and ends at a pitch register well above that level.⁸

Figures 30-31 show the effect of yes/no question intonation on utterances with all H and all L tones respectively. Comparison of these figures with Figures 11-12 reveals the difference between statement and yes/no question intonational patterns. The all H statement (Figure 11) starts just below 180 Hz and declines slightly throughout, whereas the comparable question (Figure 30) starts at nearly 200 H, rises slightly throughout, and ends in a sharp upward contour. Parallel intonational features distinguish the all L statement (Figure 12) and the all L question (Figure 31).

Figure 30. H HH HHH
ka gojjo gombira? ‘do you buy okra?’

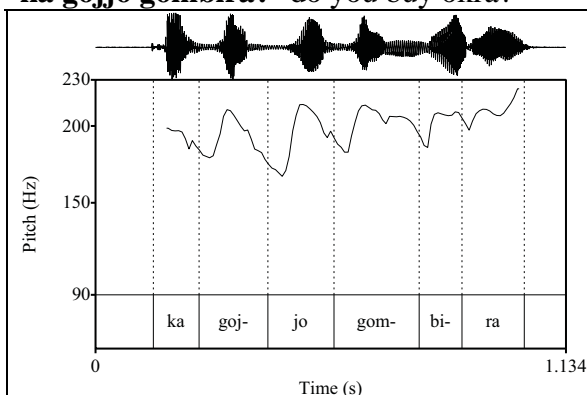
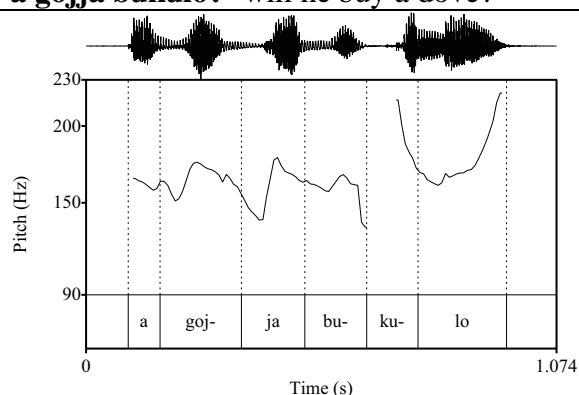


Figure 31. L LL LLL
à gòjjà bùkùlò? ‘will he buy a dove?’



⁸ The description in this section and in §5.2 assumes that tones can be independent phonological units, though, to be realized, tones must, of course, dock to segments capable of bearing tone. This assumption underlies the perhaps universal acceptance of the need for floating tones in the adequate description of African tone languages. Newman and Newman (1981), further developed in Newman (2000:Chapter 60), use this assumption for yes/no question intonation in Hausa, whereby a L (accompanied by vowel lengthening, also heard in Bole questions) is appended to a question-final H syllable. Under this “independent tone” assumption, rules of intonation impose intonational contours over a phrase that is fully specified for tone (including both lexical tones and non-lexical tones that become docked once a full utterance is formed). The *intonational phonology* approach would, in contrast, build intonational contours by rule, such that features like a falling or rising phrase-final pitch associated with a particular meaning or pragmatic effect would be built into the intonation pattern and would be superimposed on lexical tones. We assume that the descriptive facts can be translated into either system insofar as they are clear, accurately presented, and complete.

Figures 32-33 show yes/no questions with alternating HL sequences parallel to the statements in Figures 9-10. As in the compared statements and questions discussed above, the questions in Figures 32-33 start at pitch levels above those of their counterpart statements and end with sharp rising contours as a result of the appended XH that marks yes/no questions. Downdrift is suspended—indeed, in Figure 32, the H syllables **ka**, **-jun-**, and **-ki-** show “updrift”. In Figure 33, the first H syllable, **-jun-**, is at a higher pitch than the second H, **zo-**. The lower pitch on **zo-** is not a result of downdrift, however, but of RAISING of **-jun-** as the H in the first HL sequence (§1.3), a process that applies in questions as well as statements.

Figure 32. H LH LHL

ka gòjjun gùskinà?
‘will you buy burnt crust?’

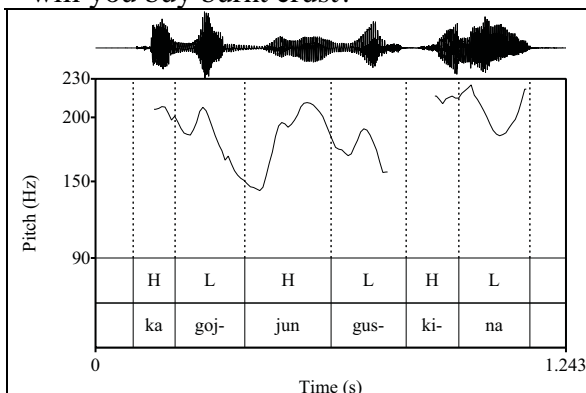
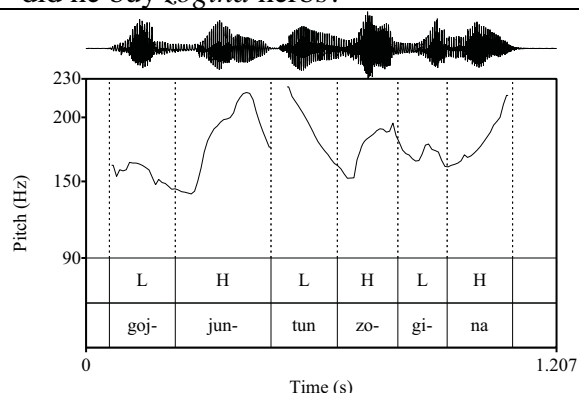


Figure 33. LHL HLH

gòjjuntùn zogìnà?
‘did he buy *zogina* herbs?’



