Polar Question Intonation in Kɔnni

Michael Cahill
SIL International

1. Introduction

Relatively few studies have been done on intonation in tone languages, in particular African languages. This is a preliminary presentation on the phonology of polar ("yes/no") question intonation in Kɔnni ([kma], Gur, northern Ghana). Some languages indicate a polar question by a particular syntactic construction ("Is he going to the park?"), and some by a particular particle (somewhat like "He's going to the park, right?"). Others use only a change in pitch (intonation) to change a statement to a question ("He's going to the park?") The last is what Kɔnni uses and is the focus of this paper.

Non-tonal languages as diverse as English, French, Italian (Chapallez 1964), Huastec of Mexico (Larsen & Pike 1949), and Kunimaipa of Papua New Guinea (Pence 1964), have a pitch which rises utterance-finally to mark a polar question.

Studies in tone languages are rarer, but exist. Chrau of Vietnam (Thomas 1966) raises the pitch of polar questions. Thai also raises pitch for yes/no questions (Luksaneeyanawin 1998). Hausa raises pitch on the final syllable (Miller & Tench 1982, Cowan & Schuh 1976).

Chang (1958, quoted in Ladd 2008:159) describes Chengdu Chinese with the following changes to the final syllable of a sentence when it is changed to a question. Note that all polar questions in Chengdu involve a raising of pitch on the final syllable.

(1)

Citation form	change when a yes/no question
I. high-rising	often ends higher than usual
II. low-falling	becomes low level
III. high-falling	becomes high level
IV. low-falling-rising	becomes low rising

In view of the many known languages with a documented pitch rise, Bolinger (1978:471) writes: "Terminals are almost universally low or falling for finality and assertion, and high or rising for the opposite, including yes-no questions…" Similarly, (Ohala 1984:2) says of the cross-linguistically common high or rising pitch to indicate a polar question:

> *[This] pattern is too widespread to be explained by borrowing, descent from a common linguistic source, or chance. It follows that there is something common to all human speakers, at all stages in history, which creates this phenomenon.*

However, languages do exist with final falling pitch to mark polar questions, e.g. Chickasaw (Gordon 2005) and Eastern European languages (e.g. Svetozarova 1998:268 for Russian), which Ladd (2008) notes sounds like a declarative sentence to many Western European language speakers. Hungarian also follows this pattern.

* Thanks to Kɔnni speaker James Amadu for these data. Limited data from Braimah Sekpegile (now deceased) also support the patterns here. Thanks also to audiences at GIAL's Academic Forum, as well as at the 42nd ACAL conference at the University of Maryland, for valuable input. All graphs, including overlays, are captured from SIL's Speech Analyzer program (free download at http://www.sil.org/computing/sa/index.htm).

 Selected Proceedings of the 42nd Annual Conference on African Linguistics, ed. Michael R. Marlo et al., 90-98. Somerville, MA: Cascadilla Proceedings Project.

(2) Hungarian (Ladd 2008:82)
L* H L
Beszél a tanár? 'Is the teacher talking?' (lit. 'talks the teacher?')

This seems a counterexample to Bolinger and Ohala, since the overall pitch is not high (an assumption here, since Ladd does not explicitly mention this), nor is there a final rising pitch.

In addition, Clements & Rialland (2008) and Rialland (2007, 2009) have collected a database of over 70 African languages, of which almost half lower their final pitch to indicate a polar question. How Kɔnni fits into their typology will be discussed at the end of the paper.

Thus it seems a rising pitch to indicate polar questions is far from universal in the world's languages. Here we present a preliminary investigation of the Kɔnni pattern in some phonetic detail, as a contribution to this growing database.

