

Some Observations on Word Order and Prosody in Karitiana Relative Clauses

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ABSTRACT

This paper aims to investigate possible prosodic differences in two word orders attested for object relative clauses in Karitiana (Tupi-Arikém). In an elicited production task, Vivanco (2014) observed that there are two possible word orders for object relative clauses in this language: OSV and SOV. Assuming the tenets of the Autosegmental Metrical Theory (Pierrehumbert, 1980, 2000, Ladd 2008), we revisit Vivanco's (2014) data and demonstrate that there is a prosodic difference between these two orders, namely, an obligatory L*+H pitch accent on the stressed syllable of subjects in SOV relatives. On the other hand, OSV object relative clauses do not obligatorily show any specific intonational contour.

KEYWORDS: Karitiana; relative clauses; word order; intonation

RESUMO

O objetivo do presente trabalho é investigar possíveis alterações prosódicas em duas ordens de palavras encontradas nas orações relativas de objeto da língua karitiana (Tupi-Arikém). Em um experimento de produção elicitada, Vivanco (2014) verificou que há duas ordens possíveis para relativas de objeto na língua karitiana: OSV e SOV. Assumindo a Teoria Autossegmental Métrica (Pierrehumbert, 1980, 2000, Ladd 2008), revisitamos os dados de Vivanco (2014) e mostramos que há uma diferença prosódica entre essas duas ordens: especificamente, orações relativas com a ordem SOV têm um evento tonal (um acento L*+H) na sílaba tônica do NP sujeito; relativas de objeto com a ordem OSV, em contrapartida, não exibem nenhum contorno entoacional obrigatório.

PALAVRAS-CHAVE: Karitiana; orações relativas; ordem de palavras; entoação

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Introduction

In Karitiana, there are two possible word orders for object relative clauses¹: OSV (example (1)) and SOV (example (2)):

(1) *OSV object relative clause*

Yn Ø-na-aka-t i-pyting-Ø [kinda'o sosy ti-'y]-ty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR [fruit armadillo TI-eat]-OBL
 'I want the fruits that the armadillo was eating'

(2) *SOV object relative clause*

Yn Ø-na-aka-t i-pyting-Ø [Luciana pykyp ti-pipāram]- aty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR [Luciana clothes TI-sew]- <e.v.>OBL
 'I want the clothes that Luciana sewed'

Variable word order is a characteristic of some of the world's languages (see Hale, 1983, 2013 and Legate, 2002 on non-configurationality). In these, factors other than the syntactic function seem to regulate serialization of NPs (Fanselow, 1990). Therefore, one question that arises in (1-2) is what factors could be involved in this variation of word order in Karitiana. In this paper, we examine possible prosodic differences in the relative clauses in (1) and (2), showing that intonation seems to be a differentiating factor between them.

The paper is organized as follows: in section 1, the necessary background information about the language and its relative constructions is provided. The theory of intonation assumed in this paper – the Autosegmental Metrical Theory - will be described in section 2, along with the inventory of the relevant tonal events in Karitiana. The phonetic analysis is developed in section 3, where it will be demonstrated that one of the word orders attested above (namely, the SOV in (2)) displays a fixed intonational contour. Finally, some concluding remarks are made in section 4.

¹ In object relative clauses, the head (*i.e.*, the relativized NP) is the direct object of the embedded verb.

1. Karitiana

Karitiana is a Tupian language of the Arikém family (Rodrigues, 1986), spoken by around 400 speakers². Most of them live in an indigenous reservation in Porto Velho, northwestern Brazil.

Landin (1982) was the first author to notice that Karitiana displayed a considerable amount of different word orders. In this regard, Storto (1999) detected a complementary distribution between matrix and embedded clauses: the former can be either verb-initial or verb-second, whereas the latter are always verb-final.

(3) *Verb-initial matrix clause*

Ø-pyry-‘a	saryt-yn	keerep	Gokyp
3-ASS-do	IND.EVID.-NFUT	in.the.old.times	sun

‘The sun was like this in the old days’ (STORTO, 2002, p.155)

(4) *Verb-second matrix clause*

Taso	Ø-na-oky-t	boroja
man	3-DECL-kill-NFUT	snake

‘The man killed the snake’ (STORTO, 2002, p.153)

(5) *Embedded clause*

[Taso	boroja	oky	tykiri]	Ø-naka-hyryp-Ø	õwã
man	snake	kill	PERFVE	3-DECL-cry-NFUT	child

‘When the man killed the snake, the child cried’
(STORTO, 1999, P. 121)

According to Storto, this complementary distribution is derived through a V2-effect in the language: in matrix clauses, the verb moves to C, while it stays *in situ* in

² Most speakers are fluent in both Karitiana and Portuguese.

embedded environments ³. In addition to word order, Storto shows that the occurrence of verb movement is also associated with verb morphology: as shown in examples (3-5), verbs surface with person, mood and tense morphology in matrix clauses; embedded verbs, on the other hand, do not exhibit such morphology.

