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How intonations interact with tones in Embosi (Bantu C25), a two-tone language without downdrift

Abstract: This chapter presents a study of the intonational system of Embosi, a two-tone Bantu language without downstep (or downdrift) in which boundary tones are superimposed on tones and not inserted on the same line. To account for the interaction between lexical tones and boundary tones, a model with a dual register organization is proposed. It involves a basic register for the tone realizations and enlargements above and below this basic register, due to extra-high or extra-low boundary tones. Expansions were found in yes-no questions and in the expression of emphasis. Boundary tones are involved in the marking of assertions (L%), polar questions (HL%), wh-questions (L%), among others. Focus is not indicated by prosodic means. Embosi has a prosodic hierarchy with Phonological Words and Intonational Phrases but lacks Phonological Phrases.

Keywords: Boundary tone, Downdrift, Final lowering, Focus, Emphasis, Phonological phrase, Polar question, Register expansion, Superimposition, Wh-question

1 Introduction

Downdrift (or “automatic downstep”) is one of the best studied prosodic phenomena. It is fascinating as it is not a simple, linear and automatic declination but it results from interval calculations, which could be modeled in mathematical terms (see Lieberman & Pierrehumbert 1984, Pierrehumbert & Beckman 1988, Prieto & al. 1996, Laniran & Clements 2003 and Laniran 1992, for example). Studies on downdrift were performed on many tonal and non-tonal languages from various continents and families. In Africa, they concern Igbo (Lieberman 1993), Yoruba (Laniran 1992, Clements & Laniran 2003), Chichewa (Myers 1996), Kono (1996), Dagara (Rialland & Some, 2011), among others.

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DOI 10.1515/9783110503524-007

However, as far as we know, there is no research on a two-tone African language without downdrift. The present chapter will fill this gap, investigating tone realizations and intonations in Embosi, a two-tone language without downdrift. Embosi is a Bantu language (C25) spoken in Congo-Brazzaville. The number of Embosi speakers in the ‘Cuvette region’ can be roughly estimated at 150000, based on the 2009 census of the region’s inhabitants and the knowledge of the main languages spoken in the villages and towns. There is also an unknown number of Embosi speakers in Brazzaville and in the diaspora. Knowledge of the Embosi language is rapidly increasing, with a number of recent articles and PhD dissertations. The current main references on Embosi are: Fontaney (1988, 1989), Amboulou (1998), Embanga Aborobongui (2013). However, so far, there exist no studies on its intonational system.

This chapter will first present the basic features of Embosi tonology and some relevant features of its segmental phonology, which are necessary to understand the overall architecture of the prosodic system. Next, we examine tonal realizations in assertive utterances, showing that there is no downdrift. Simple and complex assertive sentences will be considered, as well as yes-no questions and *wh*-questions. Based on these different types of intonation, we will argue that the observed realizations result from a superimposition of intonational tones (H%, L% or HL%) on tonal realizations, which trigger extra-high or extra-low realizations. A dual-register model will be introduced to account for this superimposition. Focus, as an answer to a *wh*-question and as distinct from emphasis, will also be studied. The final section will be devoted to prosodic subdivisions of complex sentences.

2 Basic features of Embosi tonology

Embosi is a two-tone language whose tone-bearing unit is the mora. There is no word or root level tonal patterns like the ones found in neighboring languages such as Kukuya, which provided well-known examples in phonology books (Paulian 1975, Hyman 1997, van Oostendorp & al. 2011, Archangeli & Pulleyblank 1994). Thus, any type of tone combination can be found on mono, bi or tri-moraic nominal roots, as shown by Embanga Aborobongui (2013). The following examples illustrate this broad range of possibilities. Note that only H tones are transcribed in the examples, for simplicity and clarity reasons.

- (1) a. Monomoraic roots:
- | | | |
|---|-------|----------------|
| H | a-kó | “cl9. forest” |
| | ɔ-tá | “cl3. gun” |
| L | o-mbo | “cl3. now” |
| | ɔ-dzɛ | “cl3. mockery” |
- b. Bimoraic roots (with a long vowel)
- | | | |
|----|-------|-----------------|
| HH | i-báá | “cl5. knife” |
| LL | i-baa | “cl5. man” |
| HL | i-báa | “cl5. marriage” |
| LH | i-baá | “cl8. walls” |
- c. Bimoraic roots (with two syllables)
- | | | |
|----|----------|----------------|
| HH | ɔ-mbóndó | “cl3. leg” |
| LL | i-mbamba | “cl5. frog” |
| HL | o-lómi | “cl1. husband” |
| LH | o-kondó | “cl3. tail” |
- d. Trimoraic roots
- | | | |
|-----|-------------|------------------------------------|
| HHH | e-bóndíli | “cl7. understanding” |
| | nzúbhúlé | “cl9. smoke” |
| LLL | a-jengili | “cl6. flattery” |
| | o-baṅaa | “cl3. type of eatable caterpillar” |
| HLL | ngóloma | “cl9. palm wine esp.” |
| | i-βímbisi | “cl7. hide and seek” |
| LHH | mbaβíli | “cl9. heat of the sand” |
| | tsalálá | “cl9. scattered, disorganized” |
| HHL | ngólómi | “cl9. uncle” |
| | támáre | “cl1a. aunt” |
| LLH | ɛ-juómí | “cl7. shade, rest spot” |
| | ɛ-waamí | “cl7. joke” |
| LHL | ɛ-kaláa | “cl7. afternoon” |
| | i-kaáya | “cl5. coal” |
| HLH | le-kúulú | “cl11. darkness” |
| | ɔ-ngóngombí | “cl3. collarbone” |

Embosi does not have any tonal shift rules like the ones occurring in Eastern Bantu languages, such as Chichewa (Mtenje 1987) or Shingazidja (Casimjee & Kisseberth 1998, Patin 2007) among others. Its tonal rules are local and mainly triggered by vowel elision and glide formation. They conspire in order to provide adequate solutions after the loss of a mora, given that Embosi does not allow

tonal contours on a single mora or downstep. These rules occur very frequently in Embosi speech, as semi-vocalization and elision are common processes. Thus, at any word junction within a sentence, when two vowels come into contact, a hiatus is avoided by the deletion of the first vowel in contact or the coalescence of the two vowels in contact. This vowel deletion or coalescence can be combined with a compensatory lengthening due to the loss of a prefix initial consonant (see Embanga Aborobongui 2013, Rialland & al. 2012, 2015). When a vowel is deleted and there is no compensatory lengthening, a tone is left without any tone bearing unit and has to be anchored, or eventually deleted. Contour avoidance rules and OCP rules then apply, as shown by the following examples:

- (2) a. morábve < moro ábve “somebody fell”
 b. morakósi < moro ákósi “somebody hurts himself”

In 2a, the final vowel *o* of *moro* is elided. It leaves behind a L tone, which is itself deleted, and the H tone stands alone on the vowel *á* of *ábve*. Generally, when a L tone and a H tone compete for a single mora, the H tone wins but this is not always the case, as exemplified in 2b. In this example, the H tone of the vowel *á* of *ákósi* undergoes deletion, which is due to an OCP process triggered by the H tone of the root *kósi*. Before a lexical H tone, the potential LH contour on the remaining vowel *-a* is simplified to L. The fact that the L tone is active in the tonal process indicates that the contrast between H and L tones in Embosi is a binary one and not a privative one. A detailed study of these tonal processes in various contexts can be found in Embanga Aborobongui (2013).

