

Tone and intonation*

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Abstract

The objectives of this study are (i) to identify the basic components of pitch that can be isolated from tone and attributed to intonation; (ii) to establish them as the elements that must be accounted for in the transcription of an oral corpus. These components are meant to be available for typological studies of the relationship between these elements as they are employed for marking of lexical and grammatical distinctions on the one hand, and intonation on the other hand. To address this problem, this study leans heavily on Zaar, a Chadic tone language spoken in the South of Bauchi State, Nigeria. Our hypothesis is that the role of pitch in Zaar intonation can be observed in the variation between post-lexical tones as they are perceived and transcribed by the native speaker and their acoustic realisation as represented by Praat and Prosogramme. These variations, i.e. the way intonation influences the realisation of post-lexical tones, fall under the following categories: (a) Declination; (b) Intonemes, which are divided into Initial intonemes (Step-down and Step-up) and Terminal intonemes (Fall, Rise, Level and High-Rise). These prosodic features (declination and intonemes) are illustrated in the first part of the paper. In the final part, an intonation pattern exemplifying the combination of these features is analysed. The examples quoted in the paper are extracted from the Zaar CorpAfroAs corpus.

Hyperlinks: The reference of each example in the article can be clicked to view all its tiers in the CorpAfroAs database, and play the corresponding audio file.

Most of the literature on intonation derives from pioneering studies on English intonation. These authors and their followers have identified the exponents of intonation as F_0 , rhythm (including length and pauses) and intensity. The difficulty when studying intonation in ‘tone languages’ is that F_0 is already mobilised by the lexicon and the morpho-syntax.¹ The question is then: does pitch play a role in the intonation of tone languages, and how? Is this role comparable to that of pitch in non-tonal languages? This problem became crucial in the transcription and segmentation of the tonal languages represented in the CorpAfroas corpus of Afroasiatic languages, viz. Hausa and Zaar, two Chadic languages on the one hand, and Wolaitta, an Omotic language on the other hand.

* Pre-print version to appear in Mettouchi, A., Vanhove, M. & Caubet, D. (eds.), *Corpus-based Studies of lesser-described Languages: the CorpAfroAs Corpus of spoken AfroAsiatic Languages*. Amsterdam-Philadelphia: John Benjamins

¹ Tone-languages use pitch variation for morpho-syntactic uses on a scale that cannot be compared with what obtains in a stress-language like English for example, where stress combines variation in pitch, loudness and length in the same way as intonation, but where the often quoted opposition between verb and noun relying on stress (e.g. *a* ‘record’ / *to re*’cord) is at best marginal and not systematic (e.g. *a/to* ‘cover in both cases). The only place where stress manifests itself as a prominent grammatical feature, concerns its association with certain suffixes, e.g. *-ics*, *-aphy*, *-ition*, etc., and it is not distinctive.

The objective of this study² is to identify the basic components of pitch that can be isolated from tone and attributed to intonation, and establish them as the elements that must be accounted for in the transcription of an oral corpus in order to make it useful for typological studies of the relationship between these elements as they are employed for marking of lexical and grammatical distinctions on the one hand, and intonation on the other hand.

To address this problem, this study will lean heavily on Zaar, a Chadic tone language spoken in the South of Bauchi State, Nigeria.

Introduction

Zaar is a tone language with three phonemic tones: High (written with an acute accent: *á*), Mid (left unwritten: *a*) and Low (written with a grave accent: *à*). Two contour tones result from the combinations High-Mid and Low-Mid on a single syllable, i.e. *resp.* Falling (written with a circumflex accent: *â*) and Rising (written with a caron: *ǎ*).

Tones are important to identify lexemes (lexical tone), but play a part in morphosyntax too. The influence of morphosyntax on the surface realisation of lexical tones is explained e.g. in the suprasegmental theory of tone by post-lexical rules.³

Let us take the verbs *vər*, give and *ʃet*, tell. Tense, aspect and mood are expressed in Zaar by “subject pronouns” which can affect the tone of the following verb. If we take the subject pronouns *tà*, 3PL.PFV and *tá*, 3PL.AOR, and combine them with these verbs, we get the following sentences, where the tones of the verbs vary according to their lexical tone classes and the subject pronouns preceding them:

- *tà: vər*, ‘they have given (it)’ ; *tá vər*, ‘they gave (it)’
- *tà: ʃet*, ‘they have said (it)’ ; *tá ʃet*, ‘they said (it)’⁴

Verbs can affect the tone of direct object pronouns through tone spreading, as can be seen in the 2nd person singular direct object pronoun *=kà* in the following sentences:

- *tà: vər=yà*,⁵ ‘they have given you’ ; *tá vər=yà*, ‘they gave you’;
- *tà: ʃet=kà*, ‘they have told you’ ; *tá ʃet=kà*, ‘they told you.’

However, these “surface tones” accounted for and/or predicted by post-lexical tonological rules undergo further variations. This can be heard when listening to recordings of natural speech, and it can be represented and measured through instrumental acoustics. Our hypothesis is that the pitch component of intonation in tone languages lies in this variation.

² I wish to thank Raymond Boyd, Shlomo Izre’el, Alexis Michaud, and an anonymous reviewer for their help. Any error remains mine entirely.

³ The tone marking in the transcription has been done by Marvellous S. Davan, a language assistant who consistently marks postlexical tones in grammatical words, whatever their acoustic realisation. Some of the recordings of the interviews used for this study were made in 1999. At that time, Zaar was a language without grammatical tradition or orthography, and up till now, it is not taught at school. The transcriber had just been trained in marking lexical tones on individual words and was given the recordings to transcribe as a first exercise. Without hesitation, he marked post-lexical tones right from the beginning, and has never varied in his transcriptions. Some passages that had not been faithfully transcribed (the hesitations, syntactic mistakes, etc. had been eliminated in the original transcription) were done again 10 years later. The same passages were transcribed again with exactly the same tones.