There is also some evidence of SOV being the default word order. When asked to translate sentences such as “I saw Karin hitting Ivan” into Karitiana, speakers often give us constructions like (6). The OSV equivalent, with the reversed order of NPs, can only mean “I saw Ivan hitting Karin.” for most speakers:

(6) *Embedded clause*

Yn Ø-na-aka-t i-so’oot-Ø [Karin Ivan mĩ]-ty
 1s 3-DECL-COP-NFUT NOM-see-ABS.AGR. [Karin Ivan hit]-OBL
 ‘I saw Karin hitting Ivan’ (VIVANCO, 2014, P.13)

(7) *Embedded clause – reversed word order*

Yn Ø-na-aka-t iso’oot [Ivan Karin mĩ]-ty
 1s 3-DECL-COP-NFUT NOM-see-ABS.AGR. [Ivan Karin hit]-OBL
 ‘I saw Ivan hitting Karin’ (VIVANCO, 2014, P.14)

As can be seen in examples (5-7), embedded clauses in Karitiana also do not show complementizers of any sort.

Structurally, relative clauses are very much alike other embedded clauses⁴. There are no relative pronouns, resumptive pronouns or any other morphology specific

³ This pattern is possibly due to the lack of a CP layer in embedded clauses (see Storto, 1999).

⁴ There is, however, an important difference between complement clauses (including relative clauses) and adjunct clauses: only the latter shows the adverbial marking {-t} (Rocha, 2013). This morpheme is ungrammatical in relative clauses:

(i) *Relative clause grammatical without {-t}*

Yn Ø-na-otet-Ø [pikom ðwã ti-m-pykyna ki]
 1 3-DECL-cozihar-NFUT [monkey child INV-CAUS-run ANTER]
 “I cooked the monkey that didn’t run from the child.” (ROCHA, 2013, p. 21)

(ii) *Relative clause ungrammatical with {-t}*

*Yn Ø-na-otet-Ø [pikom ðwã ti-m-pykyna ki-t]
 1 3-DECL-cook-NFUT [monkey child INV-CAUS-run ANT.-ADVZ] (ROCHA, 2013, p. 21)

to relativization. Nevertheless, object relative clauses usually surface with the inverse voice morpheme {ti-} ⁵ as in (9) (see Storto 1999, 2005). This morpheme does not appear with subject relatives, as shown in (8).

(8) *Subject relative clause*

Yn Ø-na-aka-t i-pyting-Ø [taso him by-hip]-ity
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [man meat CAUS-cook]-<e.v.>OBL
 ‘I want the man that cooked the meat’

(9) *OSV object relative clause*

Yn Ø-na-aka-t i-pyting-Ø [kinda’o sosy ti-‘y]-ty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [fruit armadillo TI-eat]-OBL
 ‘I want the fruits that the armadillo was eating’

There are some arguments pointing to the conclusion that relative clauses in Karitiana are internally-headed (Storto, 1999, 2003; Vivanco, 2014). The first one is the existence of SOV object relative clauses, such as (2) (repeated here as (10)). In this sentence, the head ‘pykyp’ is embedded within the subordinate clause

⁵ The morpheme {ti-} has been given several denominations in the literature. Landin (1984) was the first author to identify it, and named it ‘topicalizer’. Storto (2005), who we will be following here, uses the term ‘inverse voice morpheme.’

This morpheme is not specific to object relatives, as it appears in other constructions involving direct objects, such as WH- object questions and a specific kind of object focus construction (STORTO, 1999):

(iii) *WH- object question*

Mora-mon taso ti-oky-t?
 WH-INT.COP. man TI.NOM-kill-ABS.AGR.
 ‘‘What did the man kill?’’ (STORTO, 1999, p.137)

(iv) *Non-declarative object focus constructions*

‘Ep i-ti-pasagngã-t João.
 tree 3-TI-count-NFUT João
 ‘‘Trees, João is counting.’’ (STORTO, 1999, p.164)

(10) *SOV object relative clause* [= (2)]

Yn Ø-na-aka-t i-pyting-Ø [Luciana **pykyp** ti-pipãram]- aty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [Luciana **clothes** TI-sew]- <e.v.>OBL
 ‘I want the shirt that Luciana sewed’

Externally-headed relative clauses never have their heads so deeply embedded. In fact, the head on the periphery of the clause is a defining property of externally-headed relatives, whereas internally-headed constructions are surrounded by the relative clause itself (for this reason, it is called ‘circumnominal relatives’ by De Vries, 2002).

Another argument pointing to the conclusion that relative clauses in Karitiana are internally-headed is that whenever there are oblique arguments in the embedded clause, they must stay on the periphery of the subordinate clause and before the head itself. Crucially, it is not possible for the head to stay on the periphery of the relative clause, as example (13) shows⁶:

(11) *Subject relative clause*

[‘ep ohynt taso aka] Ø-na-aka-t i-a-mĩ-t a-piri
 tree on.top man COP] 3-DECL-COP-NFUT NOM-PASS-hit-ABS.AGR. 2-by
 ‘The man on top of the tree was hit by you’

Literally: ‘The man that is on top of the tree was hit by you’

(Adapted from Everett, 2006, p. 384)

(12) *Subject relative clause*

Yn Ø-na-aka-t i-so’ oot-Ø [São Paulo-pip õwã aka-ty]
 1s 3-DECL-COP-NFUT NOM-see-ABS.AGR. São Paulo-in child be-OBL
 ‘I saw the child that was in São Paulo’

⁶ Another argument first pointed out by Storto (1999) is case-marking on the head. In these relative clauses, the head surfaces with the case-marking demanded by the embedded verb, not by the matrix verb. Therefore, there is a closer relation between the head and the embedded verb. This pattern also strongly resembles the behavior of internally-headed in some of the world’s languages (see Vivanco, 2014)

