



Intonational Phonology of Malagasy: Pitch Accents Demarcate Syntactic Constituents

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Abstract

This paper is part of an ongoing project on the intonational phonology of Malagasy under the Autosegmental-Metrical model. It presents a preliminary model for Malagasy simple declaratives, focusing on the role that pitch accents play in demarcating Intermediate Phrase boundaries. Six native speakers of Malagasy from the Central Highlands of Madagascar produced declaratives that varied in their syntax, specifically in ways that affected the length of the predicate and the subject. The results indicate that there are two prosodic levels in Malagasy declaratives that are marked with intonation: the intonational phrase, marked at its right edge with a boundary tone (L%), and the intermediate phrase (ip), which corresponds to a major syntactic constituent such as the predicate or the subject noun phrase. The rightmost stressed syllable of each predicate ip, regardless of its length, bears a rising pitch accent, and the subject bears a similar rising tone, but without prominence, indicating that some Malagasy prosodic constituents mark boundaries with pitch accents. The results of this study will contribute to a full model of Malagasy intonation in the AM framework.

Index Terms: intonation, prosody, Malagasy, Austronesian, autosegmental-metrical, demarcation

1. Introduction

This paper presents a model of Malagasy declarative intonation in the Autosegmental-Metrical (AM) framework [4, 11, 15]. This framework views intonation as a series of relative low and high pitch targets over the course of an utterance, as seen in the fundamental frequency (f0). Generally, tones that are anchored to stressed syllables, called pitch accents, are used to mark prominence, while boundary tones are those that mark the edges of prosodic constituents or groups of words. However, some authors have presented data that suggests that pitch accents mark constituent boundaries in addition to prominence in Malagasy [2, 3, 7], a typologically rare occurrence. The goal of this paper is to present a model of intonation for Malagasy declaratives, taking into consideration the role that pitch accents play in marking edges, in addition to the other tonal events that occur in the language. Thus, the research questions are as follows: (1) What is the prosodic structure of Malagasy declaratives? (2) Do Malagasy prosodic constituents correspond to syntactic constituents? And finally, (3) does Malagasy use pitch accents to mark constituent boundaries?

2. Background

2.1. Malagasy syntax

Malagasy is a VOS language in which the predicate, which may include a verb, multiple objects, and some adverbs [9, 10, 13], appears sentence-initially in most constructions. Additionally, some adverbs may appear outside of the predicate [14]. An example simple declarative sentence in Malagasy appears in (1).

- (1) [Pred. Manome anao vary] [Sub. Ranaivo]
 give you rice Ranaivo
 ‘Ranaivo gives you rice.’

2.2. Malagasy Prosody

2.2.1. Word Prosody

Malagasy is a stress language. Stress can appear on the final, penultimate, or antepenultimate syllable, and minimal pairs exist (e.g., [‘la.la.na] ‘road’ and [la‘la.na] ‘law’) [12]. However, stress has been argued to be post-lexical [1], generally appearing on the penultimate syllable of the underlying form. In the case of words with antepenultimate stress, such as [‘la.la.na], it is argued that the final vowel is epenthetic and extrametrical [1, 17].

2.2.2. Intonation

Descriptions of Malagasy prosody have generally focused on the close relationship between prosodic and syntactic constituents. In particular, many authors [3, 6, 16] argue that the predicate and the subject both form intonation groups in Malagasy simple declaratives. According to these studies, there is a rise in pitch that occurs at the end of both constituents, though the nature of this rise is debated. In one of the few analyses under the Autosegmental-Metrical framework, [3] proposes that the rise on both the predicate and the subject is a L+H* pitch accent; that is, the rise occurs on the final stressed syllable of both constituents. [7], however, proposes a pitch accent only on the predicate, in this case L*+H, and no pitch accent on the subject. This claim is supported by one perception study [17], which presented Malagasy speakers with declarative sentences and asked them to identify the prominent syllables; in most cases, only the rightmost stressed syllable of the predicate was found to be prominent, whereas the stressed syllable of the subject was not, indicating that the rise in pitch on the subject is not a pitch accent. While other properties of Malagasy intonation have been largely ignored, both [3] and [7] identify a L% boundary tone at the end of declaratives.

