

# The Intonation of Malagasy: A Preliminary Look

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## ABSTRACT

This study describes the intonation of three types of Malagasy sentences as a first step toward an analysis of the intonational phonology of Malagasy. We studied the intonation of three Malagasy speakers using the Autosegmental-Metrical model, in particular with respect to surface syntactic constituents. Participants read Malagasy sentences with various structures including broad-focus declaratives, syntactically-focussed subjects, and wh-questions. Results indicate that both the subject and predicate bear pitch accents. Declaratives (both with and without syntactic focus) most commonly have an L+H\* pitch accent on both constituents and an L% boundary tone. Wh- questions have an L+H\* pitch accent on the wh- word and a L+<sub>i</sub>H\* pitch accent on the following clause. Both L% and H% boundary tones were observed in wh- questions. These results provide a clearer insight into the intonation of Malagasy.

**Keywords:** intonation, prosody, Malagasy, Austronesian.

## 1. INTRODUCTION

This study takes the initial steps toward a description of the intonation of Malagasy, an Austronesian VOS language native to Madagascar. In particular, we investigate the syntactic constituents that bear tone in declarative sentences and wh- questions, as well as the pitch accents and boundary tones that appear in these constructions. Many languages, including Malagasy, have very little information on their intonation. Thus, the purpose of this study is to expand the body of literature on the phonetics of Malagasy. This paper explores intonation in Malagasy by answering the following questions:

- (1) How does the surface syntax of Malagasy define intonation in broad-focus declaratives, declaratives with syntactic focus, and wh- questions?
- (2) Which pitch accents and boundary tones occur in these constructions?

Our results indicate that a pitch accent falls on the right edge of the predicate and subject in most sentences. L+H\* was the most common pitch accent

in our data set, while L% was the most common boundary tone.

## 2. BACKGROUND

### 2.1. Malagasy Syntax

This paper describes the intonation of three types of Malagasy sentences: broad-focus declaratives, syntactically-focussed declaratives, and wh-questions. Malagasy is a VOS language [8], derived from movement of the predicate to the sentence-initial position [12]. Subjects can, however, appear before the predicate in focussed constructions, where the subject is placed at the beginning of the sentence and the particle *no* appears before the predicate. These fronted subjects behave like predicates, and the *no*-clause acts as the subject [11]. Wh- questions are formed in the same way, with the fronted wh- word in the predicate position and the particle *no* delimiting the subject [14].

### 2.2. The Autosegmental-Metrical Model

The analysis presented in this paper was performed under the Autosegmental-Metrical (AM) model of intonation [9] [13]. The model uses relative high (H) and low (L) points in the fundamental frequency (F<sub>0</sub>) of stressed syllables to describe the intonation of an utterance. Tones on stressed syllables, called pitch accents, are marked with an asterisk (\*); utterance-final tones, called boundary tones, are marked with a percent sign (%). Tones are not necessarily monotonal: they often appear as bitonal, and hypothetically could contain any number of tones. Tonal peaks and valleys that are relatively higher than preceding tones may be described as upstepped (marked with <sub>i</sub>), while those that are relatively lower than preceding tones may be described as downstepped (marked with <sub>!</sub>).

### 2.3. Malagasy Prosody

#### 2.3.1 Stress

Generally, stress falls on the penultimate syllable in Malagasy words [10]. However, there are several notable exceptions. Single syllable words and loanwords, among others, may have stress on the final

syllable. Additionally, many words that end in [ka], [tra] and [na] have antepenultimate stress.

### 2.3.2 Intonation

While there is some previous work on the intonation of Malagasy, the present study aims to clarify certain contradictions in the literature. One early description of Malagasy prosody describe Malagasy sentences as having two tones: one on the predicate and one on the subject [3]. In declaratives, the final tone is lower than the first, while in interrogatives the final tone is higher. Raoniarisoa's [15] dissertation affirms these findings, but also claims that adverbs can form an intonation group of their own. Barjam [1] takes an Autosegmental-Metrical approach to Malagasy intonation in his analysis of declarative sentences, both simple and complex. Barjam also suggests that intonational peaks occur on the subject and the predicate; in declaratives, there is an L+H\* pitch accent on the right edge of the predicate and on the subject. Barjam also confirm's Dahl's assertion that the last pitch accent is lower than the preceding. Barjam adds that declaratives have an L% boundary tone. He also points out instances of tonal crowding that arise when pitch accents occur within two unstressed syllables of each other; in this case, the second tone is realised as H\*. Additionally, he observes that when the sentence ends with a stressed syllable, the boundary tone (L%) may surface as H%.