(13) *Ungrammatical subject relative clause*

*Yn Ø-na-aka-t i-so' oot-Ø [õwã São Paulo-pip aka-ty].
 1s 3-DECL-COP-NFUT NOM-see-ABS.AGR. child São Paulo-in be-OBL
 Intended: I saw the child that was in São Paulo'

It has been reported that some languages with internally-headed relatives show variation in the position of the head (Basilico, 1996). Consider the following data of Mojave, taken from Munro (1976):

(14) *Relative clause with head in situ*

[Masahay ahvay ʔ-ay-n^Y-č] ʔahot-m [Mojave]
 girl dress 1-give-DEM-SUBJ good-TNS
 "The girl I gave the dress to is nice"
 'The dress I gave to the girl is nice' (Munro, 1976, p. 198)

(15) *Relative clause with fronted head*

[Ahvay masahay ʔ-ay- n^Y-č] ʔahot-m [Mojave]
 dress girl 1-give-DEM-SUBJ good-TNS
 'The dress I gave to the girl is nice' (Munro, 1976, p. 198)

In these examples, one can see that the head 'ahvay' can surface in two different positions, namely [O_{GOAL} O_{THEME} V] and [O_{THEME} O_{GOAL} V]. This variation is similar to what has been observed for Karitiana. As it was discussed at the beginning of this paper, object relative clauses have two possible word orders, OSV and SOV. In the latter, the head is embedded within the relative clause itself, whereas it stays on the periphery of the clause in OSV relatives:

(16) *OSV object relative clause* [= (1)]

Yn Ø-na-aka-t i-pyting-Ø [kinda'o sosy ti-'y]-ty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [fruit armadillo TI-eat]-OBL
 'I want the fruits that the armadillo was eating'

- (17) *SOV object relative clause* [= (2)]
 Yn Ø-na-aka-t i-pyting-Ø [Luciana **pykyp** ti-pipãram]-aty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [Luciana **clothes** TI-sew]-<e.v.>OBL
 ‘I want the piece of clothes that Luciana sewed’

In sum, it was argued in this section that the sentences in (16) and (17) are internally-headed relative clauses and that there is a variation between the OSV and SOV word orders in object relatives. The next step is to analyze whether or not there could be any other difference between them besides word order.

2. Theoretical background

2.1. Autosegmental metrical theory of intonational phonology

The property of sound that is most relevant for intonation is pitch, as intonation is manifested through it (Ladefoged, 2003). Pitch can be defined as follows:

Strictly speaking, pitch is an auditory property – something you hear. It is not an acoustic property – an aspect of the sound wave that you can measure. From a practical point of view when discussing the pitch of the voice, it can usually be said to be the rate at which vocal fold pulses recur, and thus the fundamental frequency of the sound wave. (Ladefoged, 2003, p.75)

Since it is a perceptual property, it is not possible to measure pitch itself. Nevertheless, it is possible to access its acoustic correlate: the fundamental frequency (F0), measured in (Hz). Intonation analyses thus look at this property, graphically represented as a curve by several computer programs.

According to Nespor and Vogel (2007), Intonational Phrases (henceforth IntP) are commonly defined as the relevant prosodic domain for intonational contours, being delimited by pauses and/or lengthening and also by the presence of boundary tones (see

the discussion in Cruttenden (1997) on the definition of Intonational Phrases). Importantly, the borders of an IntP do not necessarily coincide with the syntactic limits of clauses. IntPs can be restructured according to several factors, such as speech rate, formality, etc., generating prosodic constituents non-isomorphic to the ones created by the syntax (Nespor; Vogel, 2007).

Our analysis is built upon the Autosegmental Metrical Theory of Intonational Phonology as proposed by Pierrehumbert's (1980, 2000) and Ladd (2008). One of its basic tenets is to view the intonational contour as a product of underlying target tones. Therefore, it is not exactly the whole form of the tune that matters, but some specific tonal events aligned with particular points of the segmental chain.

According to this theory, this underlying sequence can be described with an inventory of only two target tones, low (L) and high (H). Importantly, these tones are strictly relational: a certain tone is classified as either high or low in relation to its preceding tones, and not because it is produced within a certain range of frequency.

Pierrehumbert (1980) proposes three types of tonal events: **pitch accents**, **phrase accents**, and **boundary tones**. Pitch accents would be the tonal movements occurring on stressed syllables of words within an utterance. In the notation system proposed by her, pitch accents are indicated by a star, such as H* or L*.

Whenever these tonal excursions involve more complex movements, such as a downward movement of F0 followed by a peak, these accents can be described through bitonal pitch accents (e.g., L*+H or L+H*). In this case, the star would indicate the relative alignment of one tone in relation to the stressed syllable (Pierrehumbert, 2000).

There are still two other types of tonal events that are usually restricted to the right boundary of IntPs: phrase accents and boundary tones. Both occur after the last pitch accent of an IntP - also known as the **nuclear pitch accent**. Boundary tones are the tonal events that occur at the end of an Intonational Phrase, and phrase accents control the transition between the nuclear pitch accent and the boundary tone (e.g., specifying whether the transition will have an ascending or a descending pitch) ⁷.