2. Kɔnni polar question intonation

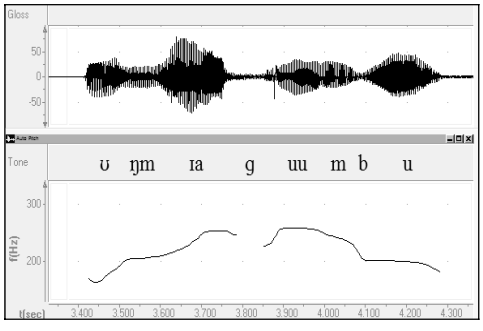
2.1. The basic pattern – a preview

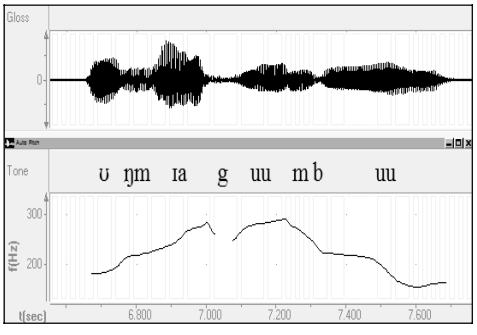
Content questions of Kɔnni merely add an interrogative marker, with no additional tonal phonology. The following examples have exactly the same pitch pattern:

(3) a. tígíŋ wón!ná 'this is a house' (lit. 'house this-is')
b. bíá wón!ná 'what is this?'

Polar questions, in contrast, lengthen the final vowel or nasal, and have some variety of a falling final pitch. In Kɔnni, this can be transcribed in terms of phonemic tones, as in the following case, which downsteps the final vowel:[1]

(4) a. ò ŋmìá gúúm!**bú** 's/he is rolling the rope'
b. ò ŋmìá gúúm!**bú!ú** 'is s/he is rolling the rope?'

a.


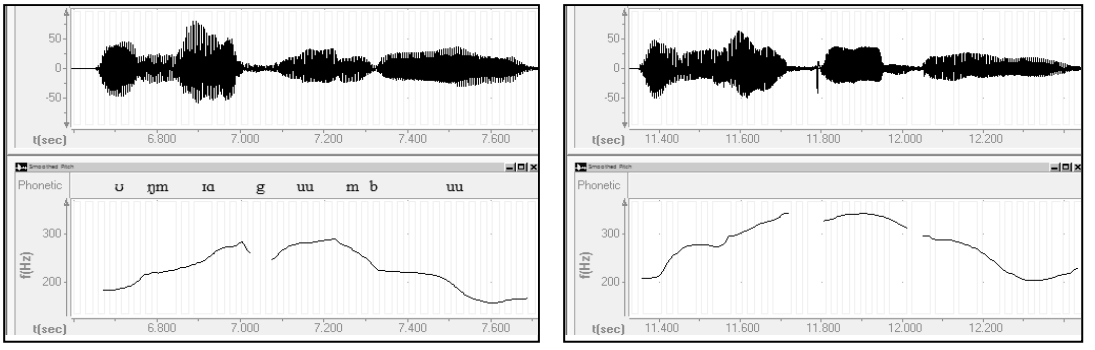
b.


The entire pitch in a polar question is also higher than in the corresponding statement. Also, most polar questions exhibit a small but consistent phonetic "upflip" at the end, as in (b) above.

An additional element is introduced in "surprise" questions, those in which the speaker expresses surprise at the situation. In these, the entire register is higher than that of the neutral question.

[1] Each utterance was repeated three times. When an average is reported below, it is taken from these three repetitions. When one example is extracted and given in a graph here, it is the second of the three utterances.

(5) a. normal polar question b. “surprise” polar question



2.2. Basic Autosegmental analysis

2.2.1. Pattern 1: H-final Words that Add Downstepped H

Which tonal autosegments are added to a statement varies according to the tones already present. In the above example, the pitch on the extended vowel is a downstepped High tone. In accordance with standard autosegmental representation, this is represented by an additional LH:

(6) a. L LH H L H b. L LH H L H **L H**
| | | | | | | | /
ɔ̀ ŋmìá gúúm!bú ɔ̀ ŋmìá gúúm!bú**!ú**

The additional statement and question below follow the same tonal pattern.

(7) a. ɔ̀ yèsɔ̀wá gbíá!bíŋ ‘s/he has carved a door’
b. ɔ̀ yèsɔ̀wá gbíá!bí!ŋ́ ‘has s/he carved a door?’