Lexically, there are three types of disyllabic words with the tonal sequence HT (T = any tone): HH (**gatto** ‘tiredness’), HL (**zottò** ‘wrapper’), and HV(ariale) (**ottò/otto** ‘otto’).⁹ The HH and HL patterns retain the respective pitch relationships between the two syllables in all environments, including final position in yes/no questions, where appending XH results in the word final H rising to higher for HH and word final L rising to higher for HL. Normally, the HV pattern is pronounced HL in phrase final position but as HH in medial position (**ottò** ‘[it’s] otto’ vs. **otto sa** ‘[it’s] not otto’). Appending the XH marking yes/no questions to a HV word results in a tone pattern like that for HH rather than that for HL. The appended XH is marked here with an acute accent. Recordings were not available from which to make figures.

redde HH ‘bush papaya’	ka ngad’a reddé?	‘will you eat a bush papaya?’	[---- /]
ottò HV ‘otto’	ka tīna ottó?	‘will you eat otto?’	(same as above)
messè HL ‘remainder’	ka tīna messě?	‘will you eat the rest?’	[---- /]

Assuming that “phrase medial” is a correct statement of the environment for HV → HH, the implication is that the final element in an intonational phrase that comprises a yes/no question is the XH tone. This tone conditions both the realization of HV as [HH] and the rise to an extra high pitch.

⁹ See Schuh and Gimba (ms, 2005) for discussion of the HV tone pattern. *Otto* (Hausa **tuwo**) is staple food consisting of a cereal grain such as rice or sorghum cooked to a stiff consistency.

3. “Yes/No Questions” with *do*

The mark of a simple yes/no question in Bole is the intonation pattern described in §2. Another type of yes/no question adds H tone *do* to the end of the question without further syntactic modification. Such questions imply that the questioner expects an affirmative response. “Do” questions have the general intonation pattern of declarative statements, but differ from them in being spoken with a higher pitch register than the corresponding statements. In Figures 34-35, with alternating HL tone sequences, the *do* question in Figure 34 starts at a higher pitch than the corresponding statement in Figure 35, and though both utterances show downdrift, it is less pronounced for the question than for the statement. Likewise, in Figures 36-37, a question-statement pair with a string of L tones followed by H,¹⁰ the overall pitch contour is almost identical, but the question is at a higher register, almost that of the all-H statement in Figure 11. If the tone preceding *do* is L, *do* always takes a higher pitch, a fact that distinguishes it from H following L at the end of a declarative statement, which typically rises little, if at all above a preceding L, and may even be lower than a preceding L (§1.2).¹¹

Sun-Ah Jun (p.c.) points out that the examples ending in *do* show a falling final pitch. Listening to the sound files for these and other examples not included here, *do* impressionistically sounds H without a salient drop in pitch. However, the speaker always terminates *do* with a glottal stop, which should perhaps be part of the lexical specification for this particle, and this glottal stop is accompanied by creak. It is probably this creak that accounts for the fall in F0.

Figure 34. H LH LHL H
ka gòjjun gùskinà do?
‘you bought burnt crust, right?’

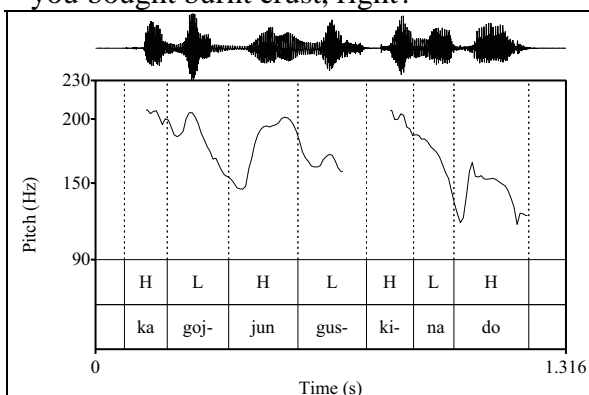
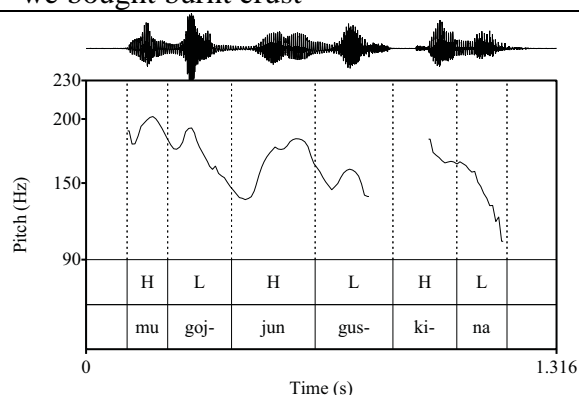


Figure 35 (= 9). H LH LHL
mu gòjjun gùskinà
‘we bought burnt crust’



¹⁰ Because *do* bears H tone, one cannot construct questions with all L tones to test for the downgliding pattern found in statements ending in a sequence of L tones, as in Figure 12.

¹¹ Since any utterance ending in ...LH can optionally rise in pitch between the L and the H, the distinction between the realization of ...LH in Figures 36-37 is actually a tendency rather than categorical. For example, the two following utterances both end in the sequence ...HLLH: **mu gojjo gàbàga** ‘we buy cotton cloth’ (see Figure 25), **ka gojjo mongòrò do?** ‘do you buy mangoes?’ The recordings for these both show a higher pitch on the last H than on the preceding L. The rise on *do* is slightly greater (3-4 Hz) than that on *-ga*, but it is certainly not great enough to argue that *do* will always show higher pitch than any phrasal final H in a declarative statement.

Figure 36. L LL LLL H
à gòjjà bùkùlò ðo?
 ‘he will buy a dove, right?’