⁷ Additionally, phrase accents can also be used to mark the boundaries of intermediate Intonational Phrases, an intonational domain smaller than the Intonational Phrase described here (PIERREHUMBERT; BECKMAN, 1986). These constituents also have tonal events at their boundaries (as well as pre-boundary lengthening). Since they involve a more subtle perception of intonational

Crucially, there is a one-to-one relationship between boundary tones and IntPs: any IntP must have a boundary tone at its end, and boundary tones signal the end of IntPs.

To transcribe tonal events, we adopt the ToBI conventions (Hirschberg; Beckman, 1994), unless otherwise specified.

2.2. Intonational grammar of Karitiana

Authors such as Storto (1999), Storto and Demolin (2005), and Everett (2006, 2008) described the intonational grammar of Karitiana in more detail. These authors, however, often assumed different premises from the ones assumed here. In this section, we highlight their main findings and discuss how these can be described in our terms.

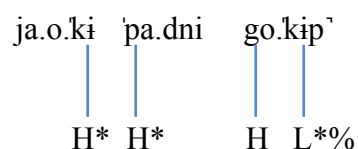
Firstly, these authors assume an isomorphic relationship between sentences and Intonational Phrases, so each sentence will correspond to only one intonational domain. As seen above, we admit the possibility of breaking down a sentence into more than one IntP (*i.e.*, restructuring). Ultimately, this difference means that in our analysis, there are more boundary tonal events than in the previous literature on Karitiana.

Storto (1999) was the first author to describe the interaction between the last pitch accent and the end of a declarative sentence in Karitiana. According to her analysis, its intonational grammar would assign H* tones to all stressed syllables in a given prosodic domain. Since declarative sentences always end in a low pitch (a fact also noticed by Everett, 2008), she proposes an L boundary tone that attaches to the last stressed syllable of the sentence. This would make the H tone previously assigned to float and to attach to the preceding syllable, generating the high-low pattern of the final parts of declarative sentences.

Consider how her system would work for an utterance like ‘Iaoky padni Gokyp’⁸:

contours, we chose not to indicate them at this point. However, future research may show that some of the tonal events described here may actually be a combination of pitch accents and phrase accents (see fn. 9).

⁸ Here, only the treatment of the nuclear pitch accent and of the boundary tones are discussed. Nevertheless, Storto (1999) and Storto and Demolin (2005) propose other rules to account for the contour of ‘Iaokyp’ and ‘padni’ as well.

(18) *First step – assignment of H**(19) *Second step – assignment of L% and dislocation of H*

[based on example 13b of STORTO and DEMOLIN, 2005, p.19]

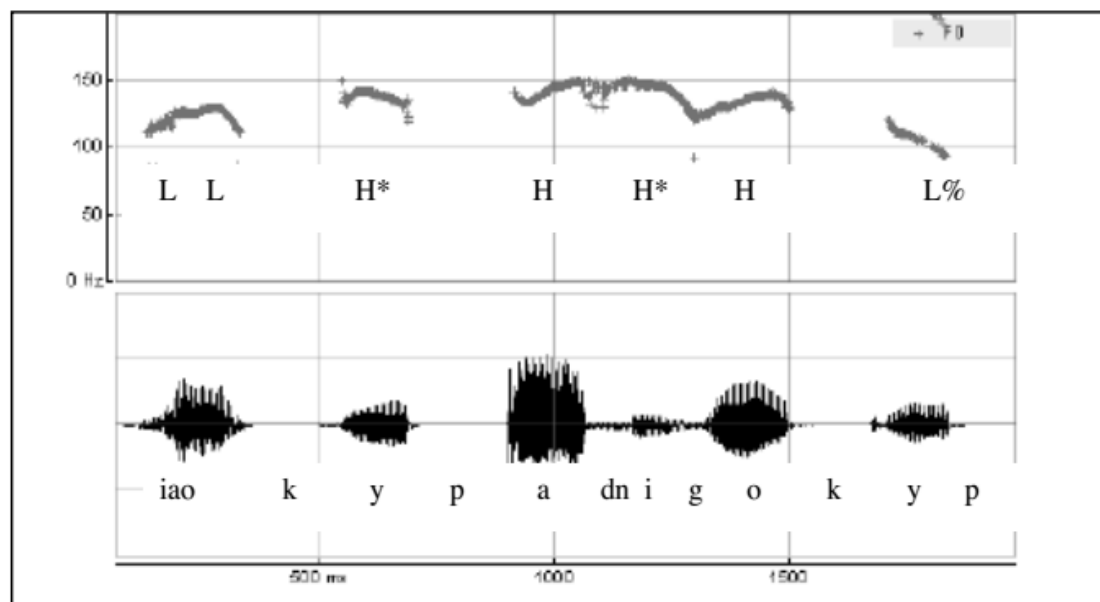


Fig. 1. Tonal analysis of the utterance 'Iaoky padni gokyp' ('Gokyp was not killed') according to Storto and Demolin (2005, p.18)

Storto's system is incompatible with the premises exposed here, as (nuclear) pitch accents and boundary tones are independent of each other in the Autosegmental Metrical Theory. In this paper, we chose to analyze Karitiana according to AM's assumptions, but the issue of how nuclear pitch accents and boundary tones could interact is a topic that deserves future investigation in the Karitiana literature⁹.

⁹ In English, at least, there is evidence that nuclear pitch accents and phrase accents/boundary tones have to be distinct tonal events, as almost all the combinations between them occur.