Finally, Frascarelli [4] also applies the AM model to Malagasy intonation. Interestingly, her results contradict Barjam's in some ways: in broad-focus declaratives, she identifies an L\*+H pitch accent, in contrast to the L+H\* accent that Barjam observed. Additionally, she only identifies a pitch accent on "the constituent preceding the [subject]", which in Barjam's analysis is the predicate, but she makes no mention of a pitch accent on the subject. Another of Frascarelli's findings is that syntactically-focussed NPs behave intonationally as if they are predicates in that there is a pitch accent at the right edge of the constituent; however, she observes an H\* pitch accent in these constructions. Frascarelli also looks briefly at wh- questions and claims an H\* pitch accent but makes no reference to the boundary tones of focussed NPs nor wh- questions.

## 3. METHODOLOGY

### 3.1. Participants

The present study involves data from three native speakers of Malagasy who were born in Madagascar and currently live in Montreal, Canada. Two of the participants were female and one was male. They

were between the ages of 50 and 60 at the time of elicitation. All participants completed a language-use questionnaire that determined that all were bilingual, with good or excellent competency in Malagasy and French. Additionally, two participants had good to excellent English skills.

### 3.2. Data collection

Data were collected using a reading task in which the participants read sentences in Malagasy comprising various syntactic structures; in particular, this paper focuses on the intonation of seven sentences that vary in their predicate and noun phrases. Each sentence contained a unique syntactic feature: verbs with one, two, or three arguments, wh- questions, syntactically-focussed noun phrases, and adverb phrases.

### 3.3. Analysis

Each utterance was analysed acoustically using Praat [2]. Intonation was visible in the fundamental frequency (F<sub>0</sub>) and pitch accents and boundary tones were annotated using the Autosegmental-Metrical framework. A second reader with knowledge of the AM model and understudied languages verified a portion of these annotations. Each tone-bearing word was coded for the participant, the constituent in which it was found, the position of the tone in the word.

There are a number of difficulties that arise when trying to describe the intonation of an understudied language. Hualde [5] details how many languages have a developed Tones and Break Indices (ToBI) system of notation for specific languages. However, Hualde and Prieto [6] outline some of the problems with existing ToBI systems, namely that these systems are specific to the languages for which they are designed. As Malagasy does not have an existing ToBI system, we will have to use a phonetic transcription that can be understood unambiguously for readers with no previous knowledge of Malagasy phonology. For this reason, we will be using the basic pitch accents and boundary tones in Tables 1 and 2, based on Jun and Fletcher [7].

**Table 1:** Pitch accent notation used in this paper

Pitch accent	Description
H*	Peak in the stressed syllable
L+H*	Peak in the stressed syllable preceded by a valley
L+ <sub>i</sub> H*	Upstepped peak in the stressed syllable preceded by a valley

**Table 2:** Boundary tone notation used in this paper

Boundary tone	Description
L%	Final descent
H%	Final rise

This notation is intended to act as a preliminary step in the analysis of Malagasy intonation, and will be used to describe the basic tonal contours that can be observed until a full analysis of Malagasy intonational phonology is completed.