Embosi also has “metatony”, that is the alternation between a L and a H tone at the end of some verb categories. ‘Metatony’ is a relatively common process in Bantu languages and it is known to vary depending upon syntactic factors, verb tenses and categories involved (Schadeberg 1995; Hyman and Lionnet, 2011). In Embosi, several tenses undergo metatony. Thus, in present and future, verbs exhibit a final H tone when they are followed by a complement, or a L tone when they are not followed by a complement. Metatony occurs also in some other tenses and in infinitives but varies depending upon the fact that a stem is monosyllabic or not (Embanga Aborobongui, 2013). This metatony helps indicating whether a verb is clause final and, consequently provides a cue for the ending of a clause (see ex. 18). Metatony-like alternations target also two pronouns with L tones (3sgPRO *wa* and 2sgPRO *ɔ*) but do not have any form of demarcative role.

To summarize, Embosi has very productive local tonal rules triggered by vowel elision, and no rule of tonal spreading, doubling or retraction. We signaled metatony for its demarcative role, though it is morphosyntactically determined.

3 Some relevant features of segmental phonology

Various segmental processes occur at two levels of the prosodic hierarchy: the Phonological Word and the Intonational Phrase.

Some major processes occurring within the Phonological Word are vowel harmony, glide formation, and consonant dissimilation. Among these processes, the **total dissimilation of the class prefix consonant** is typologically remarkable and deserves a short excursus. It consists in the elision of the initial consonant of the prefix when the root begins with a consonant, as illustrated in the following alternations of class prefixes:

- (3) Alternations of the class 1 prefix: mo-
- | | | | | |
|----|-----------|---|----------|-----------|
| a. | mo-ási | → | mw-ási | “spouse” |
| | mo-ána | → | mw-ána | “child” |
| b. | mo-kondzi | → | o-kondzi | “chief” |
| | mo-lómi | → | o-lómi | “husband” |

Alternations of the class 2 prefix: ba-

- | | | | | |
|----|-----------|---|----------|------------|
| a. | ba-ási | → | b-ási | “spouses” |
| | ba-ána | → | b-ána | “children” |
| b. | ba-kondzi | → | a-kondzi | “chiefs” |
| | ba-lómi | → | a-lómi | “husbands” |

Beltzung & al (2011) analyzed these alternations, which are found in most of the other C20 Group languages and in some languages of other groups spoken in the region, as resulting from a total dissimilation rule. It was also shown that their elision leaves a C slot which is revealed by compensatory lengthening (Embanga Aborobongui 2013, Rialland & al. 2012, 2015). **As class-prefixes occur not only in nouns but also in verbs, as subject markers, and in relative and connective constructions, this process is an important mechanism in the formation of the Phonological Word.**

Embosi does not have any segmental rules whose domain could be the Phonological Phrase. There are no phrasal rules as the ones which are found in Eastern Bantu languages such as Chichewa, Kimatuumbi (see Downing 2012, for an overview). Conversely, it has processes whose domain is the Intonational Phrase. **Within an Intonational Phrase in Embosi, hiatus is avoided at every word junction: the final vowel of the first word in contact is elided when the following word begins with a vowel.** Vowel elision can be accompanied by vowel coalescence when the vowels in contact are *a* + *i*. **Compensatory lengthening**

occurs when vowel elision is combined with the loss of a prefix consonant (Embanga, 2013). Elisions of word-final vowels are very frequent and can be seen in almost any Embosi sentence, as all words end with a vowel and that 40% begin with a vowel (Rialland & al. 2012, 2015). Many examples of these elisions will be shown and analyzed in the remainder of this chapter, at least one in every utterance. Let's first consider more closely one utterance, which will be studied later on from an intonational point of view (Figure 1).

- (4) [ekoojɔɔtɔɔmbílédibémbélé]
 e-koo já (m)ɔ-tɔɔmbíli é-di bémbélé
 cl7-foot cl7.CON cl8-automobile cl7-be.PRES cl10.inflated
 “The tire of the automobile is inflated.”

In connected speech, the vowel *á* in *já* is elided in front of the vowel *ɔ* in the word *ɔtɔɔmbíli*. The (*m*) of the class prefix of (*m*)*ɔtɔɔmbíli*, which has been deleted, is responsible for the formation of the long vowel *ɔɔ*.

To summarize, we found segmental rules whose domains are either the Phonological Word or the Intonational Phrase, but we did not find any processes related to in-between prosodic constituents. Thus, we arrive at the following conclusion: in Embosi, the Phonological Phrase is not associated with any tonal or segmental rule. Let's now examine tone realizations and intonations in various types of utterances.

4 Tone and intonation in assertive utterances: a two-tone language without downdrift

Considering tonal realization and intonation in assertive utterances, that is in utterances where downdrift could be expected, we provide evidence that Embosi is a language without downdrift. The fact that there is no downdrift does not imply that tone is realized only on two pitch levels from the beginning to the end of an utterance but rather that observed pitch decay is due to other processes. In order to determine which processes are involved in the realization of assertive utterances, we will perform an intonational analysis of some assertive utterances and then consider quantitative data. These analyses will allow us to identify the reference lines that structure the tonal and intonational system and introduce a dual register model. Juxtaposed assertive sentences will also be considered.

4.1 Analyzing some assertive utterances

To introduce our study on tone realizations and intonations, our starting point will be the analysis of three assertive utterances. These utterances are extracted from a corpus which includes 350 sentences, as well as isolated words (not considered in this study). This corpus was read by two male speakers (MEA and GNK¹). For each example included in this chapter, a phonetic notation is given, followed by a morphological gloss and a translation. The comparison between the two lines illustrates the segmental rules involved in the formation of the utterances, particularly the elision of word-final vowels at word junction, mentioned previously.

- (4) (repeated)
 [ekoojɔ́tɔ́mbílédíbémbéle]
 ekoo já (m)ɔ́tɔ́mbíli édi bémbéle
 “The tire of the automobile is inflated.”