Storto's observation about the tonal excursions at the end of a declarative sentence can be captured by positing two distinct tonal events: a nuclear pitch accent $H+!H^*$ and a boundary tone $L-L\%$. The $H+!H^*$ would comprise an early aligned H tone that occurs in the pre-stressed syllable(s) and a downstepped $!H$ tone aligned with the stressed syllable. This tonal movement can also be captured by positing an $H+L^*$, even though this pitch accent is not assumed in Hirschberg and Beckman's (1994) ToBI guidelines for English. It is reasonable to propose that the tone target aligned with the stressed syllable is an L^* , as the downward movement often approaches the bottom of the speaker's range.

After this pitch accent, there is a sharp downward movement in the pitch track and the voice frequently becomes creaky. We take this as an indication of an L - phrase accent and $L\%$ boundary tone, as this downward movement is similar to the $L-L\%$ contours identified for English.

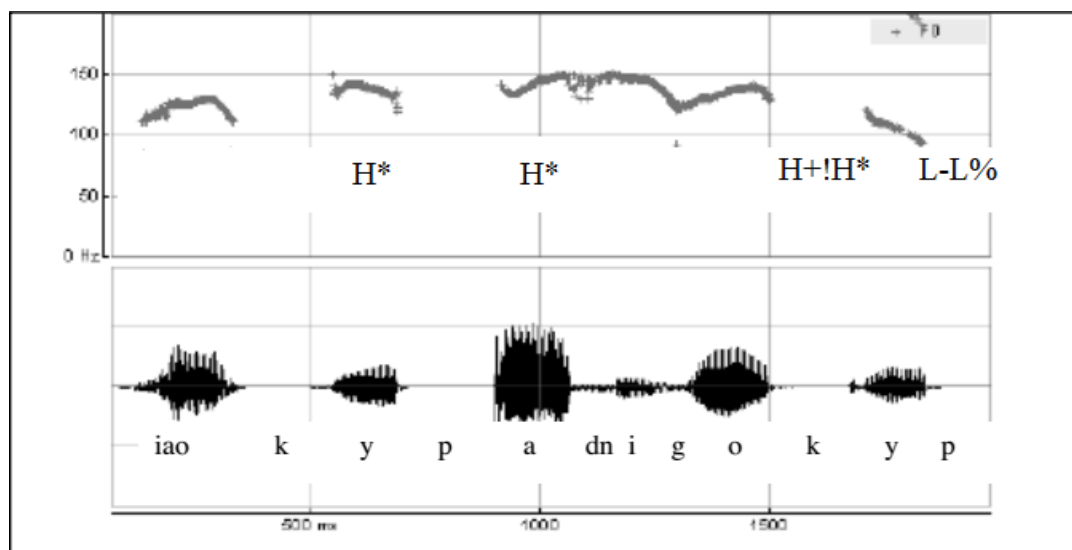


Fig. 2. Our analysis of the utterance 'Iaoky padni gokyp.'

Since the previous literature paired each sentence with only one Intonational Phrase, any tonal excursions before the end of a sentence would be either analyzed as pitch accents (as in Storto, 1999 and Storto; Demolin, 2005) or as nothing at all (as in some of Everett's 2008 examples). In this paper, we recognize that boundary tones can occur before the end of a sentence – in this case, restructuring of the IntP has taken place.

This pattern occurs in several biclausal sentences. These are frequently restructured into two smaller IntP, as can be detected by a pause between them. In this environment, a contour different from the H+!H L-L% arises. This new pattern is illustrated in the example below, where the matrix clause ‘Yn naakat iso’oot...’ (‘I saw’) ends differently from the embedded clause ‘... Maria gok amangaty.’ (‘...Maria planting the manioc.’):

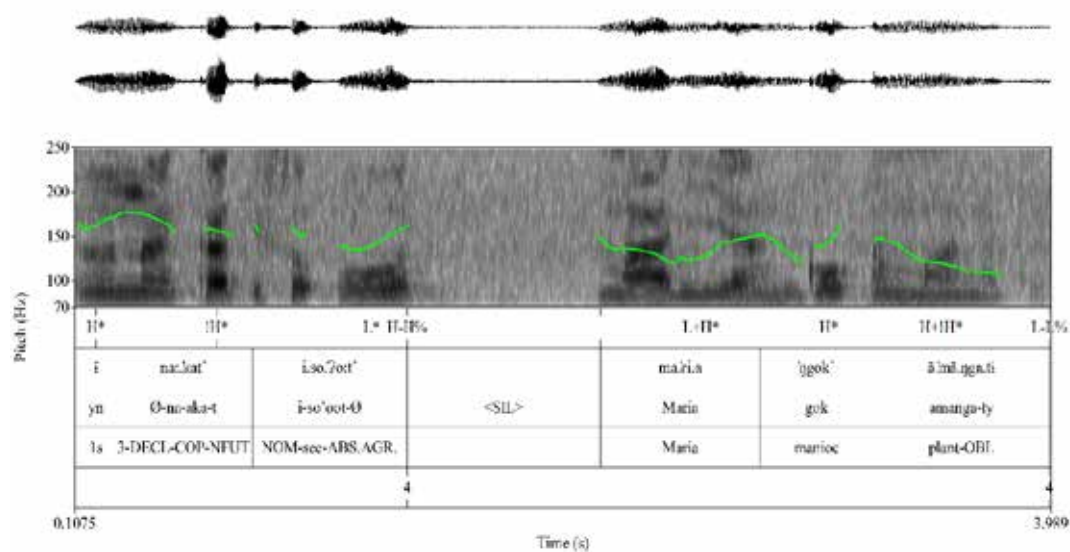


Fig. 3. Waveform and F0 for ‘Yn naakat iso’oot Maria gok amangaty.’ (‘I saw Maria planting the manioc’) – Speaker E

First, the F0 is low on the last stressed syllable, indicating the presence of an L* nuclear pitch accent. Besides, what happens after this low tone is strikingly different from the aforementioned contour: there is a rise right after the L*, indicating the presence of an H- controlling the last portion of the sentence and an H% boundary tone.