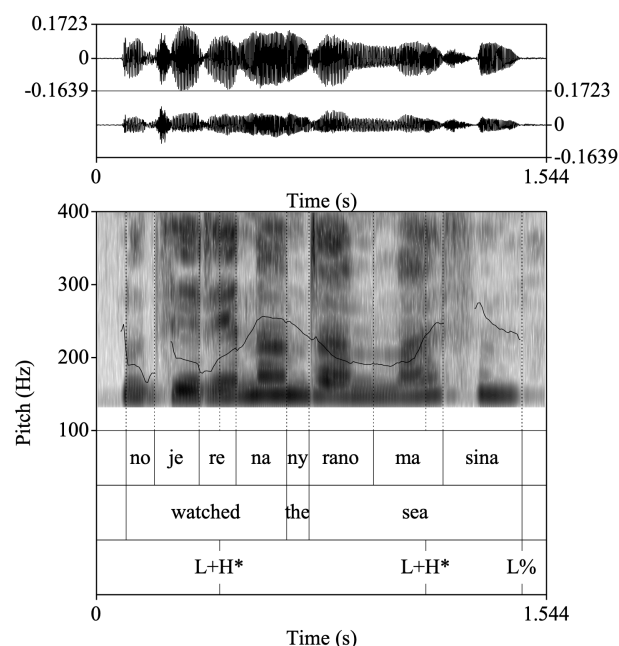
## 4. RESULTS

### 4.1. General Intonation Patterns in Malagasy

Most Malagasy sentences that we observed contain two pitch accents, on the predicate and the subject. After the initial pitch accent, the pitch sometimes fell sharply; an example is shown in Figure 1. This may mark some sort of prosodic phrase boundary, but we will refrain from annotating it as such until more data is collected. Pitch accents are typically realised on the rightmost stressed syllable of the relevant constituent; however, in many cases, the peak of the pitch accent is delayed, being realised on the following syllable. These patterns were observed in examples from all sentence types (declarative, wh-, and focussed sentences). Across sentence types, the rising pitch accent L+H\* dominates the data at 84% (n=32), while L+<sub>i</sub>H\* occurs in 13% (n=4) of instances. H\* was realised just once, representing 3% of tokens. Regarding boundary tones, 62% (n=13) of utterances contained the L% boundary tone and 33% (n=7) contained H%. One utterance did not contain a phonetically realised boundary tone.

### 4.2. Declaratives

In both broad-focus declaratives and declaratives with syntactic focus, the predicate is realised with a L+H\* pitch accent on its rightmost stressed syllable. In most cases, the peak of this pitch accent is realised on the following syllable, after which the pitch drops. Based on the data collected, this appears to be true for predicates regardless of the number of arguments that the verb has or whether or not the predicate contains an adverb phrase. In one instance, no pitch accent was realised on the predicate. Similar to predicates, most subjects also bear a L+H\* pitch accent, though its peak is less frequently delayed. Additionally, all three participants neglected to produce a pitch accent on the subject *ianao* ‘you’ in *Nomena vary ianao* ‘You are given rice’. Figure 1 shows an example utterance that is realised with L+H\* on both the predicate and the subject.

**Figure 1:** Production of the declarative *Nojerena ny ranomasina*, ‘The sea is watched’.

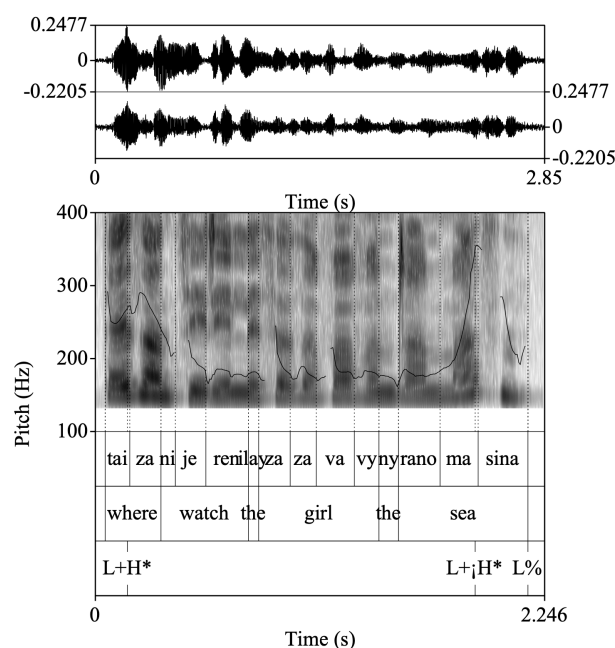
Most declaratives (73%, n=11) analysed were realised with a L% boundary tone. However, the H% boundary tone does appear with some frequency (20%, n=3). In sum, Malagasy declaratives, including those with syntactic focus, appear to have a L+H\* pitch accent on the right edge of the predicate and the subject, alongside a L% boundary tone, though there is some variation.