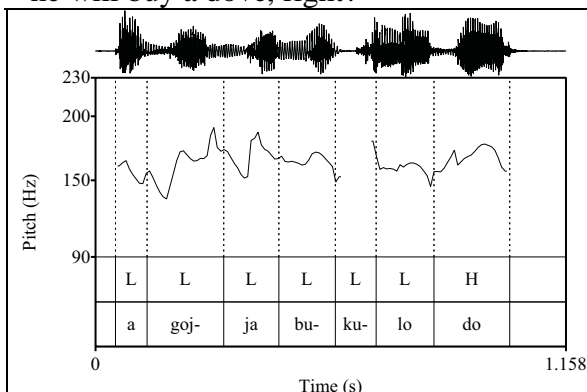
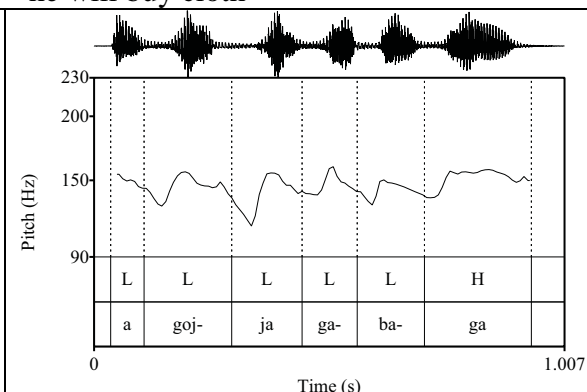


Figure 37. L LL LLH
à gòjjà gàbàga
 ‘he will buy cloth’



4. Question Word Questions (WH-questions)

WH-questions (questions asking for specific information) have the same intonational patterns as declarative statements in all respects—they undergo downdrift (§1.1), a series of phrase final L’s descends markedly (§1.2), and the first H in a HL sequence is raised (§1.3). Moreover, unlike **ðo** questions, the pitch register of WH-questions is in the same range as that for statements. All Bole question words bear L tone, and Bole has an *in situ* strategy for all WH questions except subject questions, which place the questioned subject at the END of the question. There would therefore be no opportunity to check on distinctive properties of a final H syllable in WH-questions like that of **ðo** questions. Figures 38-39 show WH-questions ending with the question words **sòttò** ‘when?’ and **lò** ‘who?’. The former begins with a L tone, the latter with H.

Figure 38. LH HLH LL
gòjjun zògìna sòttò? [bought herbs when?]
 ‘when did he buy *zògìna* herbs?’

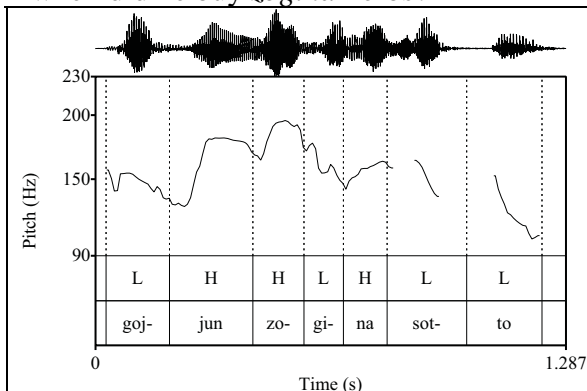
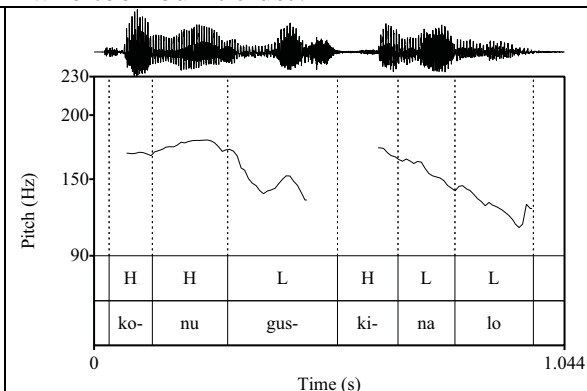


Figure 39. HH LHL L
konū gùskinà lò? [took crust who?]
 ‘who took burnt crust?’



5. Vocatives and Pleas¹²

Vocatives (calling to get someone's attention) and *pleas* (attempting to convince or entreat someone) have special intonation patterns. Examples here will consider only disyllabic names with five tone patterns commonly found with names:¹³ LL, HH, HL, LH, RL.

5.1. Vocatives

Vocatives share with yes/no question intonation (§2) an overall higher pitch register than in neutral declarative intonation, but vocatives lack the appended final XH that marks a question. Level tone patterns (LL, HH) do not show the declination typical of declarative statements—in fact the HH pattern shows a slight rise. The final L of the HL and RL patterns do not drop to the low level of declarative intonation (the pitch pattern sounds like the H Downstep patterns of terrace level languages). The H of the LH pattern rises to a distinctly higher level than the L, whereas LH in phrase final declarative intonation would typically be pronounced with both syllables at more or less the same pitch. These intonational effects give the impression of an unfinished utterance, i.e. they show essentially the pitch patterns that the respective tonal configurations would have medially in a phrase with declarative intonation, and of course, the purpose of a vocative is to give the impression that something is to follow the summons that the vocative represents.

Figure 40. HH **Tandu!**

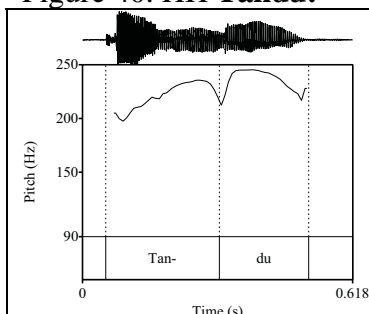


Figure 41. HL **Fanta!**

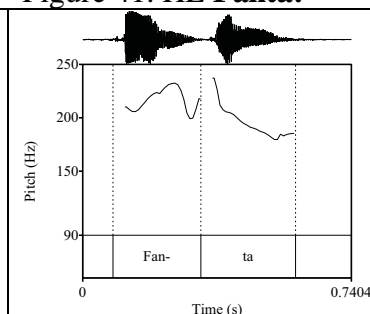


Figure 42. LH **Gòkku!**

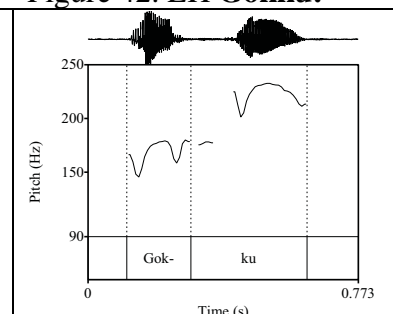


Figure 43. LL **Àmmà!**

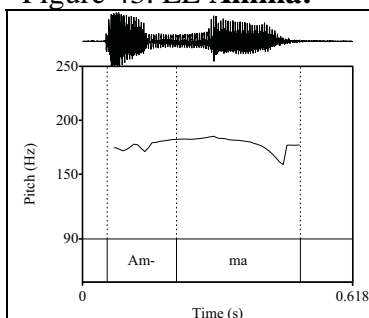
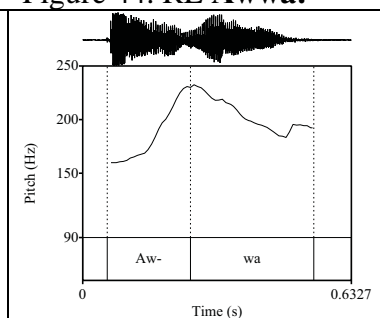