The boundary tone itself is a little difficult to see in most cases, but we can consider it an H% because of the sharp rise format. Below there is another example of this contour on the matrix clause ‘Yn naakat ipyting...’¹⁰:

¹⁰ As the F0 drops slightly at the very end of the Intonational Phrase, it is possible to analyze it as an H-L% as well. However, this could also be an effect of a segmental perturbation.

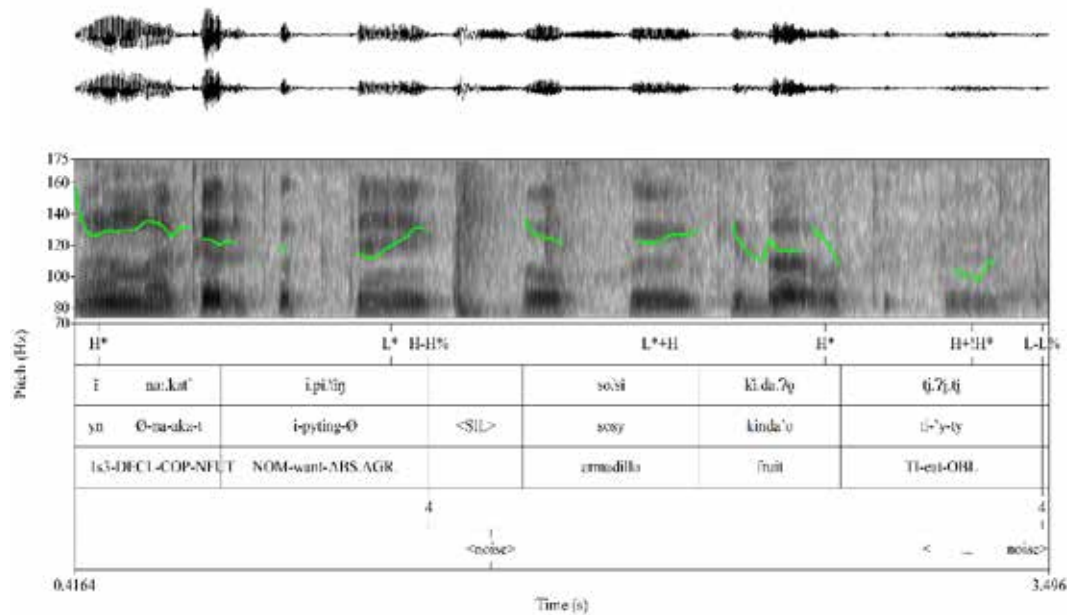


Fig. 4. Waveform and F0 for 'Yn naakat ipyting sosy kinda'o ti'yty.' ('I want the fruits that the armadillo was eating') – Speaker R_OBJ2

Crucially, these examples also illustrate that assuming the theoretical background of the Autosegmental Metrical Theory, the inventory of pitch accents in Karitiana becomes much more diverse than what has been assumed in previous accounts.

2.3. Summary

In this section, we reviewed some of the main aspects of the Autosegmental Metrical Theory of Intonational Phonology and some pitch accents, phrase accents, and boundary tones of Karitiana under this account. So far, the inventory of tonal events would be as follows:

(20) *Pitch accents of Karitiana*

- H*
- L*
- L+H*

- L*+H
- H+!H* (or a H+L*)

(21) *Phrase accents and boundary tones of Karitiana*

- H-H% (for matrix clauses of bi-clausal sentences)
- L-L% (end of declarative sentences)

In the next section, the major intonational differences between OSV and SOV relative clauses will be discussed. As will be seen, we argue that there seems to be a strong relation between one of these word orders (SOV) and the presence of a pitch accent L*+H.

3. Some observations on order variation in object relative clauses

As exposed at the beginning of this paper, our goal is to describe phonological differences between different word orders found in object relative clauses. In this section, one of the major phonological differences between these two types of relative clauses – intonation – will be presented.

All the data analyzed here comes from a production task detailed in Vivanco (2014) and Storto, Vivanco & Rocha (to appear), which was based on a protocol designed by Labelle (1990) to elicit relative clauses. In this experiment, speakers should always choose one of two pictures depicting identical characters or objects that could only be differentiated through the action of another element in the scene. Informants should say to the researcher which picture was chosen:

(22) Real extract taken from Vivanco's (2014) experiment

Researcher: There are two shirts here. This one was sewed by Ana and this other one was sewed by Luciana. You have to choose one of them and tell us which one was chosen.