### 4.3 Wh- Questions

Wh- questions follow similar intonational patterns to declaratives; however, there are some key differences. The wh- word is generally marked with a L+H\* pitch accent (83%, n=5), whose peak may be realised in the following syllable. However, we observe a different pitch accent on the *no*-clause (which behaves syntactically like a subject) compared to declarative subjects: in wh- questions, the pitch accent on the *no*-clause is an upstepped rising L+<sub>i</sub>H\*. The boundary tone of wh- questions was H% in 63% (n=5) of utterances and L% in 38% (n=3). Notably, H% appeared in all questions whose tone-bearing word is *vary* ‘rice,’ a word with penultimate stress but whose final vowel is devoiced. It is possible that since the pitch accent is realised on the last voiced vowel of the utterance, there is no space for the L% boundary tone to be realised, though more examples with other phonetically-similar words is needed to further explore this possibility. Figure 2 shows a wh-question with the L+<sub>i</sub>H\* L% pitch configuration. To summarise, in wh- questions, the wh- word was most frequently observed with a L+H\* pitch accent while

the *no*-clause was marked with L+<sub>i</sub>H\*. Furthermore, both L% and H% boundary tones were observed.

**Figure 2:** Production of the wh- question *Taiza nijeren'ilay zazavavy ny ranomasina*, 'Where did the girl watch the sea?'



## 5. DISCUSSION

The purpose of the present study is to document the intonation of Malagasy and to clarify some contrasting claims in the literature. In particular, the goal is to determine the pitch accents and boundary tones found in Malagasy declaratives and wh-questions and the syntactic constituents that trigger their appearance. The findings of this study largely refute those produced by Frascarelli [4]. She suggests an L\*+H pitch accent on the right edge of the predicate and none on the subject in broad-focus declaratives; our data, alternatively, point to a L+H\* pitch accent with a delayed peak on both constituents.

The findings of this study are, however, mostly in line with those found by Barjam [1]: we both find a L+H\* pitch accent at the right edge of both the predicate and the subject in broad-focus declaratives, and that declaratives generally have a L% boundary tone. One key difference between our analyses is that Barjam [1] describes tonal crowding, which occurs when the two pitch accents are separated by less than two unstressed syllables, in which case the second L+H\* rise is realised as a plateaued H\* pitch accent. While we did not observe it, it is possible that a larger data set will reveal tonal crowding. Future work on Malagasy intonation should include more instances of closely-positioned pitch accents to test for tonal crowding.

While this paper has refrained from making any broad claims about the intonational phonology of Malagasy, there are several patterns that may direct future research in this area. Regarding pitch accents, there were several instances of pitch accent peaks being realised outside of the stressed syllable. Additionally, no participant produced a pitch accent on the pronoun *ianao* 'you'. It is possible that this is because *ianao* is a pronoun, because the word is oxytonic, or another reason; this is a question that must be answered with future research. With respect to boundary tones, wh- questions variably contained a L% or H% boundary tone. We observed that H% most commonly appeared when the preceding pitch accent was realised on the last voiced vowel of the utterance; it is possible that this holds true for declaratives as well, though a larger data set is needed to explore this possibility.

## 6. CONCLUSION

In this study, we took the initial steps in understanding the full intonational phonology of Malagasy. The main findings of the study are that the predicate and the subject are each marked with a pitch accent on the stressed syllable at the furthest right edge of the constituent. Additionally, we found that both the predicate and the subject most often have a rising L+H\* pitch accent in declarative sentences, but the *no*-clause has L+<sub>i</sub>H\* pitch accent in wh-questions. An L% boundary tone was most common across sentences, but wh- questions were more commonly realised with H%.

This study provides an important contribution to many fields, including Malagasy phonetics and intonation more broadly. To date, it is the most comprehensive look at intonation in Malagasy under the Autosegmental-Metrical model, incorporating various syntactic structures and three participants. However, a considerable amount more work must be done in this field. First, future studies should attempt to use monolingual speakers of Malagasy, or at the least speakers who live in Madagascar. Additionally, the intonation of other syntactic structures must be studied, such as yes/no questions, complex noun phrases, and embedded clauses. Finally, some participants described large differences in the intonation of the numerous dialects of Malagasy. A complete survey of the dialects' different intonation patterns would certainly be valuable in describing the language. While this project is ongoing and will produce more results in the future, the present paper has outlined some general observations of the intonation of Malagasy, including the location and realisations of pitch accents and boundary tones in various declaratives and wh- questions.

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