Figure 44. RL **Àwwà!**



¹² Unfortunately, we did not record declarative statement intonation for the set of names used as examples here. However, one can compare the intonation patterns of vocatives and pleas with those for the trisyllabic words in Figures 1-8.

¹³ In current data there is a sixth pattern, FH, exemplified only by the female name **Yâyi**. We did not record intonation possibilities for this name.

5.2. Pleas

Pleas start at basically the same pitch range as a declarative statement. The primary mark of a plea is an appended L on the last syllable.

Figure 45. HH **Tandu!**

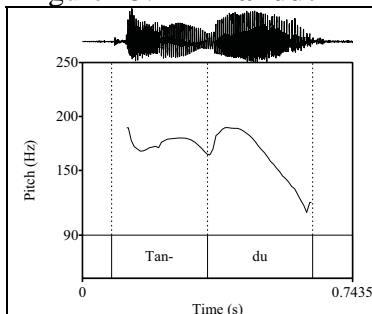


Figure 46. HL **Fanta!**

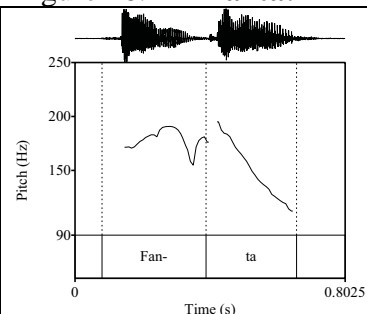


Figure 47. LH **Gòkku!**

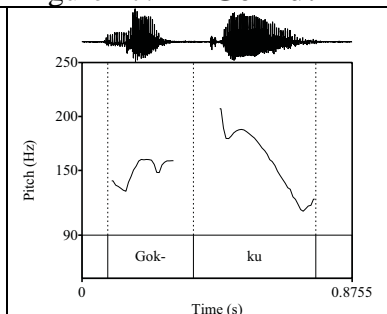


Figure 48. LL **Àmmà!**

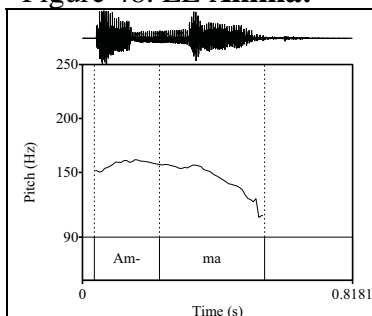
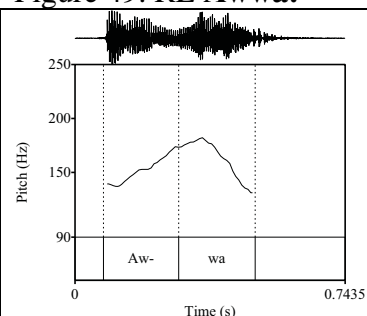


Figure 49. RL **Àwwà!**



For a LL word, which would drop in pitch on the last syllable (Figure 5) even in declarative intonation, there seems to be little intonational difference between a plea and citing a name as a declarative utterance. A canonical plea, however, wants a H+L fall on the last syllable. /HH/ and /LH/ words are realized as H-H+L (Figure 45) and L-H+L (Figure 47) respectively. In /HL/ and /RL/ words, the final syllable “borrows” the pitch of the preceding H, resulting in H-H+L (Figure 46) and R-H+L (Figure 49) respectively, that is, the underlying /HH/ and /HL/ patterns are neutralized to H-H+L. This said, there is a certain inadequacy in looking at just the F₀ intonational pattern. As described so far, the LL pattern in pleas and declarative statements is neutralized to L-L+Fall, and the declarative HH and HL patterns are neutralized to H-H+L in pleas. However, impressionistically listening to the apparently neutralized configurations, it is possible to detect differences that do not show up in a relatively gross view of the intonational pattern, perhaps in “tone of voice”, whatever that may mean, perhaps in durational factors.

6. List Intonation

In English, there are two list intonational patterns: one is to give a rising pitch to each item in the list and a falling pitch to the last, e.g. ‘Octo↑ber, Novem↑ber, Decem↓ber’; the other is to give each item up to the penultimate one a (L)HM¹⁴ pattern, with a (L)HL

¹⁴ The first syllable seems optionally to begin with a L phrase initial pitch or a M level pitch. It should be noted that the intonational patterns for lists in English are those that the first author finds natural. Other speakers might differ. The point is that lists in English have characteristic intonational patterns.

phrase final pattern on the last, e.g. ‘Oc↑to↘ber, No↑vem↘ber, De↑cem↓ber’. Bole list intonation takes a pattern comparable to the latter, *modulo* the lexical tones carried by words in Bole. That is, each item in the list is pronounced with its own phrasal intonation superimposed over the lexical tone pattern. In particular, within each member of the list, there can be downdrift (§1.1), and H raising in the first HL sequence (§1.3), but there is phrase final lowering (§1.2) only on the last item in the list. Figure 50 shows the pitch track of a sentence drawn from an unscripted narration of the story depicted in the cartoon strip in Figure 51. The sentence with the list, describes the third panel.