⁴ The two verbs *vər* and *ʃet* both belong to the same [Mid] tone class. The Low tone on *vər* is due to the depressing effect of the initial voiced consonant /v/. See (Caron 2005: 212 ff.) on tone classes in Zaar.

⁵ /k/ is realised as [ɣ] in the contexts V_V and r_V.

1.1 Tone variation

Pitch varies all along the syllables. Even non-modular tones are rarely realized by a plateau. The measurement of pitch in the study of tone has recently used the notion of “target”, defined as follows by (Akinlabi & Liberman 2001) : “the phonetic target value of a tone [is] the highest F_0 of a High tone, or the lowest F_0 of a Low tone “. In Yoruba, this target “is found at the end of the span of time corresponding to the associated tone-bearing unit”. For Zaar, this is true for Low and Mid tones, but not for High tones, where the phonetic target is at the beginning of the tone bearing unit. After a long process of trial and error, I have found that the phonetic target in Zaar is situated at the intensity peak of the syllable.

Another method, which I have used for this study, is to transcribe prosody using pitch contour stylization based on a tonal perception model and automatic segmentation, as done e.g. by “*Prosogramme*”. The system has been implemented by Piet Mertens as a Praat script.⁶ (Mertens 2004) *Prosogramme* follows four steps:

- Calculate acoustic parameters: F_0 , intensity, voicing.
- Obtain segmentation. Select the relevant units (e.g. vowels, syllables). Select the voiced portion of these units that has sufficient intensity/loudness (using difference thresholds relative to the local peak).
- Stylize the F_0 of the selected time intervals.
- Determine pitch range used in speech fragment. Plot stylized pitch and some annotation tiers (text, phonetic transcription). Use a musical (semitone) scale and add calibration lines at every 2 semitones for easy interpretation of pitch intervals. (Mertens 2002)⁷

The advantage of this method is twofold: first, it provides in a simple way images of Intonation Units, plotted against a time scale and customized annotation tiers; second, as it is automatic, it is reproducible and objective. One major drawback comes from the way vowel devoicing often prevents *Prosogramme* from representing F_0 utterance-finally and sometimes utterance-internally, e.g. last syllable *ni* and antepenultimate syllable *à*: in (Example 1). Taking into account this major drawback, I have used *Prosogramme* as a first approximation which remains useful to identify at a glance the general shape of a melody, a register shift, or a freakish phenomenon such as strong Rise-Fall associated with sentence-final adverbials (cf. § 3.2.4). See example (1) below for a comparison of both methods, e.g. the Hz representation given by Praat and the semi-tone representation given by *Prosogramme*. When a syllable is missing in Praat, I have made an approximation using the Praat Hz calculation. This approximation is represented with dotted line in the diagram as opposed to the *Prosogramme* representation which uses continuous lines.

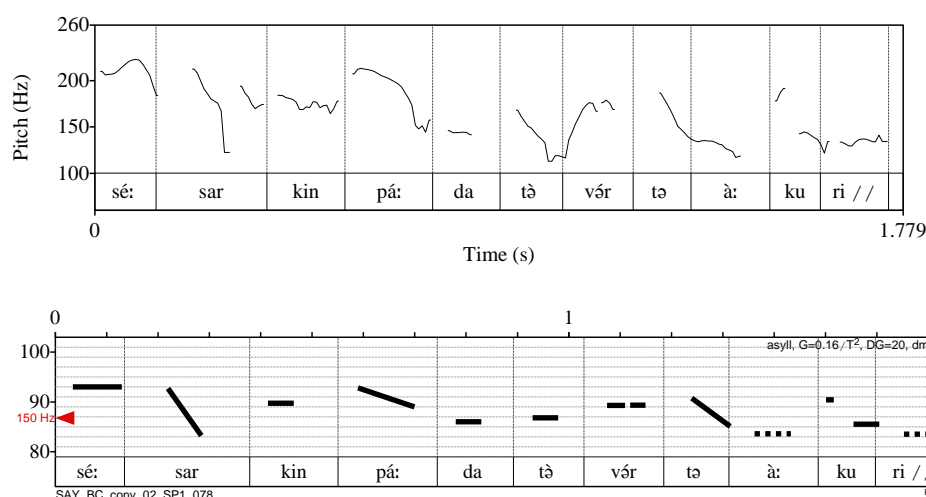
(1) *sé: sarkinpá:da tà vórtà hàkuri //*

sé: sarkinpá:da tà vór =tə hàkuri //
then Sarkin_Pada 3SG.SBV give =3S.OBJ patience //

Sarkin Pada should tell him to be forgiving. ([SAY_BC_CONV_02_SP1_077](#))

⁶ “Praat” is a tool for acoustic and phonetic research, written by Paul Boersma and David Weenink, of the Institute of Phonetic Sciences in Amsterdam.

⁷ The analysis of pitch intervals done by *Prosogramme* is based on the glissando threshold G, or auditory threshold for pitch variation. This depends on the amplitude (extent) and the duration of the F_0 variation. Since the work of J. t Hart, it is usually expressed in ST/s (semitones per second). ST use a logarithmic scale to give a better approximation of the way F_0 is perceived and interpreted by the human ear. For convenience reasons, the ‘Automatic detection of syllabic nuclei’ has been selected for this work in the *Prosogramme* settings. This method uses “a segmentation into local peaks in the intensity of band-pass (300-3500 Hz) filtered speech, adjusted on the basis of the intensity (full bandwidth)” (Mertens 2002). The other methods require manual time-plotting of the syllable nuclei on a Praat Textgrid.



In the main body of the article, in order to save space, I have represented only F_0 as calculated by Praat.