Speaker: Yn Ø-na-aka-t i-pyting-Ø [Ana pykyp ti-pipāram]-aty
 1s 3-DECL-COP-NFUT NOM-want-ABS.AGR. [Ana clothes TI-sew]-<e.v.>OBL
 ‘I want the shirt that Ana sewed’

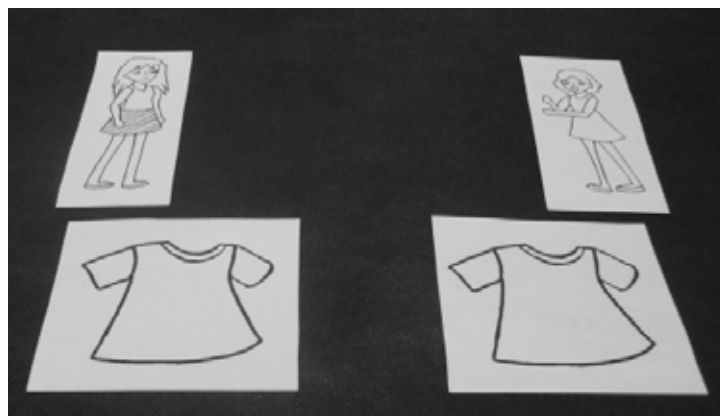


Fig. 5. Pictures used in the experiment

All contexts followed the pattern in (22). The only thing that changed throughout the experiment was the elements involved in the scene (*e.g.*, Luciana, Ana, man, woman, etc.) and the type of action described (sewing, eating, building, etc.).

The number of sentences used for phonetic analysis is 14 OSV relative clauses and 10 SOV relative clauses. These sentences were produced by 4 different speakers (3 males and 1 female) and collected at a sampling rate of 44100Hz. These four speakers produced both SOV and OSV word orders, but we occasionally considered additional data from two other speakers who only produced one of them.

The description of the situation in which SOV and OSV relative clauses were produced lead us to conclude that at least in this case, major contextual modifications do not seem to induce word order variation. Hence, this makes us wonder what the differences between these word orders could be.

Our working hypothesis is that there are phonological differences between these word orders, especially because prosody has been described to play a role in word order variation in many languages (see Antonyuk-Yudina; Mykhaylyk, 2013 on scrambling in Ukrainian, for example). The prosodic property investigated is pitch modulations on

stressed vowels and the relevant comparison here is between NPs occupying the first position of the relative clause (*i.e.*, objects of OSVs and subjects of SOVs):

(23) Comparison made in the phonetic analysis

OSV: REL[**Object** Subject Verb]

SOV: REL[**Subject** Object Verb]

In order to detect possible pitch variations, we measured the fundamental frequency (F0) of the relevant segments using the free software Praat (Boersma; Weenink, 1992-2017). Only vowels were measured and these were always stressed and short, as Karitiana has a phonemic distinction between short and long vowels (see Storto, 1999).

Given that IntPs are the domain of intonation, they will be the prosodic constituent relevant for our analysis of pitch. Just like other languages, the crucial properties to identify and delimit an intonational phrase in Karitiana are the presence of (1) pauses, (2) lengthening and (3) boundary tones.

The object relative clauses considered here usually formed their own intonational phrase, since a pause is almost always introduced between the matrix clause ‘Yn naakat ipyting’ (‘I want...’) and the relative clause itself. Besides, these relatives were always marked by an H+!H* nuclear pitch accent and a L-L% phrase accent and boundary tone. As seen above, this is the characteristic pattern of declarative sentences. In Figure 6, one can see the pause breaking up two intonational phrases in sentence (2). In the IntP corresponding to the matrix clause, the nuclear pitch accent on the syllable [tĩŋ] is an L*, and the end of this prosodic domain has an H-H% tune. The embedded clause forms its own IntP with its own contour: a H+!H* on [pã] and a L-L% at the end ¹¹:

¹¹ As the reader will notice in Figures 6-14, some F0 tracks display large and sudden jumps. These are in fact abrupt or irregular changes in frequency which the computer software tries to recognize. They usually occur at the end of an intonational phrase with an L-L% tone, as the speakers’ voice gradually becomes creaky.

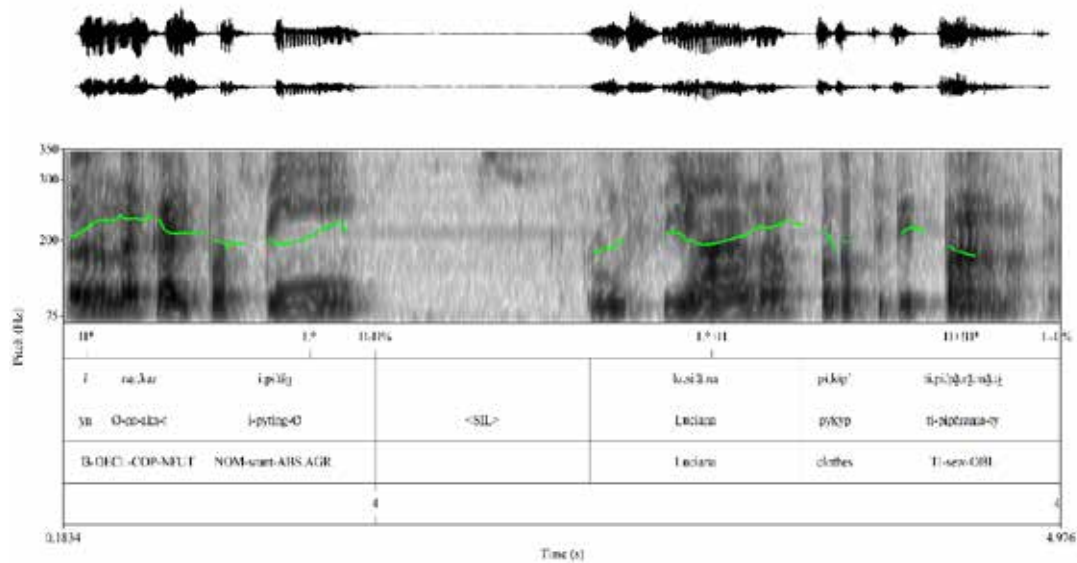


Fig. 6. Waveform and F0 for ‘Yn naakat ipyting Luciana pykyp tipipãramaty.’ (‘I want the clothes that Luciana sewed’) – Speaker S_OBJ7