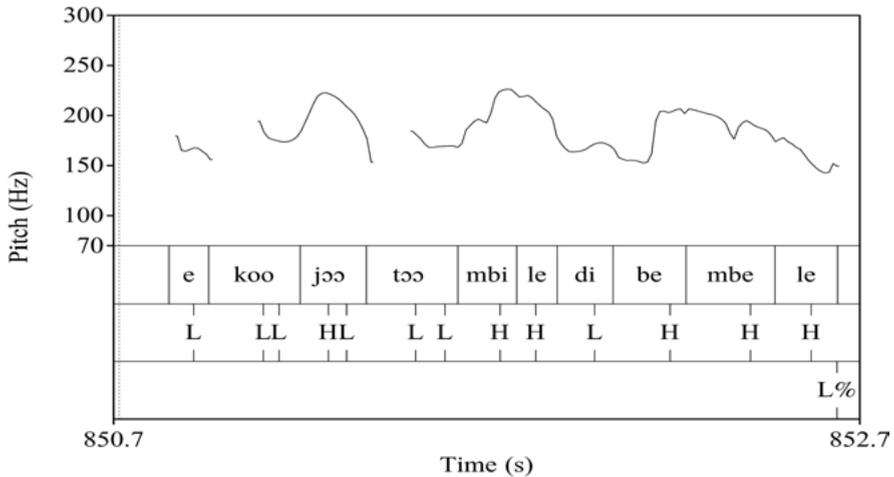


Figure 1: F0 curve of [ekoojɔ́tɔ́mbílédíbémbéle] “The tire of the car is inflated.” (Speaker MEA)

In this sentence, H and L tones in the sequence *ekoojɔ́tɔ́mbíledi* are realized on two levels (around 220Hz for the H tones and 165Hz for the L tones) separated by roughly two musical tones. There is no downdrift. In the remaining part, that

¹ Speaker MEA is the second author of this chapter. Currently, he is Assistant Professor at Marien-Ngouabi University in Brazzaville. Speaker GNK holds a post-doctorate position in Paris. Both speaks the Boundji variety of Embosi.

is on *bémbélé*, H tones are lowered, the very last tone being realized much lower, indeed even lower than the L tones of the sentence. We can explain this gradual lowering as being due to the L%. The L% boundary tone pulls down the final H tones, its lowering being strongest at the very end of the sentence. We can recognize here the effects of a final lowering, which is a well-known process found in many languages (see 3.4. for a more detailed study of final lowering). To summarize, the first part of this assertive sentence (*ekoójótɔmbilédi*) displays undisturbed tonal realizations while the last part is affected by a lowering intonation.

This is the typical intonational pattern found in an Embosi assertive utterances (without any focus or emphasis), which is also illustrated in (5):

- (5) [wáβaapibeabóowée]
 wa á.βaapi bea bá (m)o-we
 3g.PRO 3sg.take away.REC cl8.property cl8.GEN² cl1-deceased
 ‘He took away the properties of the deceased.’

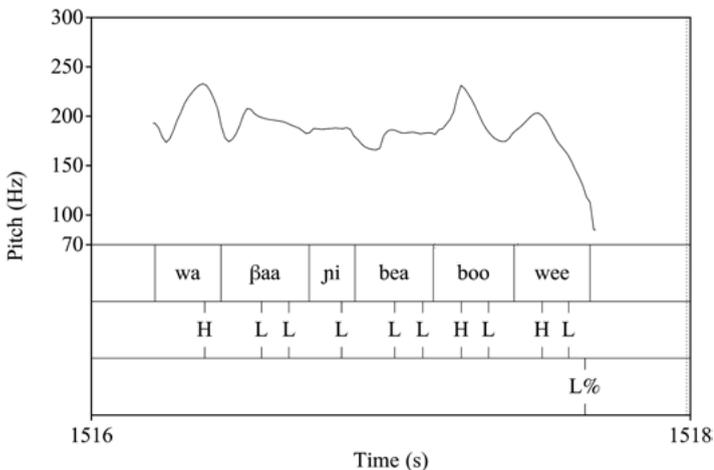


Figure 2: F0 curve of [wáβaapibeabóowée] “He took away the properties of the deceased.” (Speaker MEA)

Figure 2 exemplifies the absence of downdrift between two H tones, even if they are separated by a rather long stretch of L tones. Note that the stretch of L tones is realized as a plateau.

² GEN = genitive

The following example displays the realization of sequences of identical H tones, which are realized as plateaus.

- (6) [ikóóbíílámbíjééβíílaapóimisóóβámina]
 (b)i-kóó bíílámbí jééβíí la (m)a-póa (b)i-misáa
 cl8-manioc cl8.REL.cook.REC Gneebii at cl6-yesterday cl8-already.is
 ó-βámina
 cl15-toughen
 ‘The manioc that cooked Gneebii yesterday is already toughened.’

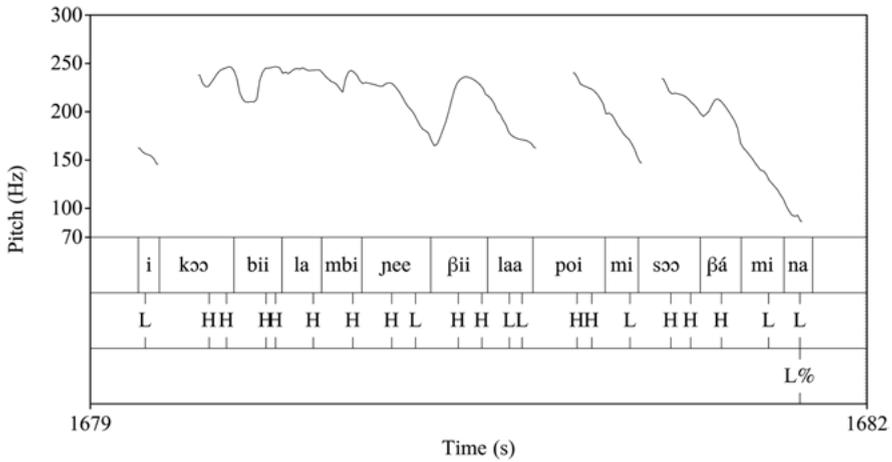


Figure 3: F0 curve of [ikóóbíílámbíjééβíílaapóimisóóβámina] ‘The manioc that Gneebii cooked yesterday is already toughened’ (Speaker MEA)

These three utterances could seem ideal. However, such a precision in the implementation of the two tones on two levels is not uncommon, particularly in read utterances. There are also irregularities in the rendition of the two tones within an utterance. Some H tones are realized higher than expected while other ones are realized lower. These irregularities might occur on any word, and they are not related to the beginning or the end of a constituent. However, we observe that a local lowering of H tones tends to occur on grammatical words, which could be interpreted as a reduction, being related to the weakness of these words.

In the following section, we provide a quantitative analysis of the relationships between successive H tones (separated by L tones) in assertive utterances.