Our hypothesis is that the role of pitch in Zaar intonation can be observed in the variation between post-lexical tones as they are perceived and transcribed by the native speaker and their acoustic realisation as represented by Prosogramme. These variations, i.e. the way intonation influences the realisation of post-lexical tones, fall under the following categories:

- (a) Declination;
- (b) Intonemes⁸, which are divided into:
 - Terminal intonemes : Fall (↓), Rise (↑), Level (→) and High-Rise (↑↑);
 - Initial intonemes: Step-down (!) and Step-up (¡).

In the first part of the paper, I will illustrate these prosodic features (declination and intonemes). Then in the final part, I will analyse an intonation pattern exemplifying the combination of these features. But before doing this, let us clarify some terminological issues.

1.2 Intonation Unit

The Intonation Unit (IU) is what “encapsulates a functional, coherent segmental unit, be it syntactic, semantic, informational, or the like” (Izre’el & Mettouchi, in this vol.). In other words, it is “that part of a discourse text that the speaker by his voice wished to identify as an informational unit.” (Markus 2006:112)

An intonation unit (henceforth IU) is characterized by a combination of the following elements:

- overall: declination.
- final: pause, creaky voice; lengthening of final vowel or consonant;
- initial: (upward or downward) pitch adjustment, acceleration.

1.3 Paratone

The paratone corresponds to an utterance, i.e. a functionally complete speech act.⁹ A canonical paratone is followed by a pause and a pitch reset, ends in a Fall, and is characterized by overall declination.¹⁰ Paratones

⁸ Intonation literature uses the terms “falling/rising tone” to refer to phonetic cues characterised by an increase/reduction in pitch. In the linguistic description of tone languages, “tone” refers to the pitch variations used to characterize lexical and grammatical oppositions alongside vowels and consonants. I want to preserve the terms “falling/rising tone” for these phonologically distinctive suprasegmental units. For the increase/reduction in pitch working as intonation acoustic cues, I will use the terms “Fall/Rise intoneme” rather than tone.

⁹ Speech act: declaration (positive and negative), question (including rhetorical questions), injunction, exclamation, etc.

can consist of one or more IU's. What distinguishes IU's from paratones is the fact that they do not necessarily correspond to a complete speech act. The end of an IU is transcribed by a single slash (/). The end of a paratone is transcribed by a double slash (//) corresponding to the completion of the speech act. In a transcribed text, a paratone is delimited by two double slashes: it ends in a double slash and begins after the final double slash of the preceding paratone.

1.4 Period

A period is the highest prosodic hierarchy, defined as “a speech stretch that shows declination along its paratones (‘supradeclication’ according to Wichman 2000: §5.2.2)” (Izre’el & Mettouchi 2013)

Declination

2.1 The general frame

For both tone and non-tone languages, declination has been presented as a universal tendency due to physiological constraints¹¹, linked to the energy used to expel pulmonic air through the vocal organs. This creates the background for a “neutral” intonation against which variations of pitch by the speaker can be interpreted as meaningful patterns of deviations¹².

How is this compatible with what obtains in tone languages where the constraints of lexico-grammatical tones may influence the melody in an upward movement, contrary to the general downward movement of declination? Bearth (98) sketches a typology of declination in tone languages, falling into 3 categories illustrated by Chinese (where intonation is superimposed on lexico-grammatical tonology), Akan languages (where declination is phonologised into tone downstep, and intonation is added to the periphery) and Toura (where declination is neutralised, and intonation is added to the periphery).

Zaar belongs to the Chinese type in Bearth's typology, with no downstep phenomenon, and a declination observable from the Intonation Unit up to the Period as a gradual lowering of the pitch over the intonation unit. This is noticeable sp. in High tones. The highest tone in an IU is the first High tone of this unit. Each following High tone is pronounced lower than the preceding one. In example (2), the first three High tones read at 251 (*á*), 249 (*mí*) and 243 (*ya:*) respectively, with the last High tone of the utterance (*lí*) reading at 172. The same declination is observed in the final Low tones reading at 175 (*mà*) and 169 (*jè*). Utterance-

¹⁰ See below for the way genre (e.g. tales) or gender (e.g. women speech) can interfere with this canonical definition.

¹¹ The phenomenon of declination has to be distinguished from downstep. Downstep occurs in some tone languages and is set off by a succession of High and Low tones. It results in the automatic lowering of a High tone following a Low tone. As a consequence, in a succession of High-Low-High tones, the second High is pronounced with a lower pitch than the first one, resulting in what has been called terraced-level tone languages (Clements 1979). On the other hand, declination is a gradual, progressive lowering of F_0 occurring over an utterance, whatever the succession of tones, and can be observed even in utterances with both all-High or all-Low tones. As stated by (Ladd 1996), “(...) F_0 tends to decline over the course of phrases and utterances, both in tone languages and in languages like English or Dutch.” (p. 73ff.) , and “[...] even when nothing is ‘happening’ phonologically in the contour, F_0 continues to go down slightly [...]” (p. 18)

¹² However, Bearth (1998) presents data from Toura, a four-tone African language, where declination is limited to local tonal downstep where two tones of the same phonological level are separated by one or several lower tones, the second tone tends to be realised lower than the first. This lowering is then immediately locally readjusted and the following tones resume the general framework of the language, where all high tones of a unit will be pronounced at approximately the same level. Intonation is then expressed at the periphery of the IUs. “C’est la dernière more (...) de l’énoncé qui est le point de contact entre la [tonalité lexico-grammaticale et l’intonation périphérique] à partir duquel se contitue un paradigme énonciatif chargé de caractériser l’énoncé des points de vue notamment de son statut en tant qu’acte illocutif, de sa complétude ou incomplétude, de l’expression de la subjectivité et de l’émotivité, ainsi que du positionnement social des interlocuteurs. » (Bearth 1998: 80-1)