2.2.2. Pattern 2: H-final Words that Add L

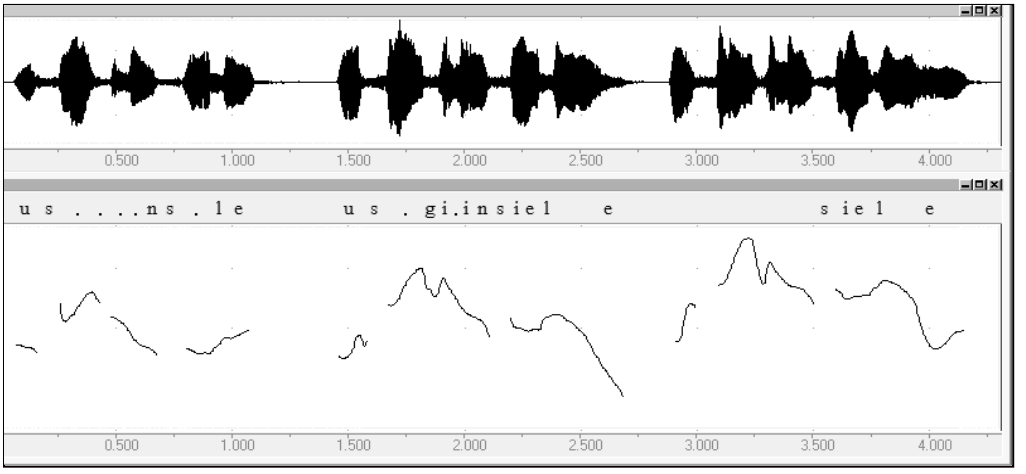
However, not all questions end with a downstepped High. Some, as the following, end with a Low tone:

(8) a. ù sìé gìlìnsìè**lé** ‘s/he is dancing gilinsiele dance’
b. ù sìé gìlìnsìè**léè** ‘is s/he dancing gilinsiele dance?’

In the above, only a L tone is added to produce a polar question. (The fall to the end of the upflip in the final syllable of the polar question *-bú!ú* averages 4.8 semitones, or 55 Hz, and in *-léè* averages 8.5 semitones, or 85 Hz. The fall to the bottom of the upflip syllable in *-bú!ú* averages 5.8 semitones, or 65 Hz.) There is a considerable and quite audible difference in the downstep vs. the falling tone.

In the *gìlìnsìèléè* case, the “upflip” is also absent. However, in the “surprise question” form (*gìlìnsìèlé!é*), the LH is added, and the upflip is again present.

(9) a. statement b. normal question c. "surprise" question



Phonologically, both *gúúm!bú* and *gìlìnsìèlé* end with a H autosegment, so why the different behavior? Why add LH to one and only a L to another? More data has not given a definitive answer.

2.2.3. Additional data for H-final words

The word *sààbó* 'the TZ porridge" has a tonal configuration much like *gìlìnsìèlé*: both end in surface LH. However, it does not follow *gìlìnsìèlé* in Pattern 2, but behaves like *gúúm!bú* in consistently adding a downstepped High, that is, LH (Pattern 1):

(10) a. tì díè sààbó 's/he is eating the TZ' (TZ is a type of porridge)
b. nì díè sààbó!ó (normal *and* surprise question)

On the other hand, the word jóríkó 'the ladder' resembles gìlìnsìèlé in displaying Pattern 2:

(11) a. ò yásíná jóríkó 's/he is climbing the ladder'
b. ò yásíná jóríkóò (no upflip)
c. ò yásíná jóríkó!ó surprise question (upflip)

There does not appear to be a floating tone at the end of one class of words but not the other; both *sààbó* and *gúúm!bú*, for example, have the definite suffix *–bÚ*, but behave differently. At this point, with admittedly limited data, which pattern a noun ending in H exhibits, Pattern 1 or Pattern 2, appears to be an idiosyncratic feature of individual lexical items.