3. Methods

3.1. Data Collection

The data presented in this paper were collected in Antananarivo, Madagascar in 2018. Six speakers of Malagasy read 20 simple declarative sentences, for a total of 118 utterances (two were removed due to speech errors). These sentences varied in their syntax, in particular with respect to the length of the predicate and the subject; for example, predicates varied in their number of arguments, while subjects may or may not have been modified by an adjective. The previous studies mentioned above indicate that the predicate, and perhaps the subject, are marked with a pitch accent; in order to test whether these tones are pitch accents (appearing on stressed syllables) or boundary tones (appearing at constituent boundaries), the final word in both the predicate and the subject varied in the position of the stressed syllable (either final, penultimate, or antepenultimate).

All speakers, five male and one female, were born and continued to live in the Central Highlands of Madagascar, in and around the capital of Antananarivo. All identified as native speakers of Malagasy and had learned French as a second language. The sentences that the speakers read were written in Official Malagasy, the standardized variety of Malagasy based on and closely related to the dialect of the Central Highlands.

3.2. Analysis

Pitch contours were located in the fundamental frequency (f0) of each utterance using Praat [5]. First, the broad phonetic categories L (low) and H (high) of different tonal events were labelled on the pitch track. The phonological categories of these tones were determined based on phonetic, contextual, and syntactic cues. A full description of these phonological categories, as well as their allophones and the contexts in which they appear, is in Section 4.

4. Description of Malagasy Intonation

4.1. Pitch Accents and L*+h

The data show that the final word of the predicate is consistently marked with a rising pitch accent on the stressed syllable, with increased intensity. Regardless of the length and the complexity of the predicate—whether it contained multiple objects (Figure 1) or adverbs (Figure 2), or if it was as short as a single word (e.g., an intransitive verb) as in Figure 3—the pitch accent appeared on the last word in the predicate constituent. For this reason, I have described this pitch accent as marking the edge of the entire predicate, as opposed to marking a specific syntactic category (e.g., nouns) or argument (e.g., objects).

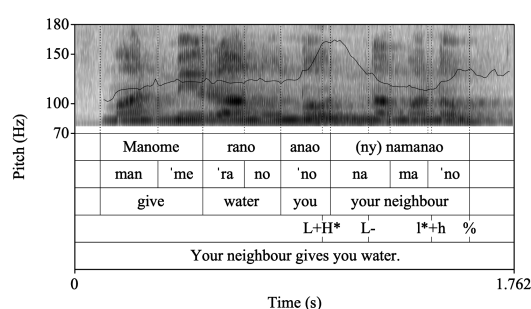


Figure 1: Pitch track for 'Your neighbor gives you water'

The predicate pitch accent is categorized as L+H*, with the low target realised on the syllable *preceding* the stressed syllable and the high target realised *within* the stressed syllable. This realization appears in 47% of predicates and is shown in Figure 1. Less common is L+<H*, a pitch accent similar to L+H* but whose high f0 peak is delayed until the following syllable. This pitch accent occurs in 25% of predicates. These two f0 contours appear to be variable, as the same utterance may be produced with L+H* by one participant and L+<H* by another. Because L+H* is the most frequent variant L+H* was chosen as the label for this category. Finally, L*+H was produced in 20% of predicates. The low target of this tone is realised within the stressed syllable and is followed by a rise into the following syllable. This tone appears to be an allophone of L+H*, as it generally appears when the predicate consists of a single word. It is possible that this tone arises because there is not enough space to realize the low target prior to the stressed syllable when it appears early in the predicate; however, further investigation is needed to confirm the distribution of this variant. L*+H is exemplified in Figure 3.

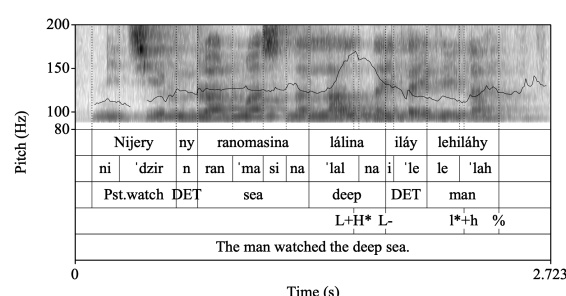


Figure 2: Pitch contour for 'The man watched the deep sea'

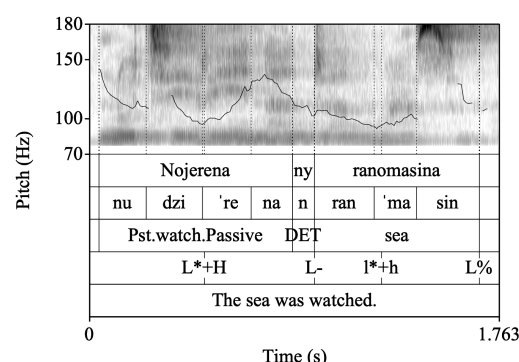


Figure 3: Pitch track for 'The sea was watched'