4.2 Absence of downdrift in assertive utterances: a quantitative analysis

The corpus includes 100 assertive utterances that were read by speaker MEA and 78 assertive utterances that were read by speaker GNK³. At first glance, it seems that there is no regular decay in the section of assertive sentences not affected by final lowering, but only local raisings or lowerings of H tones. If there were downdrift in this section, it would affect successive H tones separated by L tones, and we would expect to find an exponential decay toward an asymptote.

Despite differences between languages, exponential decay toward an asymptote is a signature of downdrift (Liberman & Pierrehumbert 1984, Myers 1996, Laniran 1992, Clements & Laniran 2003, Prieto 1996, Liberman & al. 1993, Bird 1994, among others). Due to its exponential nature, downdrift decay is particularly important at the beginning of a sentence.

To determine the presence (or absence) of downdrift, we measured the F0 peak values of H tones in sections of the utterances, which were not affected by final lowering. These undisturbed sections start at the beginning of an utterance and do not include the final part of utterances, which undergoes final lowering. 146 measurements from 100 utterances were performed for speaker A, and 108 measurements from 78 utterances for speaker B were performed. Measurements were taken on the peak of an H tone's realization.

H_n represents a given H tone and H (n+1) the following H tone, being separated from H_n by a L tone or a string of L tones. Most of the time, H_n corresponds to the first H tone (H1) and H(n+1) to the second tone (H2) of an utterance. We compared the F0 values of H_n with the F0 value of H(n+1).

The following graphs present the values of H_n on the x-axis plotted against the values of H(n+1) on the y-axis for Speaker MEA (Figure 4a) and Speaker GNK (Figure 4b).

We can observe that for both speakers, the regression line is close to the diagonal, which means that the values of H_n and H(n+1) tend to be similar. In both figures, the regression line crosses the diagonal, which is due to the fact that the difference between H and H(n+1) can be positive or negative: H(n+1) can be either lower or higher than H_n.

³ Sound examples with text-grids in PRAAT format for both speakers (MEA and GNK) are provided with this chapter.

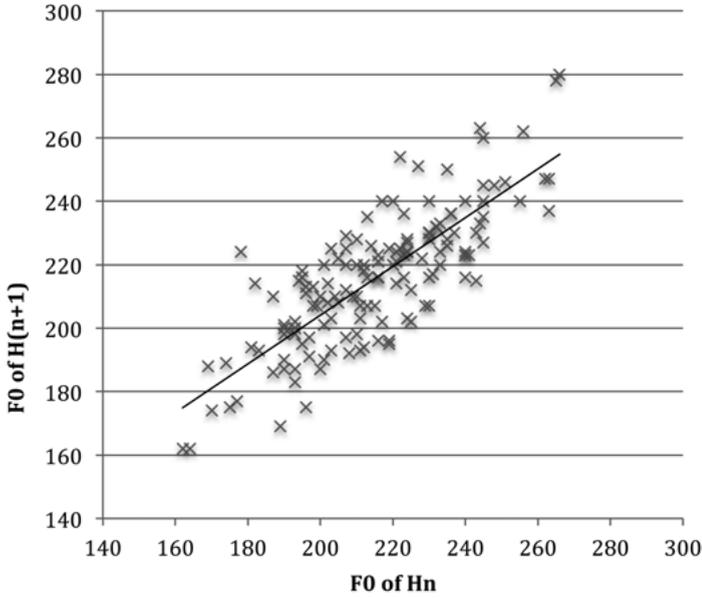


Figure 4a: F0 value of a H tone (Hn) plotted against F0 value of the following H tone (H (n+1)), separated by L tone(s) in sections of utterances unaffected by Final lowering (Speaker MEA)

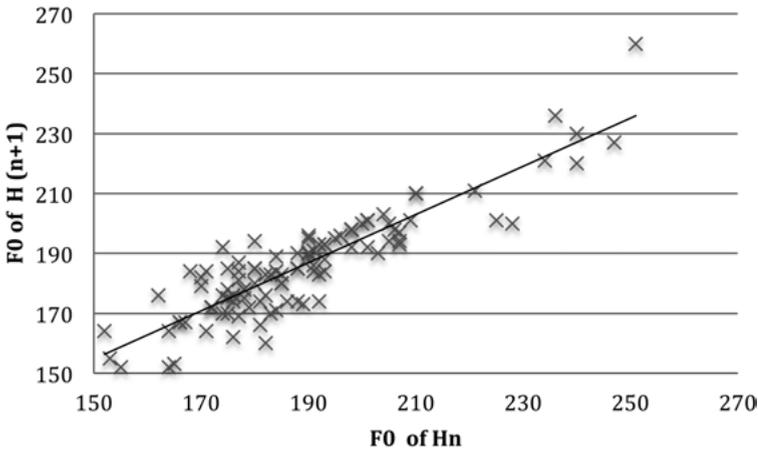


Figure 4b: F0 value of a H tone (Hn) plotted against F0 value of the following H tone (H (n+1)), separated by L tone(s) in sections of utterances unaffected by Final lowering (Speaker GNK)

The mean values with standard deviations of H_n and $H(n+1)$ values for both speakers are presented in Table 1:

Table 1: Mean values with standard deviations of H_n and $H(n+1)$ values for Speaker MEA and Speaker GNK

Speaker MEA:	mean of H_n = 215Hz	σ = 18Hz
	mean of $H(n+1)$ = 216hz	σ = 7hz
Speaker GNK:	mean of H_n = 189Hz	σ = 4Hz
	mean of $H(n+1)$ = 185Hz	σ = 7Hz

For both speakers, despite the dispersion of the pitch realisation, which is mainly due to variations in register spans (see 3.3.), the mean values of H_n and $H(n+1)$ are very close. For speaker GNK, there is a slight decaying tendency (around 4 Hz). But this slight decay is very small compared to the steps of a downdrift. For example, in Yoruba, a language with downdrift, the difference between a first H and a second H separated by a L tone is roughly 30Hz for speakers with similar pitch range (Laniran 1992). Based on this data, we can conclude that there is no downdrift in these utterances.

We can also remark that the standard deviation is more important for H_n , which is often the first H in a sentence than it is for $H(n+1)$ with speaker MEA. This can be explained by the fact that the first H tone tends to be carried by a grammatical word and that grammatical words tend to display more variation than verbs or nouns, as they are occasionally reduced.

We next consider an important source of variation in tone realization: variations in the register span.

4.3 Variations of the register span

The register of tonal realization varies within the speech of a single speaker as well as across speakers. In our corpus, variations mainly involve the span of the register, which can be expanded or reduced. Expansion or reduction correlates mainly with the level of the ceiling of the register, which can be raised or lowered. The following example is a sentence read by the same speaker as the preceding examples, showing how he can expand his register of tonal realizations.