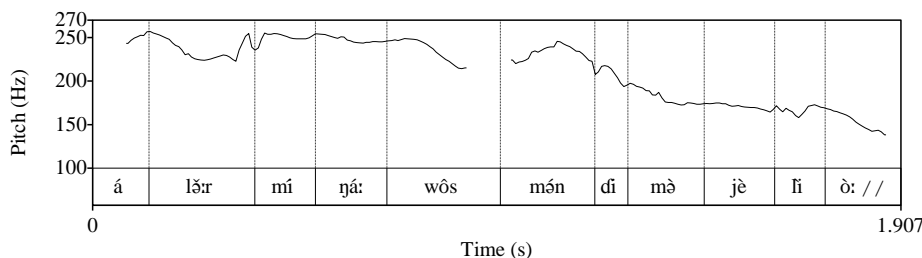
final Falls are added to declination, e.g. the lexically Mid tone of the last syllable of the paratone (o:) which bears the utterance-final Fall from 161 (lower than the preceding Low tone) to 140.¹³

(2) *á lǎ:r mí ɲá:wôs mǎndí mǎ jèlì ò: //*

á lǎ:r =mí ɲá: =wôs
3SG.AOR.SBJ bring =1PL.OBJ son =3SG.POS

mǎn -dí mǎ jèl -i -o:
BEN -DIR 1PL.AOR.SBJ see -SPCF FCT

He has brought his son for us to see. ([SAY_BC_CONV_02_SP2_029](#))

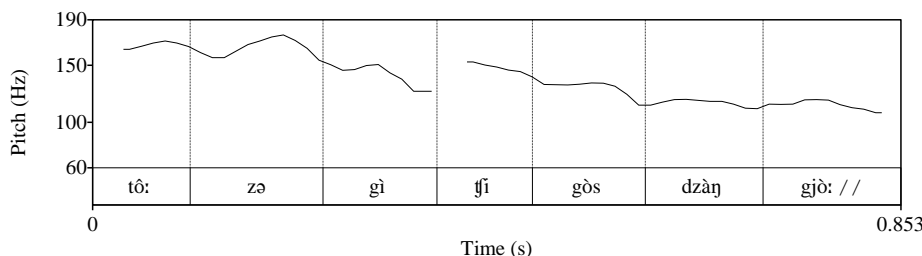


This is representative of the canonical declarative intonation of Zaar. The same intonation pattern is found in WH-Questions, as in example (3):

(3) *tò: zəgì ʔí gòs dzàŋ gjo: //*

tò: zəgì ʔí gòs dzàŋ gjo: //
well Ziggy 3SG.SBJ.be 3SG.POS day which //

Well, Ziggy, his own, which day (was it)? ([SAY_BC_CONV_03_SP1_703](#))



To compensate for declination, each IU starts with an initial pitch reset, also called ‘declination reset’ (Ladd 1996:279). When IU’s are integrated into a paratone, or paratones into a period, declination applies inside larger units as well, e.g. in Example (4):

(4) *mjá:ni ma mbútni / ká ngják gà:lí yá / basəm // (776) tò: / ká ngjêrtə / dón vwàrnì / tà ná: basəm // (1070) dón vwàrnì já: ná: basəm mjâ:n ma da:fá gətn bá:tkən // (561) káwájò: //*

mjá:ni ma mbút -ni / ká ngjak
1SG 1SG.FUT lie_down -INCH / 2PL.FUT hold_fast

gà:l -í: ká / bas =əm // tò: / ká nger=tə /
cow -RES at / PosL =1SG.OBJ // well/2PL.FUT cut =3S.OBJ /

¹³ This final lowering explains why the assertive particle o: has been transcribed with a Low tone by the language assistant.

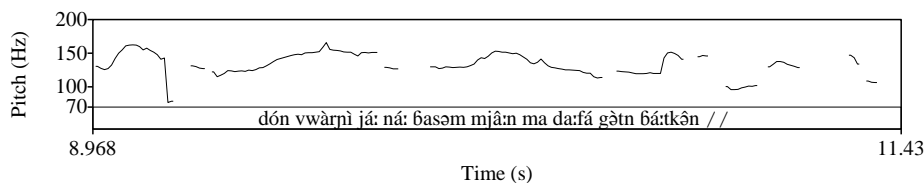
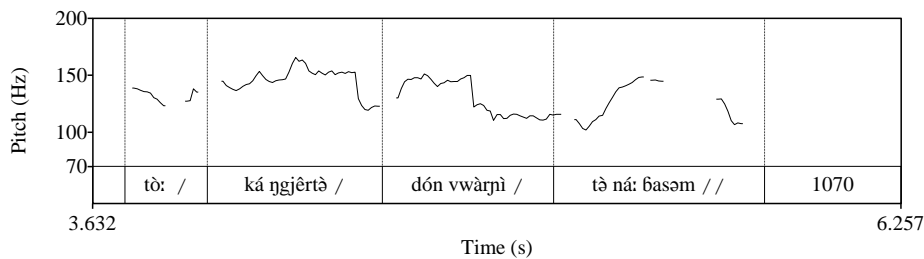
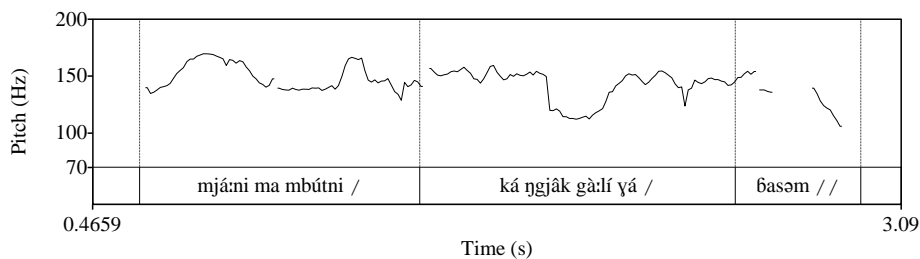
dón vòràŋ -i / tɔ̀ na: ɓas =mə //
 because blood -INDF / 3SG.SBV remain PosL =1SG.OBJ//