2.2.4. Pattern 3: L-final Words that Add HLH

Additional complexity comes with statements ending with a noun with final Low tone. In these, the pitch is actually raised before falling:

(12) a. ò dàwá níí**gè** 's/he has bought a cow'
b. ò dàwá níí!**gé!é** 'has s/he bought a cow?' (normal and surprise question)

In this case, it appears that a HLH is added to the statement's tone melody, as follows.

(13) a. L L H H L
| | | | |
ò dàwá níí**gè**

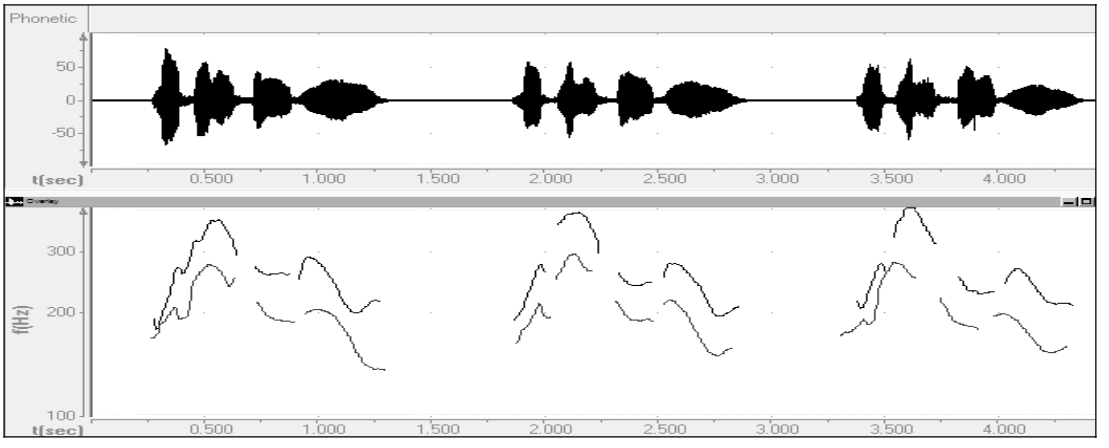
b. L L H HL **HLH**
| | | | | /
ò dàwá níí!**gé!é**

To summarize, what all three Patterns have in common is a distinct falling pitch in the final syllable, but this fall is neither phonetically nor phonologically invariant. Whether a statement ends in H or L, tones are inserted, and these additional tones produce some sort of a fall, whether a HL fall or the more common downstep H!H. Kɔnni's polar questions thus exhibit quite a different strategy than English, French, or other widely-known languages.

2.3. Surprise questions

There are undoubtedly more ways to modify a polar question than the "surprise question." Further research may indicate intonation patterns to indicate doubt, other emotions and attitudes, or focus of different parts of the sentence (though Schwarz 2009 contends that Kɔnni and two closely related languages use only morphosyntactic structure to indicate focus). Here we examine how a polar question is pronounced when the speaker expresses surprise, even astonishment. As previously mentioned, and seen in the graph below, the main pattern is that the entire sentence is raised in pitch.

(14) 3 repetitions of *nì dìè sààbó!ó* 's/he is eating the TZ' in normal and surprise question intonation (pitches superimposed, with surprise question at the higher pitch)