- (7) [ɔkɔnímóobénálalekú]
 ɔkɔní móobémá la lekú
 cl1.patient cl1.wail.PRES with cl.11.agony
 “The patient wails in agony”

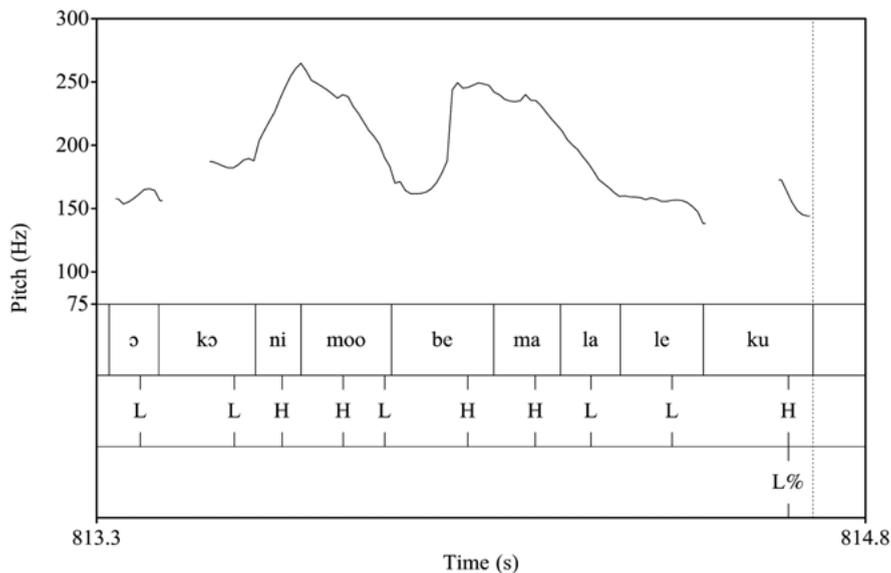


Figure 5: F0 curve of the utterance: [ɔkɔnímóóbémálalekú] “The patient wails in agony.” (Speaker MEA)

In Figure 5, the register span of the tone realizations in the section, which is not affected by the final lowering, ranges from 158Hz to 264 Hz, which can be compared with the 165Hz–220Hz span of the similar section in Figure 1. The register span in Figure 5 covers 9 semitones while the register span in Figure 1 covered only 5 semitones. Aside from this difference in the register spans both examples are similar, with a L% realized lower than any tone and pulling down the preceding H tones. Let’s consider final lowering more closely.

4.4 Final lowering

Final lowering, as distinct from declination or downdrift, has been studied in many languages: in Japanese by Poser (1984) and Pierrehumbert & Beckman (1988); in English by Pierrehumbert & Liberman (1984) and by Arvaniti (2007), in Spanish by Prieto & al (1996), in Yoruba by Connell & Ladd (1990) and Laniran (1992), and in Kipare (Herman 1996), among others. In all these languages, final lowering had to be separated from other decaying processes, particularly downdrift. In Embosi, final lowering appears in its purest state, without being intricately intertwined with downdrift phenomena.

As in most languages in which final lowering has been documented, final lowering in Embosi is triggered by a L%. Cross-linguistically, this L% is very common, particularly at the end of assertions. The phonetic implementation of this L% has been studied in many languages. It has been found that it is not a L tone but an extra-low tone, going down to the bottom of the speaker's pitch range (see Maeda 1976 for a pioneering study on English, Rialland and Robert 2001 on Wolof, among others). **In Embosi, the L% also reaches the bottom of the pitch range and it is often associated with devoicing.**

This L% boundary tone is 'superimposed' on the realization of tones, lowering both final L and H tones. Figures 1, 5 and 8 exemplify the strong lowering of a final H tone, pulled down by the L%. An utterance-final string of H tones displays a progressive lowering, as shown in Figure 1. **The final lowering does not only lower the last tone or string of tones but it is gradual: it affects also preceding tones but at a lesser degree. It triggers a progressive lowering toward the end of the utterance (Figure 2, 3, 5).**

This final lowering recalls the Kipare lowering, after the other sources of decay were factored out (Herman 1996). The points in common are a strong lowering at the end of the utterance and an anticipation of this final strong decay on some syllables before the end.

4.5 Identifying reference lines in the realizations of tone and intonation in assertive utterances

One of the important results of the numerous previous studies on downdrift and downstep is that they were able to identify reference lines guiding the realization of tones. Asymptotes recognized by downdrift studies are examples of these **reference lines**. In performing downdrift, speakers tend to reach these asymptotes. Other reference lines were also identified such as the L, M and H tone reference lines in Yoruba, the H reference line being also the downdrift asymptote in this language (Laniran 1992, Laniran & Clements 2003). In their study of downstep in Dagara, Rialland and Somé (2010) posited a reference line for the last downstep in sequences of downsteps and even a second reference line in longer sentences when the number of downsteps exceeds five steps. There is also a reference line which seems common to many languages (if not all languages): the bottom of the pitch range, which is reached by the L%. Let us consider the Embosi data and begin to determine which reference lines can be posited for it.

The melodic organization of these Embosi assertive utterances is quite simple and results from the interaction of the following elements: **H and L tones, and a**

L%. In a given utterance, H and L tones stay essentially at the same level. Two reference lines can be posited: one for the H tones and another for the L tones. The L% tone is realized lower, toward the bottom of the speaker's pitch range. This organization can be schematized as follows in Table 2:

Table 2: Pitch references lines in assertive utterances

H reference line	H _____ H _____ H _____
L reference line	_____ L _____ L _____ L _____
L% bottom of the pitch range	_____ L%

As we examine juxtaposed assertive sentences (in section 4.6) and yes-no questions (in section 5), we will show that there are also extra-high intonational tones, which will provide a type of symmetry to the whole system, with the span of the tonal realization in the middle.

4.6 Sequences of juxtaposed assertive sentences: introducing the H%

Juxtaposed assertive sentences are very frequent in Embosi narratives. Each of them forms an intonational phrase, ending either with a L% or a H%. Starting with examples extracted from the beginning of an interview conducted by the second author, we introduce the H% and show some of its properties. At the end of a sentence, H% plays a similar role as the continuation rise in languages such as English and can be found in a similar context. In Embosi, its specificity is to be attracted by the last H of the intonational phrase. Consequently, it is realized on the last mora, which bears a H tone in example 8 and in Figure 6. The result is an extra-high tone at the end of the sentence and a rising contour that sounds like a continuation rise. In example 9 and in Figure 7, it is realized as an extra-high tone on the penultimate syllable, which bears the last H tone. Thus, the final contour is falling.

(8) [ngáβámwánájookoβapóójéédijé]

ngá βá mwána ájεε okoβa póo
 1sgPRO here cl1.child cl1.come.PAST cl15.take.Hm. cl.9.stories
 jéé di jé
 cl9.REL. be.PRES cl9.DEM.

(litt.) “To me, here, the child came to collect stories which are these (ones)...”
 ‘To me, here, the child came to collect stories from here.’