dón vòràŋ -i já: na: ɓas =mə
 because blood -INDF 3SG.COND remain PosL =1SG.OBJ

mjá:ni ma da:fá gə̀tn ɓa:t -kə̀ni //
 1SG 1SG.FUT continue 3SG.POS lick -NMLZ //

káwâj -o: //
 merely -FCT //

I will lie down and you will hold the cow over me. Then, slaughter it so that the blood should stay on me. Because if the blood stays on me, me, I will keep licking myself. That's all.
[\(SAY_BC_NARR_02_SPI_101-112\)](#)



In this example, gradual declination of high tones can be observed over the first three paratones, from 169,7 to 150,6 Hz; 152 to 142,4 Hz; 162,3 to 135,7 Hz, with final High tones getting gradually lower.

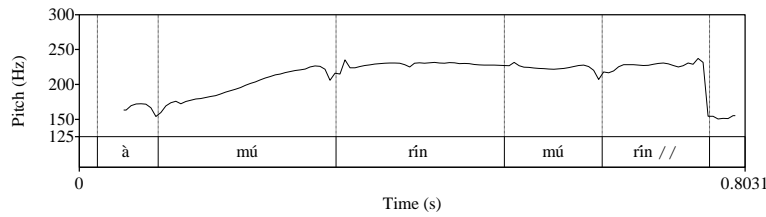
2.2 Variations in declination

Declination however is neutralised in some conditions, e.g. exclamation (example 5), in some forms of story-telling, and in some women's speech, (example 6).

(5) à múrín múrín //

á múr -ón múr -ón //
 eh man -PROX man -PROX //

Really, this man! [\(SAY_BC_CONV_02_SP2_178\)](#)



Example (6) is part of a woman's speech detailing her daily chores. It shows a period consisting in two paratones where the second one finishes roughly at the same level if not slightly higher (155 Hz) than the first one (150 Hz). This cancellation of declination gives a feeling of vehemency to the way the women's speech is perceived.

(6) *tô: / mjà:ní / lâp já: lǎ:j / tô: mǎ ʔi: ná ɲamtsǎ nátkǎnì // mǎ nât ɲamtsǎdǐ / tô: mǎ mǎnì mǎ mǎn tsǎtnnì //*

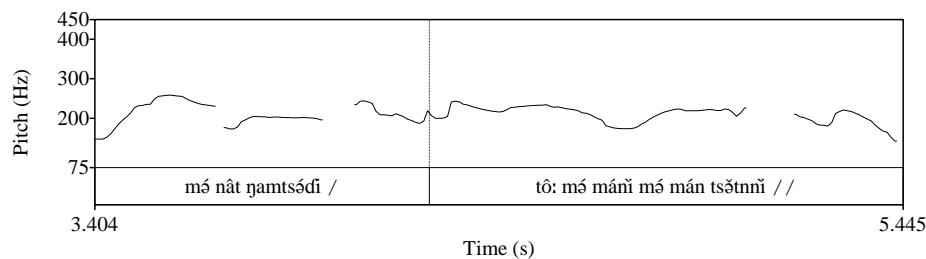
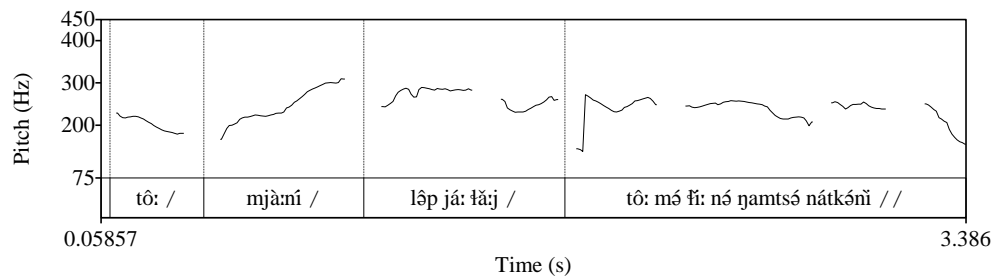
tô: / mjà:ní / lâp já: lǎ: -í: /
well / 1PL / place 3SG.COND cut -RES /

tô: mǎ lǎ -í: ná ɲamtsǎ nat -kǎnì //
well 1PL.AOR go -RES for wood tie -NMLZ //

mǎ nat ɲamtsǎ -dǐ /
1PL.AOR tie wood -CTP /

tô: mǎ mǎnì mǎ man tsǎtn -nì //
well 1PL.AOR come 1PL.AOR come sit -INCH //

Well, we, when the day breaks, well we go and collect wood. After collecting wood, we come back and sit down. ([SAY BC CONV 02 SP1 014-019](#))



Apart from those exceptions, declination helps identify the limit of speech units through pitch reset. Against this general background, intonemes operate both at the initial of IUs (affecting the whole of the unit) and at the end of paratones, in what Bearth (1998) calls 'peripheral intonation'.

Intonemes

Intonemes are defined as the minimal units of distinctive intonation contours associated with particular functions.