Figure 50. List intonation: “baggage”

konū karè yê màdǎǎ a gǎ ko-n-nì màdǎǎ a gǎ mbā-nì màdǎǎ a gǎ sā-nì
 take(cpl) stuff the some at “in” head-of-him some at “in” arm-his some at “in” hands-his
 ‘he took the things, some were on his head, some were under his arm, some were in his hands’¹⁵

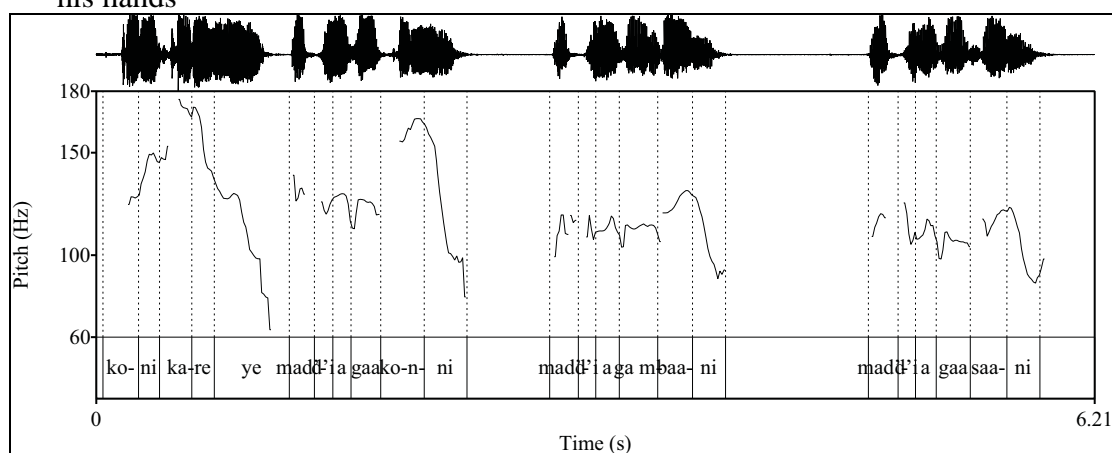


Figure 51. Cartoon: third panel described in Figure 50.¹⁶



Each item in the list seems to reset the phrase initial pitch register for this speaker, though there is a slight downtilt of the whole list, as might be expected within one intonational phrase. As it happens, each item in this list has the overall tone pattern LHL, with HL on the last two syllables. Note the boost of the H in each case, i.e. each of these HL sequences is treated as the first HL in a phrase (§1.3). The pitch tracking does not reveal an additional effect that can be heard on the final L of each item in the list, viz. the L of the last item of the list drops in a way that signals phrase final. The minimum pitch of the vowel of **-nì** in the penultimate member of the list is 88.9 Hz, whereas the

¹⁵ The introductory clause before the list forms a separate intonational phrase, with boosted pitch on the H of the first HL (↑karè), downdrift seen on the H portion of the HL falling tone of yê, and phrase final drop of the L portion of falling on yê.

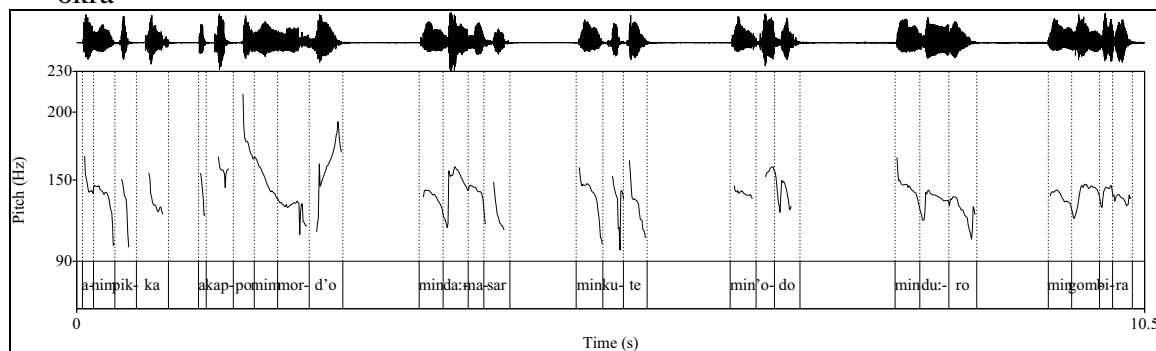
¹⁶ Cartoon from *Sauna Jac*, Zaria, Nigeria: Northern Nigerian Publishing Company, 1966, page 1.

minimum of **-nì** of the last item is 86.4 Hz. This difference seems trivial, but listening to the sound file, it is perceptible and clearly signals the end of the intonational phrase.

Figure 52 shows comparable boosts of the H in the first HL sequence in the introductory phrase and each item in the list where there is a HL sequence. The phrase final item, which has the pattern LHHH, shows phrase final lowering of the H of a phrase final LH. It must be noted, however, that the list internal items with all L tones (**mìn kùtè** ‘things like sorghum’, **mìn dūrò** ‘things like Bambara groundnuts’) do have the downward curve characteristic of phrase final ...LL declarative statements, and played as separate items, impressionistically, they sound as if they could be phrase final statements.

Figure 52. List intonation: “crops”

Ànìm Pìkkà à kappa mìn mòrd’o, mìn dâa masàr, mìn kùtè, mìn odò, mìn dūrò, mìn gombira.
 people Fika ipf plant etc.¹⁷ millet etc. maize etc. sorghum etc. beans etc. BGN etc. okra
 ‘Boles plant things like millet, maize, sorghum, beans, Bambara groundnuts, and okra’



Figures 53 and 54 show the contrast between a LH as medial vs. final member of a list. In Figure 53, the numbers **bòlou** ‘two’ and **pòd’o** ‘four’ have LH tones. **Bòlou** shows a rise (though downdrifted) pitch on the second syllable whereas the two syllables of **pòd’o**, which is phrase-final here, are at about the same pitch. In Figure 54, however, where **pòd’o** is not phrase-final, the pitch rises on the second syllable.