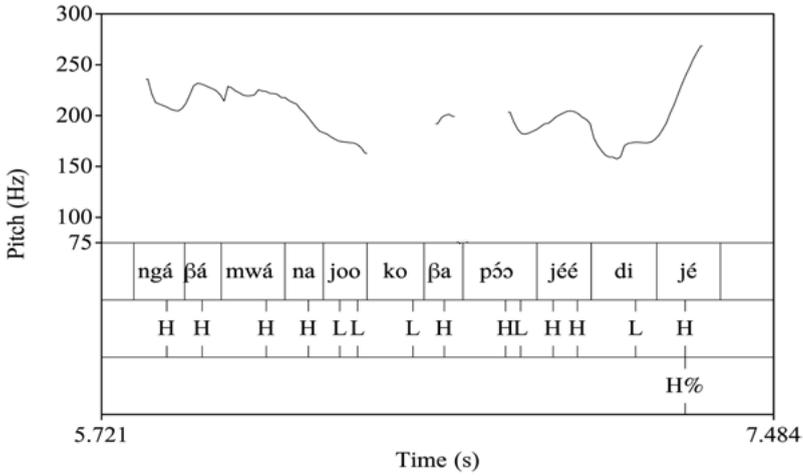


Figure 6: F0 curve of [ngáβámwánajookoβapócjéédijé] “To me, here, the child came to collect stories from here. . .” (Speaker: Catherine S., interview)

- (9) [ádzaábísímóondzési]
 ádzaá bísí mó (m)ondzési
 “it was us during childhood” = “It was during our childhood. . .”

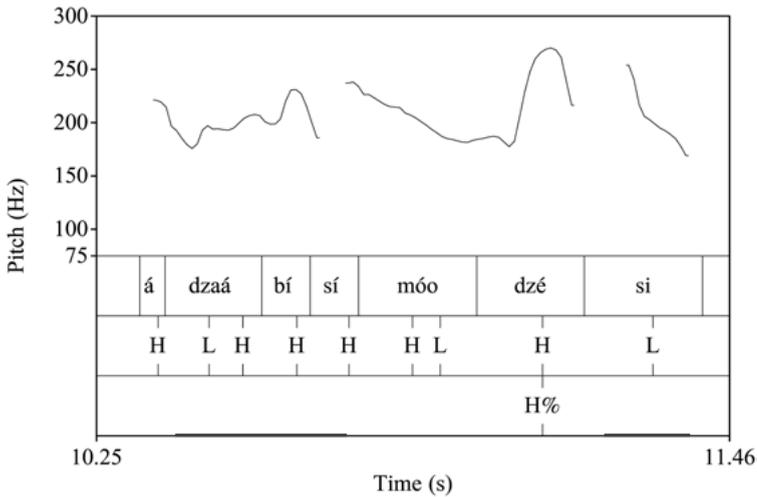


Figure 7: F0 curve of [ádzaábísímóondzési] “It was during our childhood. . .” (speaker: Catherine S., interview)

This H% is not only present in sequences of assertive sentences, but it is also involved in yes-no intonation marking, as we shall see in the next section.

5 Intonations of yes-no questions: a HL% contour boundary tone

A HL melody is one of the intonational markers of yes-no questions found in Bantu languages (Clements & Rialland 2008, Downing, this volume). For Embosi yes-no questions, an HL melody is also present, and we propose that this melody results from a combination of two boundary tones: a H% and a L%, forming together a HL% boundary contour. Similar to the L% in assertive utterances (see 2), the L% of this HL% contour has a strong lowering effect, particularly on final H tones. It is associated with the end of an utterance. Similar to the H% in juxtaposed assertive utterances (see 3), the H% of this HL% triggers extra-high realizations and is attracted by H tones. The alignment of this HL% contour with the tone tier of the utterance is as follows: the L% is found at the end of the utterance while the H% occurs on the last H tone if the final tone is a L tone. Otherwise, the H% of the HL% is pushed forward towards a preceding H tone, extending the contour on a larger domain. Besides these intonational HL%, the yes-no questions are also characterized by a general register expansion. Consider the realization of the following assertive and interrogative pairs:

- (10) [bánabáadzáa] (assertion/question)
 b(a)-ána báadzáa
 cl2-enfant cl2.eat.PRES
 “The children eat” / “Do the children eat?”
- (11) [oβémbóódzɔɔbvé] (assertion/question)
 (m)o-βémbá (m)ódze (m)ɔ-bvé
 cl3-journey cl.3.be.REC cl3-good
 “The journey was good.” / “Was the journey good?”

In these assertive/interrogative pairs (Figures 8 and 9), the interrogative counterpart is realized on a higher and expanded register. This effect is exaggerated in these examples, due to the fact that these interrogative utterances were read in pairs with their assertive counterparts. In the assertive forms (Fig. 8a and 9a), final lowering due to the L% can be observed. In questions (Fig. 8b and 9b), this final lowering is still present, pulling strongly down realizations of a final H tone

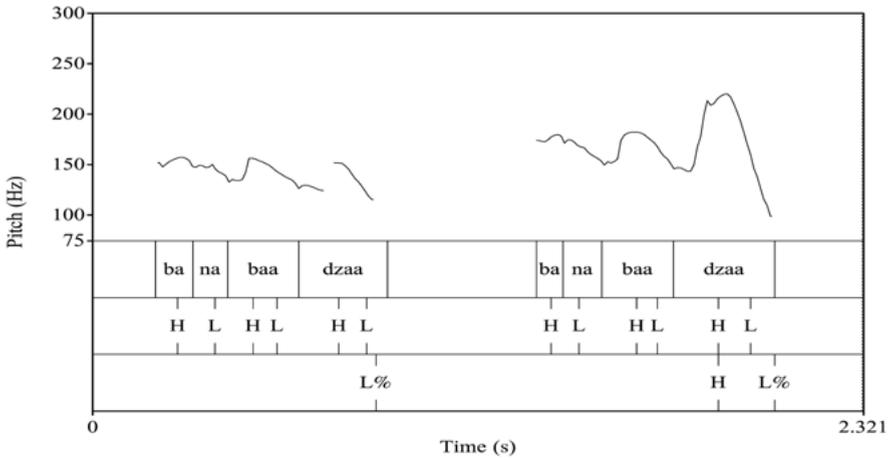


Figure 8: F0 curve of [bána báadzáa], a) “The children eat.” / b) “Do the children eat?” (Speaker MEA).