3.1 Initial: Step-up and Step-down¹⁴

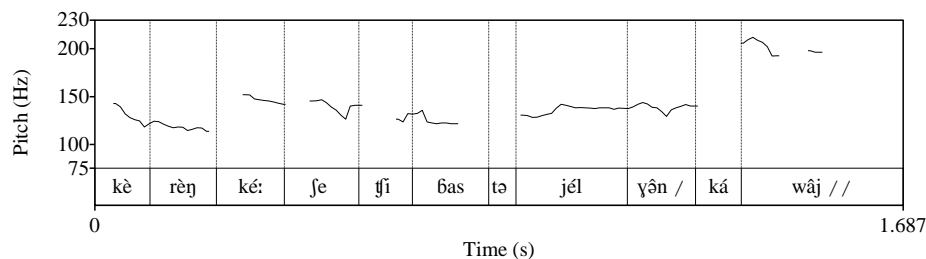
Initial lowering (Step-down, noted !) or raising (Step-up, noted ¡) consist in a noticeable change in the register of an intonation unit compared to the preceding one. This initial pitch adjustment creates a break in the gradual lowering of the pitch induced by declination. Both Step-up and Step-down are associated with specific functions: Step-up is associated with topicalisation, emphasis of adverbials and emotional statements. Step-down is associated with parenthesis and comments following a (stepped-up) topic.¹⁵

Example (7) shows an emphasis of the final adverb *kawai* through a Step-up of 73 Hz from 138 to 211 Hz, which is remarkable for a male speaker.

(7) *kèrènké:ʃe ʃĩ b̥as =tə j̥el -kónì / ¡káwâj //*

kèrènké:ʃe ʃĩ b̥as =tə j̥el -kónì / káwâj //
Kerenkeshe 3SG.SBJ.be PosL =3S.OBJ see -NMLZ / merely //

Kerenkeshe was merely watching him. ([SAY_BC_NARR_02_SPI_155-6](#))



In example (8), a Step-down separates the temporal frame (‘since I started’) from the assertion (I haven’t been here). The two IUs average at 101 and 87,75 Hz respectively, with their respective nuclei measuring at 111 and 89 Hz.

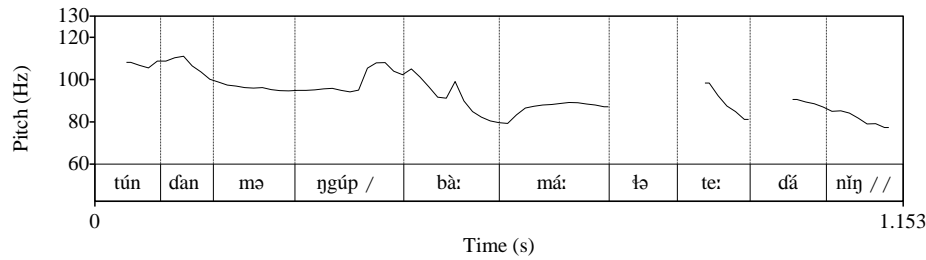
(8) *túndàn mə ɲúp / !bà: má: tə te: d̥ǎni h̥əŋ //*

túndàn mə ɲúp / bà: má: tə te: d̥ǎni h̥əŋ //
since 1SG.AOR start / NEG1 1SG.PFV go at there NEG2 //

Since I started, I haven't been there. ([SAY_BC_CONV_03_SPI_137](#))

¹⁴ The terms Step-up and Step-down are borrowed from (Crystal 1969 :143-52) to avoid any confusion with downstep, as characterised in (note 11) above.

¹⁵ Lowering and raising of register linked to informational factors such as emphasis or parenthesis, here described as Step-down and and Step-up are associated with and may be described as compression and expansion of register. Level and span are intimately linked, insofar as raising the voice, involves expanding the pitch span from the bottom up while the bottom of the speaking range remains more or less constant. “[...] broadly speaking, the higher the level the wider the span.” (Ladd 1996: 260).



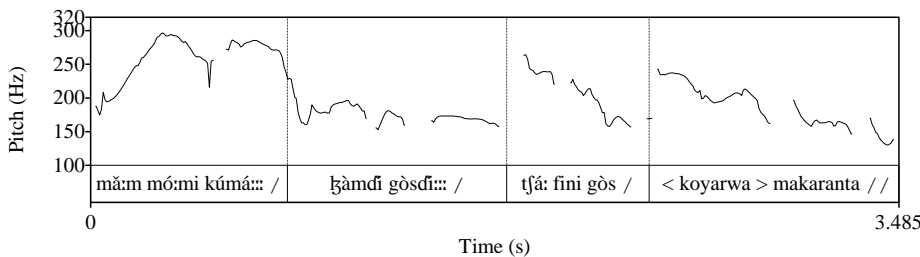
In example (9), after an initial IU corresponding to the introduction of a new topic (a new example to prove the speaker's case), a Step-down accompanies some backgrounded elements where the speaker reminds her audience of the theme of the conversation (women keep running about, overworking themselves, whereas men stay idle in the compound, chatting with their friends). This long paratone is characterized by ample declination and clear change of register at the beginning of the last two IUs.

(9) *mǎ:m mó:mi kúmá:: / !ɬàmɖi gòsdí:: / tʃá: fini gòs / <koyarwa> makaranta //*

mǎ:m ká mó:mi kúmá -:: / ɬam -dí gòs -dí -:: /
mum POSL Momì also -LENGTH / return -CTP 3SG.POS -CTP -LENGTH /

tʃá: fì -ni gòs / < koyarwa makaranta > //
3SG.IPFV do -INCH 3SG.POS / < teaching school > //

As for Momi's mum, the place where she goes, what she does, is to teach children in school.
([SAY_BC_CONV_02_SPI_023-26](#))



3.2 Terminal intonemes

These terminal intonemes are the Fall, the Rise, the Level, and the High Rise.