Figure 53. HL LH HL LH
mòd’i, bòlou, kunnùm, pòd’o ‘1-4’

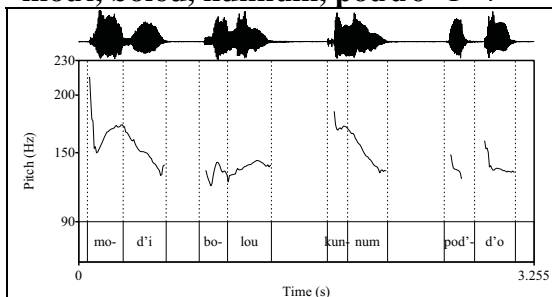
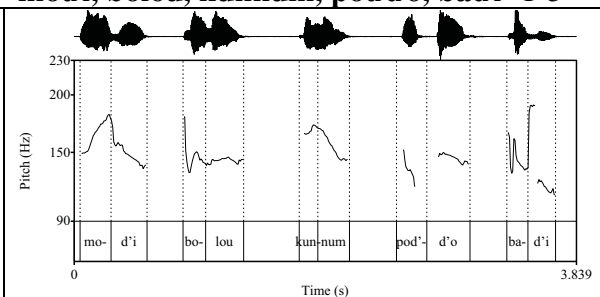


Figure 54. HL LH HL LH LL
mòd’i, bòlou, kunnum, pòd’o, bàd’i ‘1-5’



To summarize, unlike yes/no questions and pleas, which *add* a characteristic tonal component to the lexical tones, lists do not do this. The intonation patterns of items in a list can be accounted for by general rules of Bole declarative phrasal intonation, with a

¹⁷ The word **mìn** can be prefixed to a noun, including one or more members of a list, in the meaning, “things like...”, “...etc.”, “...& Co.”

resetting of the pitch register before each member of the list (with possible slight downtilt over the list, though not as great as that seen in the downdrifted pattern of phrases like those in Figures 9-10). The indicator that such a series is a list, not separate declarative statements, is the *absence* of phrase final lowering in a LH sequences and less drop in pitch of the L in a list-final HL sequence. There seems, however, to be little if any difference in the realization of ...LL in stand-alone declarative statements (Figures 3, 5), list internal items (Figure 52), or list final items (Figure 54).

7. Ideophones and Ideophonic Adjectives

Ideophones and ideophonic adjectives are words that evoke highly specific descriptions of actions, qualities, or things. They have special properties at the interface of tone and intonation. Essentially all ideophones and ideophonic adjectives are monotonal—all H or all L, with all H being seven or eight times more common—and nearly all fall within a limited set of canonical shapes. The most common ideophone shapes are CVC and CVCVC, often reduplicated in speech, though there are longer ones (see Figure 57). Ideophonic adjectives have a larger repertoire of segmental shapes and range from 2-4 syllables. The distinction between the two classes of words is largely syntactic, with ideophones acting as modifiers of verbs and adjectives, ideophonic adjectives as descriptors of nominal referents.¹⁸

Figures 55-58 give examples of these word classes with L tones, Figures 59-62 with H tones:

Figure 55. L CVC ideophones
pito shà, gudiri mbèt
'rain [went] *sha*, a log [fell] *mbet*'¹⁹

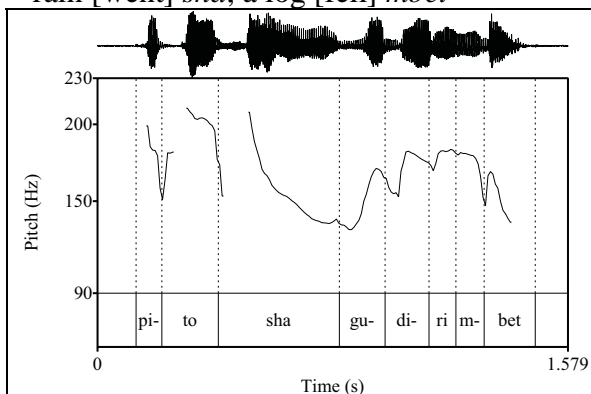
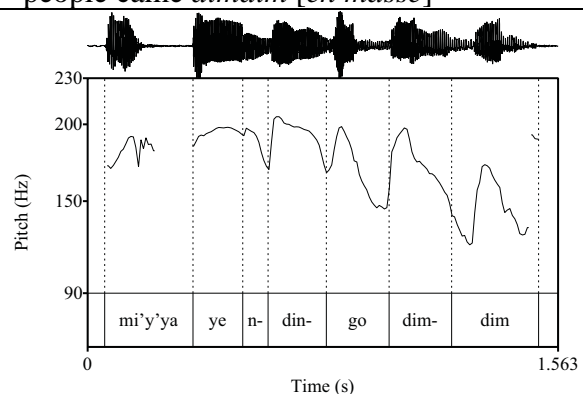


Figure 56. LL reduplicated ideophone
mi'y'ya ndingò dìm dìm
'people came *dimdim* [en masse]'



¹⁸ See Schuh and Gimba (ms-b) for a description of the shapes of ideophonic adjectives and their syntactic properties.

¹⁹ This is a rather crude riddle, where the listeners are supposed to figure out the metaphor, viz. "urination followed by defecation".

Figure 57. L trisyllabic ideophone
pèten gà jò sòre gà gà pàli tàkìshà
 ‘he came out at a run and fell into the puddle
takisha [splash]’

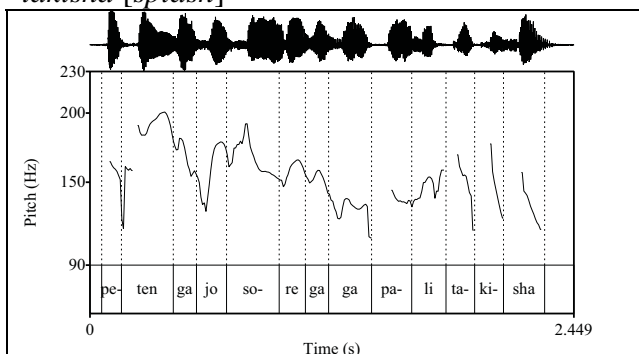


Figure 58. L trisyllabic ideophonic adj.
kùdà sīri gùngùrùḡ
 ‘a big pot *gunguruḡ* [huge and round]’