Subject noun phrases in Malagasy are also marked with a tone on the rightmost stressed syllable, though the realization of this tone differs from predicate pitch accents. Because Malagasy has VOS order, most clausal boundaries also correspond to subject boundaries. In 33% of these, there is a rising pitch accent that is perceived as prominent by the author and has an increased intensity, relative to the rest of the data. Additionally, 12% of subjects had no tonal event at all. However, in most instances (55%), a rising tone that was not prominent appeared. In many ways, this tone resembles a pitch accent: first, its f0 shape and tone-text alignment is similar to that of the L*+H pitch accent, sometimes seen in the predicate. What is most important, however, is that the low target is aligned with a stressed syllable.

While the alignment of this rising tone with the stressed syllable does show similarity to pitch accents, the fact that it is not prominent (a result which is consistent with the perception study in [17]) makes it difficult to call this a postlexical pitch accent as found in various stress-accent languages, described under the AM framework. Therefore, these tones were labelled using lowercased letters, i.e., [l*+h], to represent the lack of prominence in these pitch-accent-like tones. Examples of l*+h are shown in Figures 1, 2, and 3.

An important note to be made is that the l*+h tone is not necessarily associated with the edge of the subject NP; instead, it may actually mark the edge of the utterance. Evidence for this comes from a single sentence where the subject is followed by an adverb *afak'omaly* 'two days ago'. In this case, five of six consultants put prominence on the subject, marking it with a pitch accent. On the sentence-final adverb, however, only one participant put prominence on the adverb, while the rest marked it with the non-prominent l*+h. An example of a typical utterance with a predicate-external adverb appears in Figure 4. This may indicate that sentence-final pitch accents are made non-prominent, perhaps as a way to mark clause boundaries. However, the data here is too limited to make any strong claims and must be supplemented by research on other word orders in Malagasy that allow for constituents besides the subject to appear sentence-finally.

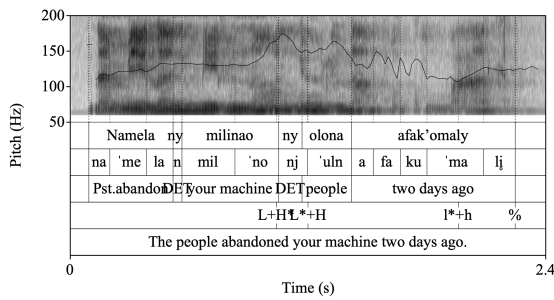


Figure 4: Pitch track for 'The people abandoned your machine two days ago'

4.2. Boundary Tones

While Malagasy seems to mark syntactic constituents with pitch accents and the non-prominent l*+h tone, speakers also use boundary tones to mark the edges of these phrases. In the present data set, 54% of predicates are marked with a final boundary tone. Typically, this is realized as an f0 fall between the predicate pitch accent and the predicate boundary, labelled L-. Figure 5 shows an example of this. However, when the predicate pitch accent falls on the final syllable of the constituent, or when the pitch accent is L+<H* (with a delayed peak), L- is commonly realized on the first syllable of the following subject noun phrase, suggesting that Malagasy prohibits the realization of multiple tones on the same syllable. This indicates that, while the edge of prosodic constituents and the edge of syntactic constituents are aligned at the underlying level, this alignment is less precise at the phonetic level. When there is only one syllable between the predicate pitch accent and the pitch accent of the subject NP, a boundary tone was often not realized. Instead, the two pitch accents were interpolated. It may be that the predicate boundary tone is deleted when there is not enough space to realize them before the following tone, or that there is no underlying boundary tone at all in these cases.

Research on Malagasy speakers' perception of juncture in these utterances may shed light on this.

Finally, Malagasy simple declaratives are marked at their right edge with a low (L%) boundary tone. After the final l*+h tone, f0 falls toward the end of the utterance, generally ending lower than the preceding high but relatively higher than earlier low targets, suggesting that the L% is partially undershot. On the other hand, when the final pitch accent is realized on the final syllable of the phrase, the L% boundary tone is deleted and f0 ends with a high tone, i.e., L% is truncated due to tonal crowding. An example of the overt L% boundary tone appears in Figure 3, and the truncated L% boundary tone appears in Figures 1, 2, and 4.