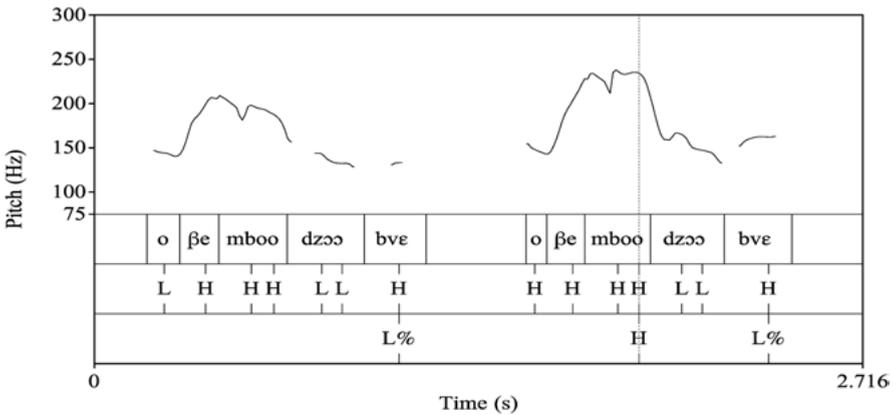


Figure 9: F0 curves of [oβé mbóódzɔ̀bvé], a) “The journey was good.” / b) “Was the journey good?” (Speaker MEA)

like in *bvé* (Fig. 8b). The H% of the HL% contour is found on the last H tone when the sentence ends with a L tone. Then, this last high tone becomes extra-high (see Figure 8b). If there is a H tone at the end of the utterance, this final H tone is lowered by the L% boundary tone, and the H% of the HL% contour is found on the preceding H, raising it to an extra-high (Figure 9b). This analysis is confirmed by the other 15 assertions/yes-no question pairs recorded by speaker

A, the same corpus recorded by speaker B, and yes-no questions occurring in the 3 interviews conducted by the second author.

The existence of this H% tone has an interesting consequence for our overall model: this H% provides a higher-level reference line above the reference lines of the tone realizations (Table 3).

Table 3: Pitch references lines of H and L tones and L% and H% boundary tones

H%	_____ H% _____
H reference line	H _____ H _____ H _____
L reference line	_____ L _____ L _____ L _____
L% bottom of the pitch range	_____ L% _____

6 Intonation of *wh*-questions

Wh-questions in Embosi have been investigated by various theses and publications (Amboulou 1998) but the most detailed study is found in Embanga Aborobongui & al. (2011). Embosi has two sets of interrogatives pronouns: 1) *nda/nde* with *nda* referring to humans, among others (ex. 13) and *nde* referring to inanimate objects and some animals (ex. 12, 14 & 15); and 2) interrogatives words, agreeing in class with the noun that they modify or replace. Embosi also possesses interrogative adverbs. Two types of constructions are possible for questions on the subject, on the direct and indirect objects: constructions with relatives (ex. 12 & 13) and in situ constructions (ex. 14). Only in-situ constructions are permitted for questions on place, manner or cause. Here are some examples (partly from Embanga Aborongui & al. 2011):

- (12) [ɲamajeéboomíngobasákóédzende]
 ɲama jeébo mí ingoba sá kó édze nde
 cl1.animal cl1a.REL.kill.REC Ingoba in forest cl.7.be.REC which
 ‘Which animal did Ingoba kill in the forest?’

- (13) [morojeɛpeníitswétswelélawádzenda]
 moro jeɛpe nó itswétswelé la wa
 cl1.person cl1.REL.give.REC 2sgPRO.Hm cl4.oranges to 3sgPRO
 ádze nda
 3sg.be.REC who
 ‘To whom did you give oranges?’

(14) [nódziindɔ́fėti]
 nɔ́ ódzii nde (m)ɔ́ fėti
 2sgPRO 2sg.find.REC. what during festivities
 ‘What did you find during the festivities?’

(15) [nópfeβándéngénde]
 nɔ́ ópfe βá ndéngé nde
 2sgPRO 2sg.arrive.REC here cl9.manner which
 ‘How did you arrive here?’

Whatever their construction (with relatives or in-situ), *wh*-questions in Embosi do not have any specific intonations. They display the same intonations as assertive utterances, as illustrated by the following F0 curve of a realization of example 12 (Figure 10):

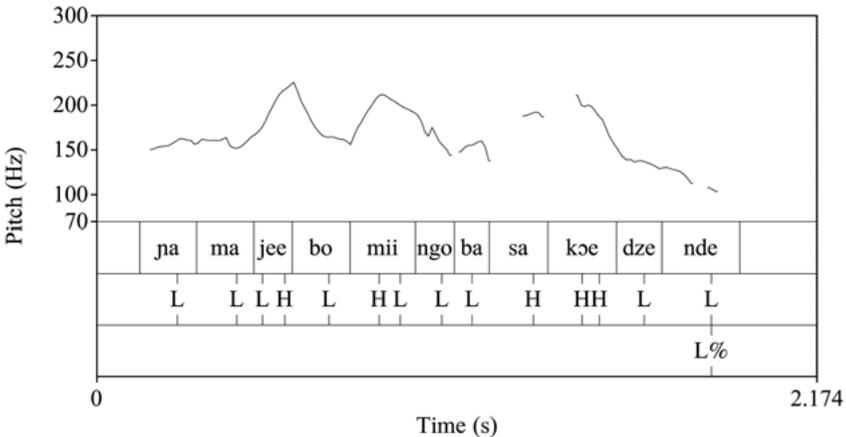


Figure 10: F0 realization of the utterance [ɲamajeébomfingobasákɔ́édzende] ‘Which animal did Ingoba kill in the forest?’ (Speaker MEA)

The similarity of intonation between assertive utterances and *wh*-questions, observed in Embosi, is shared by all the languages of this volume, except Moro (Rose & Piccinini, this volume) and is common cross-linguistically (Cruttenden 1997, Frota and Prieto 2015 in Romance languages, for example).

7 Absence of specific intonation of focus

In Embosi, an answer to a *wh*-question could typically be a single word, a word with a copula or a sentence with a relative clause. Thus, the answers given by MEA to the question in (12), repeated below for convenience are as follows:

(12) repeated

[ɲamajeéboomíngobasákóédzende]

ɲama jeéboomí ingoba sá kó édze nde

cl1.animal cl1a.REL.kill.REC. Ingoba in forest cl7.be.REC which

(translation word by word: the animal that Ingoba killed was which?)

‘Which animal did Ingoba kill in the forest?’

(16) answers

a. one word answer

ngombá “a porcupine”

b. answer with a copula

édze ngombá

cl7.be.REC. porcupine

‘It was a porcupine.’

c. answer with a relative clause

[ɲamajeéboomíngobasákóédzengombá]

ɲama jeéboomí ingoba sá kó édze ngombá

cl1.animal cl1a.kill.REC. Ingoba in forest cl7.be.REC porcupine

‘The animal that Ingoba killed in the forest was a porcupine.’