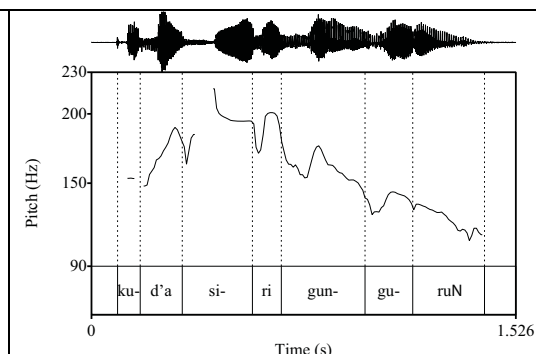


Figure 59. H CVC ideophone
dài shit
 ‘bright red [red *shit*]’

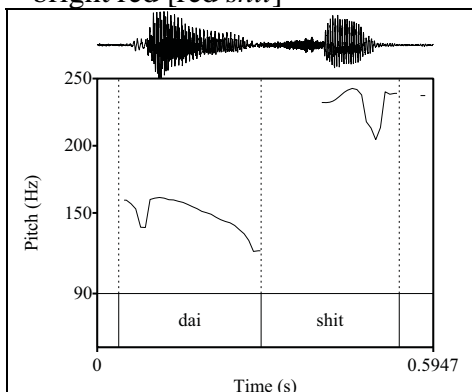


Figure 60. H trisyllabic ideophone
gàrun kùrèḡḡ kò gà wùyo piyoti
 ‘he pulled a snake from the hole *piyoti* [long & thin]’

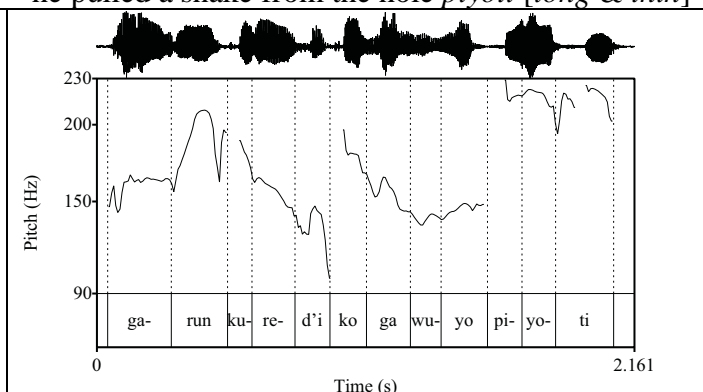


Figure 61. H CVCVC ideophone
mànshi lukup
 ‘old as the hills [old *lukup*]’

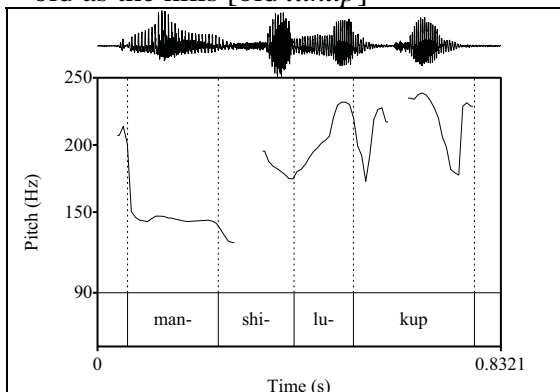
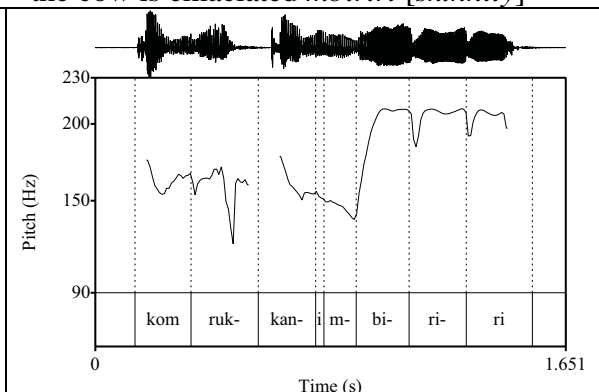


Figure 62. H trisyllabic ideophonic adjective
kòm rùkkàḡḡ m̀bīrīrī
 ‘the cow is emaciated *mbiriri* [skinnily]’



The L ideophones and ideophonic adjectives appear to be intonationally identical to any phrase final L or string of L's, i.e. a string of phrase-final L's gradually descends with an extra-L drop on the last syllable. The absence of special intonational properties

for L items parallels the pattern of items with final L tones uttered as pleas (§5.2) and as non-final items in a list (§6). The distinctiveness of L ideophones and ideophonic adjectives from “non-phonaesthetic” items is primarily segmental: most end in closed syllables, or if they end in a vowel, the vowel is drawn out. Nearly all substantive items and all suffixes end in short vowels, which are typically terminated with a glottal stop.

H ideophones and ideophonic adjectives, on the other hand, are prosodically special: when phrase final, they always take an extra H (XH) pitch ranging over all syllables of the word and well above the pitch of any preceding H. For example, in Figure 61, the LH initial sequence of **mànshi** ‘old’ rises from 127 to 188 Hz, but the ideophone **lukup** rises further to 231 Hz on the first syllable and 238 Hz on the second.

An issue of interest for this paper is whether associating this XH pitch with a H ideophone or ideophonic adjective is intonational or lexical, i.e. does Bole have three lexical tones, L, H, XH, or should assignment of XH to H ideophones and ideophonic adjectives be treated as appending a tone that creates a particular intonational pattern, comparable to adding XH to yes/no questions (§2) and L to pleas (§5.2).

The implication of saying that a language has lexical tone is that the tones of a lexical item are an unpredictable property of that item, just as the segmental make-up of that item is unpredictable.²⁰ It would run counter to this implication to assign lexical XH just to the class of non-L ideophones and ideophonic adjectives. This XH, distinct from L and H, is predictable as a property of lexical category and as a correlate of phrase finality. We therefore propose the following (tentatively formulated) rule:

H IDEOPHONE RAISING: H → XH

|
[σ₁]_{IDEOPHONE} %

A lexically H ideophone or ideophonic adjective of one or more syllables takes an extra-high (XH) tone at the end of an intonational phrase.