5. Model of Malagasy Simple Declarative Intonation

Based on the data analyzed, we can propose a preliminary model of intonational phonology for Malagasy simple declarative sentences, which is shown in Figure 5. First, Malagasy utterances, or at least Malagasy clauses, form one intonational phrase (IP). Each IP is marked at its right edge with a L% boundary tone, which may be not fully realized due to tonal context. Below the level of IP is the Intermediate Phrase (ip), which in Malagasy corresponds to a major syntactic constituent. From the data analyzed in the present paper, predicates, subject NPs, and predicate-external adverbs may each form an ip. Each ip is marked with a rising tone on its rightmost stressed syllable, which is generally prominent (L+H*) when the ip is the predicate but not prominent (l*+h) when it is the subject NP. Additionally, a sentence-medial ip (typically the predicate) is marked with a L- boundary tone at its right edge, which may also not be realized due to tonal crowding.

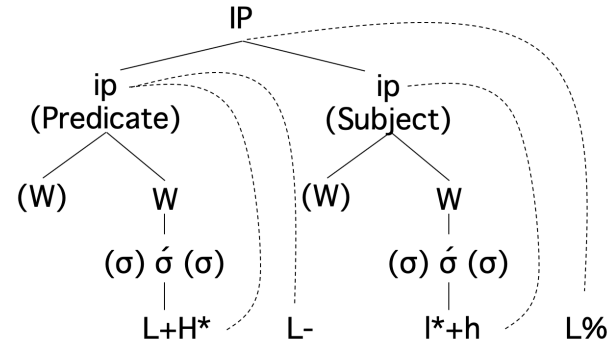


Figure 5: Proposed prosodic structure of Malagasy simple declaratives.

6. Discussion and Conclusion

The present paper asked three questions about the intonation of Malagasy. First, we asked what the prosodic structure of simple declaratives in Malagasy is. We saw that Malagasy simple declaratives have two levels of prosodic constituency that are marked with tonal events: the intonation phrase is marked at its right edge with a boundary tone, and an IP-medial ip is marked at its right edge with a boundary tone. Additionally, a rising pitch accent appears on the rightmost stressed syllable of each ip, though the realization of this tone varies. Then, we asked whether Malagasy prosodic constituents correspond to syntactic constituents. It was demonstrated that at the underlying level, the edges of syntactic and prosodic

constituents are closely aligned; in particular, the predicate and the subject NP each forms an ip, and an adverbial may also form an ip if it appears outside of the predicate. However, this relationship is somewhat loosely defined at the phonetic level, as the predicate ip boundary tone may be realized outside of the predicate. Finally, we asked if Malagasy uses pitch accents to mark constituent boundaries. The data analyzed in this study indicate that this is the case. In particular, Malagasy predicates are consistently marked with a rising pitch accent on the final stressed syllable of the constituent, while subjects are similarly marked with a rising tone that resembles a pitch accent but often lacks prominence. This indicates that intermediate phrases in Malagasy are demarcated with pitch accents, in addition to boundary tones.

It is typologically rare for a language to mark constituent boundaries with pitch accents. It has been argued that French demarcates accentual phrases with a pitch accent [8]; however, to the author's knowledge, there is no language that has been documented to mark major syntactic constituents, such as the predicate, with pitch accents, as Malagasy does. What is even more unusual is that the predicate is additionally marked with a boundary tone, which does not serve any additional demarcative function. These findings, then, may challenge our understanding of the role that pitch accents can play in intonational phonologies. That is, a pitch accent marks syntactic constituency as well as prosodic prominence.

An additional unusual feature of Malagasy intonation is the non-prominent tone that marks the right boundary of the subject ip. One possibility is that this is underlyingly L*+H (i.e., a pitch accent with prominence). In Section 4.1, it was tentatively proposed that it is only the sentence-final ip that bears l*+h; perhaps, then, there is some other constraint in Malagasy that causes the final pitch accent to lose its prominence in many cases. l*+h is underlyingly L*+H (i.e., a pitch accent) and that some other constraint causes the final pitch accent to lose its prominence. It is important that more data be collected, and this possibility investigated. Further, it remains to be seen why some of the clause-final subjects are marked with a pitch accent, and what the function of prominence vs. non-prominence pitch accent may be.

7. References

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