3.2.1 Fall

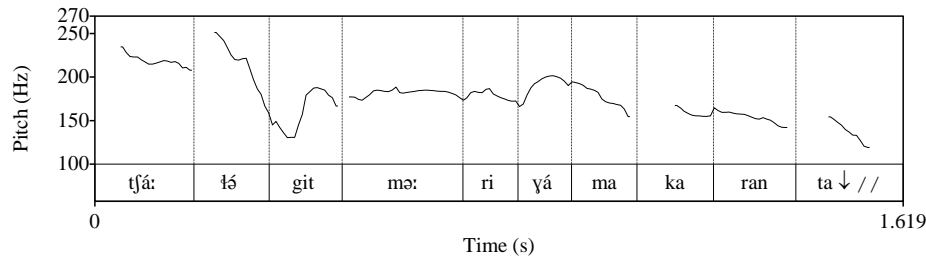
The Fall intoneme (transcribed with the sign “↓” in the annotation) consists in a distinctive lowering of the pitch at the end of the paratone. It characterises canonical assertions and Wh-questions. In Zaar, contrary to what avails e.g. in French and other Afro-Asiatic languages e.g. Hausa (Newman 2000: 613) and Bole (Schuh, Gimba & Ritchart 2012:236), it is found at the end of Y/N-Questions as well.¹⁶

(10) *tʃá: ɬə git mə:ri yá makaranta ↓//*

tʃá: ɬə git mə:ri ká makaranta //
3SG.IPFV go show child.PL at school //

She goes to teach children in the school. ([SAY_BC_CONV_02_SPI_028](#))

¹⁶ Cf. Caron *et al.* in this volume.



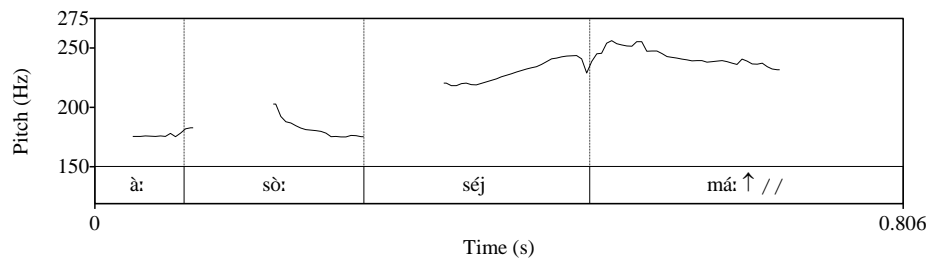
3.2.2 Rise

This final intoneme (transcribed ↑) is mostly associated with exclamation, such as can be seen on example (5) and here in example (11), where the final high tone on *má:* is measured at 255,5 Hz while the second syllable of *sò:séj*, the paratone nucleus, peaks 12 Hz below at 243,6 Hz only:

(11) *à: sò:séj má: ↑ //*

<i>à:</i>	<i>sò:séj</i>	<i>má:</i>	//
ah	quite	even	//

Ah quite so ! ([SAY_BC_CONV_01_SP2_052](#))



3.2.3 Level

This final intoneme (transcribed →) cancels declination. It is often associated with lengthening and induces the only (rare) cases of plateau realization of flat tones. This intoneme can be observed twice in example (9), at the end of the first two IU's. The intonation of this example can now be transcribed as follows: *mă:m mó:mi kúma:: → / !gàndi gòsdì:: → / tʃá: fini gòs / < koyarwa > makaranta ↓ //*. As is the case here with the first two IU's, the Level intoneme often identifies the limit and relationship between a topic and a comment. It is also associated with hesitation, e.g. in example (13) at the end of the paper.

3.2.4 High Rise

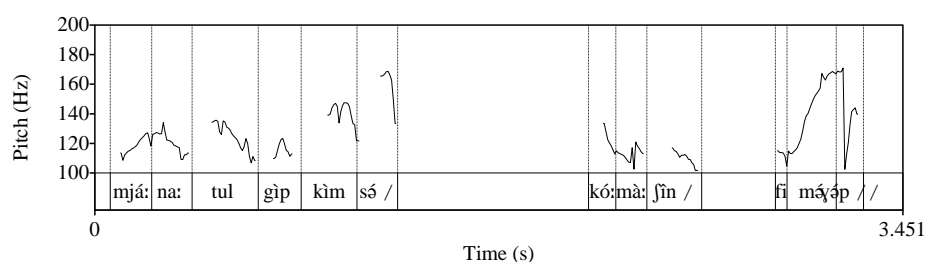
High Rise (transcribed ↑↑) is characterised by a sharp rise of F_0 to a level beyond the speaker's usual range of high tones. It is systematically associated with emphasis on negation, ideophones and assertion particles. It can be followed by a Fall when occurring at the end of a paratone. In Example (12), we have two occurrences of this intoneme. The first High Rise occurs at the end of an intonation unit, but paratone-internally. It is borne by the last syllable of the word *kìmsá*. The second High Rise occurs at the end of the paratone, and is followed by a Fall.

(12) *[...] mjá:na: tul gip kimsá ↑↑ / (816) káwâj mà:fɪn / (314) fɪ máyáp ↑↑↓ //*

<i>mjá:na:</i>	<i>tul</i>	<i>gip</i>	<i>kì</i>	=mə	-sə	/
1SG.CONC	arrive	inside	2PL.SBJ	=1SG.OBJ	-PL	/

<i>káwâj</i>	<i>mà:fɪn</i>	/	<i>fɪ</i>	<i>mókáp</i>	//
merely	motorbike	/	do	stop	//

[...] we had just entered Kimseh when the motorcycle stopped. ([SAY_BC_CONV_03_SP1_400-4](#))