The XH tone of lexically H ideophones and ideophonic adjectives is thus viewed as an intonational rather than a lexical phenomenon since the trigger is phrasal, as with the prosodic phenomena considered in previous sections. Note, however, that H IDEOPHONE RAISING begs the question of what it means to be “at the end of an intonational phrase”. Obviously, an ideophone at the end of an *utterance*, as illustrated in Figures 55-62, is at the end of an intonational phrase, but utterances such as the following come up frequently:

zòri botū <u>dot</u> gà gà bòzò	‘the rope broke <u>snappo</u> inside the well’
kulà ngòmanì <u>rabal</u> gà àtti	‘the gourd bowl is full <u>to the brim</u> with <i>kunu</i> ’
konnì <u>kultum</u> mana ko dàbi	‘his head [is] <u>kultum</u> [<i>long and hard</i>] like a hoe blade’
ishi <u>ngūrīrī</u> kala làwò sa	‘he [is] <u>of tiny stature</u> but he is not a child’

In these examples, the underlined ideophones or ideophonic adjectives do not fall at the end of the respective utterances, nor would there generally be a pause following them,

²⁰ Tones may be predictable in subsets of lexical items, of course. In Bole, tones of verbs are 100% predictable, depending on TAM, inflectional morphology, and derivational morphology. Verbs therefore cannot be said to have lexical tone. This does not apply to ideophones and ideophonic adjectives, some of which are H and others L, and there are even pairs distinguished only by tone, such as the ideophonic adjectives **shòmshòm** ‘sour’ vs. **shomshom** ‘pointed’.

yet they would be pronounced with XH tone.²¹ From a syntactic point of view, however, the material following the ideophonic word is “outside” the phrase to which the word belongs. In the first three, this material is an adjunct phrase (locative **gà gà bòzò** ‘in the well’, instrument/substance **gà àtti** ‘with *kunu* (a type of gruel)’, comparison phrase **mana ko dàbi** ‘like a hoe blade’), and in the last, it is a separate clause (**kala lãwò sa** ‘but [he is] not a child’). Though we do not currently have instrumental records to demonstrate the exact intonational pattern of the material following the ideophonic words, it seems that this material constitutes a new intonational phrase within a single utterance.

It is not the case, however, that an ideophonic word automatically creates (or must fall at) an intonational phrase boundary. In utterances like the following, the underlined ideophonic words are not utterance final, but in contrast to those above, they have normal H tone, not XH.

gòn, àmma laka sa ‘[it’s] nice, but not *super (nice)*’ (but **gòl LAKA**)
mànshi, àmma lukup sa ‘[he’s] old, but not *doddering*’ (but **mànshi LUKUP**)
bilbil lãwò ‘*teensy-weensy* child’ (but **lãwò BILBIL**)
betiker sumbu = betiker gà sumbu ‘*massive* [in the] buttocks’ (but **sumbu BETIKER**)

In the first two, somewhat jocular expressions, the ideophones are followed by the negative clitic, **sa**, which must be phrased with what precedes and thus prevents the ideophones from being phrase final. They are pronounced with regular H tone rather than XH. In the latter two, the ideophonic adjectives are used as prenominal modifiers, again requiring that they be phrased with the following word and thus preventing their falling at the end of an intonational phrase.²² However, if the same words follow the noun, in essentially the same meaning, they are phrase final and do have XH tone, shown by small caps in the parenthesized sentences.

To summarize, lexically H ideophones and ideophonic adjectives trigger the intonational property of an XH tone, but only if they are final in an intonational phrase. Although this is a property of a specific word class, it is comparable to other phrase final intonational properties, such as phrase final lowering (§1.2) and appending an XH tone to yes/no questions (§2). The fact that ideophones and ideophonic adjectives have normal H tone in utterances where they are syntactically precluded from being phrase final shows that XH tone is not a lexically assigned tone for these words distinct from L and H.

8. Conclusion

This paper is a descriptive account of intonational phenomena in, Bole, a language with a fairly typical African tone system that contrasts H and L lexical tones. Our broader goal is to extend research on intonation to tone languages in general, in which the two pitch-related prosodic phenomena of tone and intonation interact.

We have looked at eight types of phrases with distinct intonational patterns. Intonational phenomena are overall phrasal patterns linked directly to lexical tones. Bole

²¹ Unfortunately, we do not have recordings of these or comparable utterances in order to show the F0 curve. This issue arose as the paper was being written in the US and the second author, Alhaji Maina Gimba, was in Nigeria, making recording logistically difficult.

²² In **bilbil lãwò** ‘*teensy-weensy* child’, **lãwò** ‘child’ has undergone LOW TONE RAISING on the first syllable because of the preceding H tone. Schuh and Gimba (2005) show that this takes place only when the two words have a close syntactic bond. Ideophonic adjectives can often be used in a phrase formed with **gà** ‘with, in the...’, as in **betiker gà sumbu** ‘*massive* in the butt’, but again, because the ideophonic adjective is necessarily phrased with what follows, it does not fall at the end of an intonational phrase.

intonation does not single out items internal to a phrase for particular intonational treatment. Some intonational phenomena run across an entire phrase, such as suspension of downdrift in yes/no questions. Others primarily affect phrase endings in ways particular to the function of the phrase, such as appending an XH tone to the last syllable of yes/no questions or a H+L fall to pleas. Certain intonational phenomena that are predictable from the tonal make-up of a phrase are found across various phrase types, including downdrift (§1.1), which is suspended only in yes/no questions, phrase final lowering (§1.2), which is overridden by the appended XH tone in yes/no questions and is suspended in vocatives, and boosting of H in the first HL sequence of a phrase (§1.3).

In the final section we considered the prosody of ideophonic words, which, to the best of our knowledge, has not been dealt with in the context of intonation studies. Rather than consider the extra-high tone associated with H ideophones as being a tonal property of individual words, we have argued that this should have the same type of formal account as canonical intonational phenomena that relate to functions associated with overall phrases (asking question, registering pleas, making lists, etc.).

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