In these various answers, *ngombá* is the focus. These utterances display the typical assertive pattern with the final part being lowered by the L%. As a result of this final lowering, the final H of *ngombá* is strongly lowered and there is no prosodic indication of its focus role: no increase of the pitch range, no lengthening. Possible answers to five *wh*-questions by speakers A and B were recorded and none of them showed any form of prominence or prosodic subdivision or lengthening.

Embosi can be added to the growing list of languages without any prosodic focus marking. It includes Bantu languages (Northern Sotho, Zerbian 2006; Tumbuka, Downing 2012, this volume; Chichewa, Downing, this volume; Basaa, Makasso and al., this volume), non Bantu African languages (Wolof, Rialland & Robert 2001; Buli and related Gur Languages, Schwartz 2009; Hausa, Hartmann & Zimmermann 2007; selected African languages, Zerbian & al. 2010, Moro,

In (17), two sets of food are pointed at, one intended for Ngala and the other one for Pendzi. The proximal demonstratives (*bí* “this”) are realized with an expanded register (Figure 11). In association with a deictic expression or an expression of quantity, this local register expansion has an iconic value, enhancing the importance of the designated item. In all of its usages, it has a local highlighting function. It is clearly not related with focus as an answer to a wh-question as seen previously in 7, it is often involved in contrastive expression but it is also present when there is no contrast to insist on a given word or as a metaphoric expression of bigness. In our view, the main difference between this emphasis and focus is that it is a gradient phenomenon: a term or an expression could be more or less emphasized, depending upon the importance of the register expansion. This local register expansion has also a mirror image which is local register compression, indicating that a given term or expression is less important or backgrounded within the discourse. In this chapter, we are keeping “emphasis” separate from focus which is marked syntactically, without any involvement of intonation as seen in 7. Focus divides an utterance into two parts: a new or contrastive part and given or presupposed part while we assume that emphasis (or backgrounding) modulates locally the informative weight.

9 Subdivisions of complex sentences

In our corpus of isolated words and sentences, which include 45 complex sentences, there were no pauses or any other prosodic events between subordinate clauses and main clauses. Like in simple assertive sentences, vowel deletion processes can occur at any word junction, without any disruption. One process is sensitive to clause boundary: metatony, as mentioned previously. Thus, a verb, which undergoes metatony, will end with a L when it is clause final as in the following example (from Embanga Aborobongui 2013):

- (18) [ojúluláalámbatsínadílandzaa]
 (m)o-júlu láalámba tsína adí la N-jaa
 cl1-woman cl1.PRES-cook because cl1.PRES-be.Hm with cl9-hunger
 ‘The woman cooks because she is hungry.’

In (18), the verb *alámba* which undergoes metatony, displays a final L tone because it is clause final, while it would have had a final H tone if it were followed by a complement. Conversely, the verb *di*, which is also sensitive to metatony, is realized with a final H because it is followed by a complement.

In a study on relative clauses in Embosi (Beltzung & al. 2011) based on a different corpus recorded by Speaker A, it was also found that utterances including relative clauses are overwhelmingly realized without any intonative subdivision. In more careful speech (perhaps sometimes too careful), pauses might occur between the antecedent and the relative clause and between the relative clause and the matrix clauses. We also found few occurrences of boundary tones, which indicate Intonational Phrase boundaries, in the same positions.

We also studied dislocations in Embosi, from syntactic and prosodic points of view. The study was based on a separate corpus recorded by speaker EMA (Embanga Aborobongui & al. 2014). An asymmetry was found between right and left dislocations. In right dislocations, the main clause ends with a L% boundary as well as the dislocated part. Cross-linguistically, this pattern is very common, found in African languages (Hyman 1999, Downing 2011) but also in non-African languages such as French (Clech-Darbon & al. 1999), among others. Here is one example:

- (19) [[ojúluláaβelópwamúa L%/ɔkwáí L%] (Embanga Aborobongui & al. 2014)
 (m)o-júlu láaβelá ɔ-pé wa mú-a (m)ɔ-kwáí.
 1-woman 1.PRES.can.Hm cl15-give 1a.PRO 3sg.PRO 3-machete
 ‘The woman can give him it, the machete.’

In left dislocations, no boundary tones are realized. In our corpus, generally a pause was observed between the dislocated element and the main clause but there were few cases of continuity between them, with the final vowel of the dislocated part being deleted. Interestingly, if a pause is generally present between the dislocated element and the main clause, there is often no pause between two dislocated elements: they are often combined into a single unit, without any pause or discontinuity in the process of vowel elision at word junction. The following example illustrates this configuration:

- (20) [básópoo /báabáaβelótonánɔ]
 básí ó poo / báa báaβelá o-toná nɔ.
 cl2.woman at cl7.village cl2.PRO cl2.can.PRES.Hm cl15-refuse.Hm 2sgPRO
 ‘The women, at the village, they can refuse you.’

In (20), there is a pause between the two dislocated elements (*básí* and *ó poo*), and the main clause, and the two dislocated elements are grouped together, as shown by the elision of the vowel *-i* of *básí* ‘women’ at the junction with the word *ópoo*. To account for this phrasing, we do not introduce a notion of Intermediate Intonational Phrase, but rather we propose a recursive structure of IPs as follows:

(21) [Dislocated element [core clause]]IP

This representation formally accounts for the fact that there is no boundary tone at the end of the dislocated part and that the beginning of the main clause is similar to the beginning of an Intonational Phrase.

In the eight folktales extracted from Obenga (1984) that were read by speaker MEA, we observed no dislocation, and complex sentences were rarely prosodically divided. In the three interviews that were conducted by the second author in Brazzaville, dislocations were rare and intonational breaks mainly occurred only between the sentences, even if the sentences were complex.

10 Conclusion

Embosi (Bantu C25) is a two-tone language without downdrift. To account for the superimposition of intonational tones on tone realizations, a dual-register model is proposed. It involves a basic register for lexical tone realization and enlargements above and below this basic register due to extra-high or extra-low boundary tones. The basic register of tone realizations can be compressed or expanded. Expansions were found in yes-no questions and in the expression of emphasis.

The prosodic hierarchy of Embosi includes Phonological Words and Intonational Phrases, which are both associated with phonological processes. No correlate, either segmental or tonal, was found for a potential Phonological Phrase. Absence of a Phonological Phrase seems typologically rare (Jun 2014). However, it is probably more common than usually assumed, as the prosodies of many languages, and among them many Bantu languages, are still undocumented. (See Downing, this volume, for another case.)

The prosody of Embosi is distinguished by its economical features: an intonational structure without downdrift and a prosodic hierarchy skipping the level of the Phonological Phrase (or at least with an invisible Phonological Phrase).

Acknowledgements

We would like to express our gratitude to our Embosi speaking consultants in France and in Brazzaville, particularly to Guy-Noël Kouarata and Angélique Otsanaa. This chapter has benefited from comments from Laura Downing, Caroline Féry and Sonia Frota, whose suggestions for improvements were very useful.

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