Intonemes combine into intonation structures

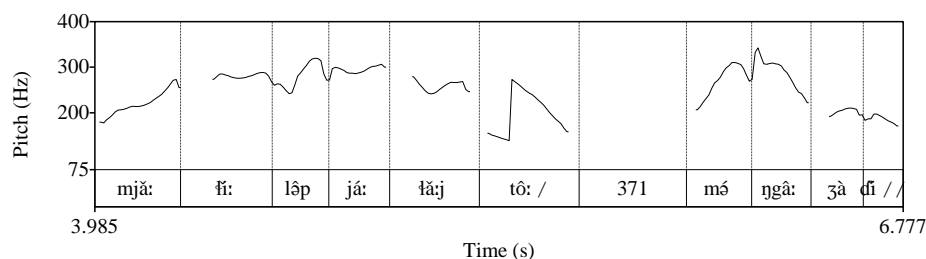
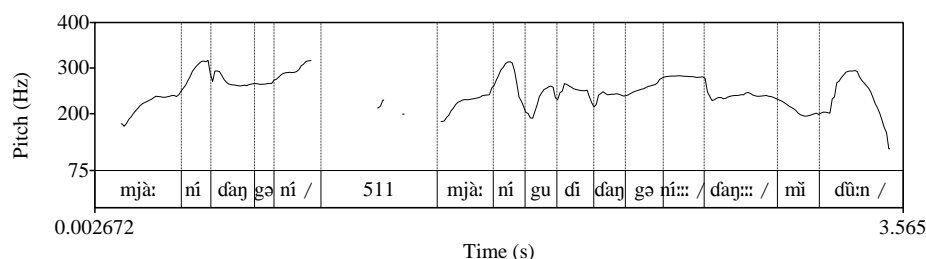
To illustrate how these various intonemes can be used to characterise a complex intonation structure, let us have a look at example (13) spoken by a mature woman describing her daily routine.

(13) *mjà:ní dāngəní → / (511) mjà:ní guđi dāngəní::: → / dāŋ::: → / mǐ dū:n ↑↓ (420) mjǎ: ǎ: lǎp*
já: ǎ:j tô: / (371) mǎ ngâ: zǎđi ↓ /

mjà:ní	dāngəní	/	mjà:ní	guđi	dāngəní	dān	mǐ	dū:ní	/
1PL	now	/	1PL	woman.PL	now	REL2	1PL.SBJ	here	/
míká	ǎ	-í:	lǎp	já:	ǎ:	-í:	tô:	/	
1PL.CONT	go	-RES	place	3SG.COND	cut	-RES	well	/	
mǎ	ngâ:	zǎ	-đi	//					
1PL.AOR	fetch	water	-CTP	//					

We now, we women now... who... are here, we go when the day breaks well we fetch water.

([SAY BC CONV 02 SPI 001-7](#))



This example consists of two paratones divided into many IU's. IU #1 is a topic, finishing in a Level intoneme; IU's #2 and #3 finish in hesitation, marked by final vowel lengthening and a level intoneme. From a functional point of view, IU #2 is the development of the Topic expressed in IU #1. The hesitation introduces IU #3, which consists in a relative pronoun announcing a further development of the second Topic. However, this IU finishes in the same hesitation as IU #2. These hesitations, meanwhile, introduce some ambiguity as to the interpretation of the rest of the paratone. IU #4 is expected to achieve the completion of the relative clause announced in IU #3, and of the second Topic at the same time. However,

the combination of Rise and Fall at the end of this unit could lead us to interpret it as a whole paratone, IU #3 as the end of an aborted paratone (##). In this case, IU's #5 and #6 make a second paratone with IU #5 functioning as a conditional frame for the rest of the utterance. The alternative interpretation sees the whole utterance as a completed paratone, with IU #6 as the comment of the two initial topics (IU #1 and IU's #2 to #4) and IU #5 as the conditional frame of IU #5. In this case, the Rise and Fall intonemes at the end of IU #4, quite unusual for a topic, could be interpreted as a reflex from the speaker to compensate for the preceding hesitations, giving an unnecessary assertive power to the topic. The two competing structures are:

- (a) *mjà:ní dāngəní* →/ (511) *mjà:ní gudi dāngəní::* →/ *dāŋ::* →/ *mì dū:n* ↑↓/ (420) *mjä: ħ: lâp já: ħ:j tô: / (371) mǎ ngâ: zàdi* ↓//

We now, we women now... who... are here, when the day breaks, we go and fetch water.

- (b) *mjà:ní dāngəní* →/ (511) *mjà:ní gudi dāngəní::* →/ *dāŋ::* ##
mì dū:n ↑↓// (420) *mjä: ħ: lâp já: ħ:j tô: / (371) mǎ ngâ: zàdi* ↓//

We now, we women now... who... We are here. When the day breaks, we go and fetch water.

Structure (a) consists in one long complex paratone; structure (b) consists in a period with three paratones, the first one being aborted. This type of ambiguity is not uncommon in natural speech, and the identification of the tonal exponents of intonation in Zaar has enabled us to describe it precisely.

Conclusion

Two conclusions can be drawn of a preliminary exam of the few elements discussed in this paper about Zaar intonation:

If I refer to the typology sketched by T. Bearth (1998:80-1), which distinguishes between two types of languages, i.e. (i) those that stack intonation patterns over lexico-grammatical tones and (ii) those that express intonation at the periphery of the utterance, Zaar would be a mixed language, with both internal intonation (with Step-up and Step-down inducing pitch-raising or lowering over whole intonation units) and peripheral intonation (with Rise and Fall final intonemes). This could be further developed if the final intonemes are confirmed to be correlated by anticipatory Rises and Falls inside the intonation units.

Beyond the variations in the location of intonemes (whether peripheral or contiguous with the whole intonation unit), the same general pragmatic interpretation of intonation contours seems to hold for Zaar, as well as for Toura, and English for that matter: a stepped-down Intonation Unit either bears some background information, or a repetition of something that has already been said.¹⁷

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¹⁷ Markus 2006 :117.

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