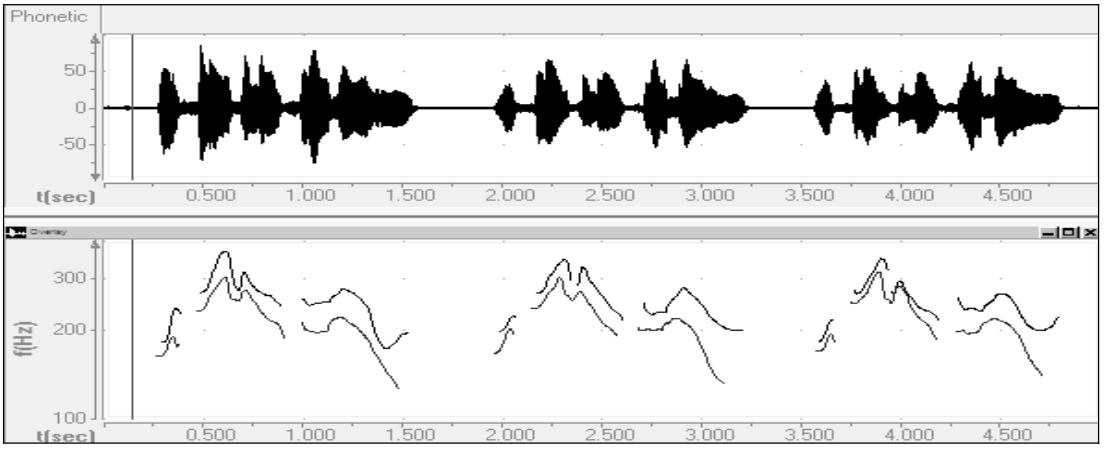
However, in at least two Kɔnni forms, the surprise question has different tonal autosegments than the neutral question (e.g. *ù sìé gilinsiele!é* vs. *ù sìé gìlìnsìèlééè*).

(15) a. L LH L L L H **L**
| || | | | | |
ù sìé gìlìnsìèlé è

b. L LH L L L H **LH**
| || | | | | |
ù sìé gilinsiele !é

The normal polar question in (14a) adds only a Low tone to the statement tone, while the surprise question adds LH autosegments. The graph of these is seen below.

(16) 3 repetitions of *ù sìé gìlìnsìèlé̱è̱* and *ù sìé gìlìnsìèlé̱!é̱* 's/he is dancing the gilinsiele'
(pitches superimposed, with surprise question at the higher pitch)



(Ladd 2008) discusses "paralinguistic" information, which includes information about the speaker's emotional and physical state, such as fatigue, excitement, anger, etc. He states that such "paralinguistic" information does not add categorical linguistic information. The "surprise questions" presented here certainly differ from the normal questions in emotional state, and so qualify as "paralinguistic" differences. Furthermore, if we recognize that tonal autosegments are segments, then they can be termed categorical linguistic information. So the Kɔnni case calls Ladd's claim into question.

2.4. The upflip

The "upflip", a short rise utterance-finally, is a phonetic detail that occurs in most polar questions, and is always present in the "surprise question" forms. Any time there is an auditory downstep in the extended vowel or nasal, the upflip is present (unlike in the base form of the word).

This is a regular pattern in Kɔnni which needs additional investigation. At this point, all I can do is to offer some speculative thoughts.

The upflip was not noticed auditorily at first, but only by an inspection of the pitch traces. That is, it is not audible to the casual outside listener. However, its regularity, occurring in two speakers' speech, indicates that it is learned as a normal pattern of a child acquiring Kɔnni question intonation.

A reasonable hypothesis is that this upflip is a phonetic manifestation of LH. Generally a surface [HLH] tone is prohibited in Kɔnni; if such a configuration would occur by morpheme concatenation, then the second High spreads left. It delinks the Low and downstep occurs, yielding [H$^{!}$HH], with no discernable dip for the L tone, either auditorily or graphically. So this does not follow the normal tonology patterns of Kɔnni.

The upflip is definitely a phonetic raising of pitch, but it does not follow the normal patterns for a rising tone in Kɔnni, in two ways. First, the rise in pitch for a polar question upflip averages 0.84 semitones and for surprise averages 1.45 semitones. These are significantly less than the usual Low-High rise, which for the sentence-final LH data in this paper averages 2.02 semitones for a High after a series of Lows. Second, on the long two-mora vowel, the pitch remains at a stable high pitch throughout the first mora, only exhibiting a "rise" on the second mora. However, Kɔnni does not allow a rising tone on a short vowel elsewhere in the language (Cahill 2007). The slightness of the rise and the restriction of its locus to one mora are both anomalous in Kɔnni. It seems likely that this upflip, then, is perhaps more a phonetic than a categorical phonological phenomenon.

3. Discussion

3.1. Some irregularities

Most of the data available has been described and categorized above. However, some data does not fit into the framework presented here, and act as outliers, raising more questions. First, why does 'house' in (17) below not have a fall at all in the normal polar question but does in the 'surprise question'? There is a very slight declination in pitch (average 0.6 semitones, 7 Hz), but not enough to be transcribed as a downstepped High, let alone a HL falling tone. This is the only sentence in my data with no significant falling pitch in the polar question.

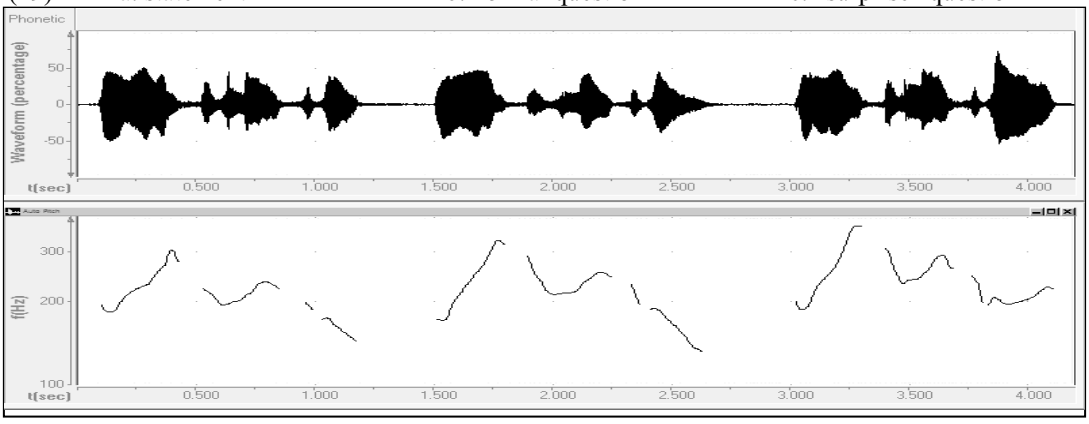
(17) a. ò gàrá$^{!}$wó tígírí 's/he has gone to the house'
b. ò gàrá$^{!}$wó tígíríí (polar question – slight decline, but not quite downstep)
c. ò gàrá$^{!}$wó tígírí$^{!}$í (surprise question, with upflip)

The second unanswered question is why is there a *rising* tone at the end of the surprise question below? This example is the only one in my data.

(18) a. ù wó sìgìlínsìgè 's/he lacks hiccups'
b. ù wó sìgìlín$^{!}$sí$^{!}$géè (transcription uncertain: *sɪ* is very short)
c. ù wó sìgìlínsìgèé (surprise question, with *clear rising tone at end*)

The rise in the three examples of (18c) averages 2.5 semitones, 31 Hz. This is much closer to the average LH rise in other words in this data than it is to the upflip rise (Sec. 2.4). In the graph below (19c), note also that the low portion of the rise occurs early in the vowel, unlike the situation with the upflip. The pitch rises over the entire two-mora duration of the final vowel, as is typical of a phonological rising tone in Konni. Thus this is a real phonological rise, not a phonetic detail.

(19) a. statement b. normal question c. "surprise" question



3.2. A unified representation for polar questions?

A suggestion was made both at the ACAL conference and by a referee to consider a LH autosegment, generally manifested as downstepped High, as the morphological marker of polar questions. This would account for data in this paper which end in downstepped High, and could possibly be connected to the common phonetic final upflip in polar questions. The question *ù wó sìgìlínsìgèé* 'does s/he lack hiccups?,' with rising final tone, could also be generated by this, with the L of the added LH merging with the final L lexically present in *sìgìlínsìgè*. However, other data remain problematic for this approach. In particular, *ò dàwá níí$^{!}$gé$^{!}$é* 's/he has bought a cow' in (12b, 13b) adds HLH, not just LH. Also, *ù sìé gìlinsièléè* 'is s/he dancing gilinsiele dance?' in (8) and a similar example in (11) seem to add only L tone, not LH, though adding LH would give a licit representation, as shown by the corresponding "surprise questions" for these two examples, which do in fact add LH.

At the very least, there would need to be significant machinery added to the analysis in order to make a LH representation viable for all the data here.

3.3. Gur and the Larger Context

Though the larger linguistics world has the impression that rising or high pitch is almost universally characteristic of polar questions (Sec. 1), recent work by Africanists has called this into question. Specifically, Clements & Rialland (2008:75ff) have a section on polar questions in Africa, noting that of the 75 languages in their sample (admittedly genetically and areally unbalanced), 34 have falling rather than rising intonation at the end. Almost all Gur languages in their sample have this pattern. Most have no actual phonetic data, however, as this presentation does. In light of studies that mostly focus on other areas of the world (such as those referred to at the beginning of this paper), they claim that this type of question intonation is almost unique to Africa.

Following up this paper, Rialland (2007, 2009) lists characteristics of what she terms "lax question intonation." 36 out of 78 African languages in the database of Rialland (2007), and 66 of 119 languages in the expanded database of Rialland (2009), have some form of "lax question intonation." Some languages in Africa display most of these; others display a subset. These include:

(20) Characteristics of "lax question intonation" in Africa (Rialland 2009)
- a. Low or L%
- b. length
- c. breathy termination
- d. [open] vowel

Rialland (2007) also includes "polar tone" in her list, but this seems peripheral at best, so it is understandable that it is omitted in her later publication. Of the characteristics in (20), Kɔnni demonstrates one of these partially, and one fully. As has been demonstrated, Kɔnni lowers pitch, but usually manifests downstepped H tone, not Low (with the exception of a few lexical items), so it demonstrates (20a) only partially. It turns out there are other, more complex, ways to lower a pitch besides merely adding a L tone to it. Regarding (20b), increased length of the final vowel or nasal is fully present. For (20c,d), there is no trace of breathiness or any change in vowel quality in polar questions in Kɔnni. So Kɔnni partly exhibits (20a), and fully exhibits (20b), but not the others.[2]

Ladd (2008:158-9) notes three types of interaction of intonation with tone features in tone languages. Of these, the first two below are pertinent to this study:

- Paralinguistic effect, a modification of pitch range to denote emotion
- Phrase-final tone modification
- Meaningfully distinct overall contour shapes upon which lexical tones are superimposed

It seems that "phrase-final modification" is extremely common , possibly universal, when a polar question affects pitch at all. In the examples in the Introduction as well as in Kɔnni, either the pitch rises or falls, but it is always at the *end* of the question, never any other position.[3]

This study, as usual, raises a number of questions that deserve additional research. The most obvious, of course, is an expanded number of sentence-final lexemes. There may be an answer to the question of why some H-final lexemes add a single L tone to create a polar question, and others add LH, but this cannot be answered with the limited data available. Also, negative polar questions and embedded polar questions, as a reviewer notes, would be of interest to see if the patterns noted above hold in these contexts.

One final lesson from this study deserves comment, that it is possible to analyze intonation patterns with tonal autosegments in a tone language. In at least one language, Kɔnni, and therefore probably others, the pitch differences between statements and the corresponding polar question are

---

[2] Rialland (2007, 2009) refers to Kɔnni, using the single example given in Watters (2000). I supplied that information to Watters before the present detailed study, and the present paper corrects and supersedes the transcription *nì díè sààbóò* in that publication (see (10b)). The form actually ends in downstepped High, not Low.

[3] The Thai study of Luksaneeyanawin (1998) dealt only with one-word utterances.

exactly the same as with any other tonal phenomena. Polar questions therefore include specific phonological information, not merely phonetic modifications.

References

Bolinger, Dwight. 1978. “Intonation across Languages.” In Greenberg. J. H. (ed.), Universals of Human Language 2 (Phonology). Stanford University Press, pp. 471- 524.

Cahill, Michael. 2007. Aspects of the Morphology and Phonology of Kɔnni. Dallas: SIL International

Chang, Nien-Chuang. 1958. Tones and intonation in the Chengtu dialect (Szechuan, China). Phonetica 2:59-84.

Chapallaz, Marguerite. 1964. Notes on the Intonation of Questions in Italian. In David Abercrombie, D.B. Fry, P.A.D. MacCarthy, N.C. Scott and J.L.M Trim (eds.), In Honor of Daniel Jones. Longman, pp. 306-312.

Clements, G.N. and Annie Rialland. 2008. Africa as a phonological area. In Heine, Bernd, and Derek Nurse (eds.) A Linguistic Geography of Africa. Cambridge: Cambridge University Press, pp. 36-85.

Cowan, J. Ronayne, and Russell G. Schuh. 1976. Spoken Hausa. Spoken Language Services, Inc., Ithaca, NY. (see esp. pp. 198-199)

Fajobi, Eunice. 2011. The nature of Yoruba intonation: a new Experimental Study. Ms. http://www.sussex.ac.uk/linguistics/documents/ef_yoruba_intonation.pdf, accessed March 29, 2011.

Gordon, Matthew. 2005. Intonational Phonology of Chickasaw. In Sun-Ah Jun (ed.), Prosodic Typology: the Phonology of Intonation and Phrasing, pp. 301-330. Oxford: Oxford University Press.

Hirst, Daniel, and Albert Di Cristo. 1998. Intonation Systems: A Survey of Twenty Languages. New York: Cambridge University Press.

Ladd, D. Robert. 2008. Intonational Phonology. Second. Cambridge Studies in Linguistics 119. New York: Cambridge University Press.

Larsen, Raymond S., and Eunice V. Pike. 1949. “Huasteco intonation and phonemes.” Language 25: 268-277.

Luksaneeyanawin, Sudaporn. 1998. Intonation in Thai. In Hirst & Di Cristo, pp. 376-394.

Miller, Jennifer, and Paul Tench. 1982. Aspects of Hausa Intonation, 1: Utterances in isolation. Journal of the International Phonetic Association 12(2):45-63.

Ohala, John J. 1984. “An ethological perspective oncommon cross-language utilization of F0 of voice.” Phonetica 41: 1-16.

Pence, Alan R. 1964. “Intonation in Kunimaipa (New Guinea).” Linguistic Circle of Canberra Publications A3: 1-15.

Rialland, Annie. 2007. Question prosody: an African perspective. In Gussenhoven, Carlos, and Tomas Riad (eds.), Tunes and Tones, Volume 1: Typological Studies in Word and Sentence Prosody. Berlin: Mouton deGruyter, pp. 35-62.

Rialland, Annie. 2009. The African lax question prosody: Its realisation and geographical distribution. Lingua 119.6: 928-949.

Schwarz, Anne. 2009. Tonal focus reflections in Buli and some Gur relatives. Lingua 119:950-972.

Svetosarova, Natalia 1998. Intonation in Russian. In Hirst & Di Cristo, pp.261-274.

Thomas, Dorothy. 1966. "Chrau Intonation." Mon-Khmer Studies 2: 1-13.

Watters, John. 2000. Syntax. In Heine, Bernd and Derek Nurse (eds.), African languages: an Introduction. Cambridge: Cambridge University Press. pp.194-230.

Selected Proceedings of the 42nd Annual Conference on African Linguistics: African Languages in Context

edited by Michael R. Marlo, Nikki B. Adams, Christopher R. Green, Michelle Morrison, and Tristan M. Purvis

Cascadilla Proceedings Project Somerville, MA 2012

Copyright information

ISBN 978-1-57473-453-9 library binding

Ordering information

Orders for the library binding edition are handled by Cascadilla Press.
To place an order, go to www.lingref.com or contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, fax: 1-617-776-2271, sales@cascadilla.com

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Cahill, Michael. 2012. Polar Question Intonation in Kɔnni. In *Selected Proceedings of the 42nd Annual Conference on African Linguistics*, ed. Michael R. Marlo et al., 90-98. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #2761.