Returning now to the variation under discussion, there seems to be a phonological difference between relative clauses with OSV and SOV word order. Intonation-wise, OSV and SOV differ in the sense that only the latter has a **marked and fixed pitch pattern**. Specifically, SOV relatives obligatorily show an L*+H accent on the stressed vowel of subjects, which can be identified in the F0 track as a valley or plateau (the L tone) followed by an ascending line (the H tone)¹².

We provide below four examples to demonstrate this pattern. It is necessary to remember that assuming the tenets of Autosegmental Metrical Theory, the most important thing here is not the absolute values of frequency reached during the production of the stressed vowel. Therefore, it does not matter whether the intonational contour is a smooth line or an abrupt valley-rise. What matters here is that the underlying pattern L*+H is recurrent in all of these examples¹³.

¹² It is also possible to break up this pitch accent into a combination of a pitch accent and a phrase accent. Most cases of SOV object relative clauses seem to include lengthened syllables, which could indicate the presence of an intonational boundary. In this case, this tonal movement could be also analyzed as an L* H- pattern (or perhaps even an L* H-H% or an L* H-L%).

¹³ Following the ToBI conventions, the location of pitch accents (including bitonals) is placed in the middle of the stressed vowel. In some cases, this does not correspond exactly to the place with the lowest or the highest F0 in the pitch track.

Starting with Figure 7, this pattern can be observed on the stressed vowel [ã] of ‘Luciana’, the subject of the relative clause: the F0 track first falls (the tone L*) and then starts to rise on the next syllable (the late-aligned tone H):

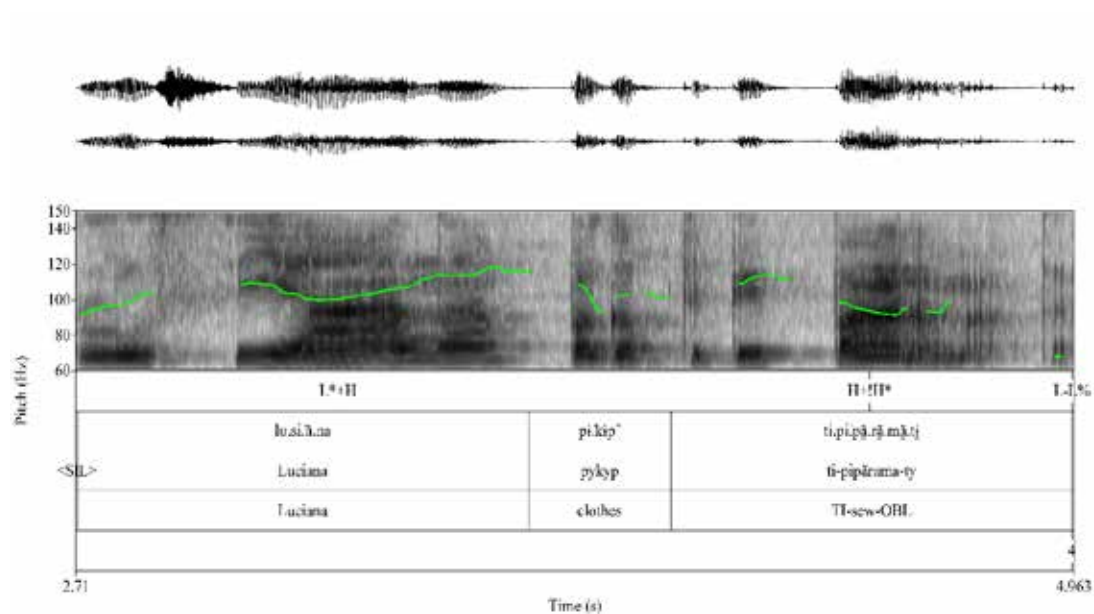


Fig. 7. Waveform and F0 for ‘... Luciana pykyp tipipãramaty.’ (‘... clothes that Luciana sewed’) – Speaker S_OBJ7

This example is also illustrative because the stressed syllable is the penultimate. Most Karitiana nouns have stress on the last syllable (Storto, 1999). Therefore, in most examples the relative alignment of tones in some bitonal pitch accents can be blurred. For this reason, cases like Figure 7, in which the subject has a different stress placement, show the alignment patterns more clearly¹⁴.

Figure 8 also shows another word with the penultimate stress as the subject, ‘Ana’. One can see that the low part of the tone (the L*) is aligned with the first stressed syllable [ã], whereas the late-aligned H extends onto the post-stressed syllable [nã].

¹⁴ ‘Luciana’ possibly has a different pattern because it is a loanword from Portuguese. The name ‘Ana’ from Figure 8 is also a loanword.

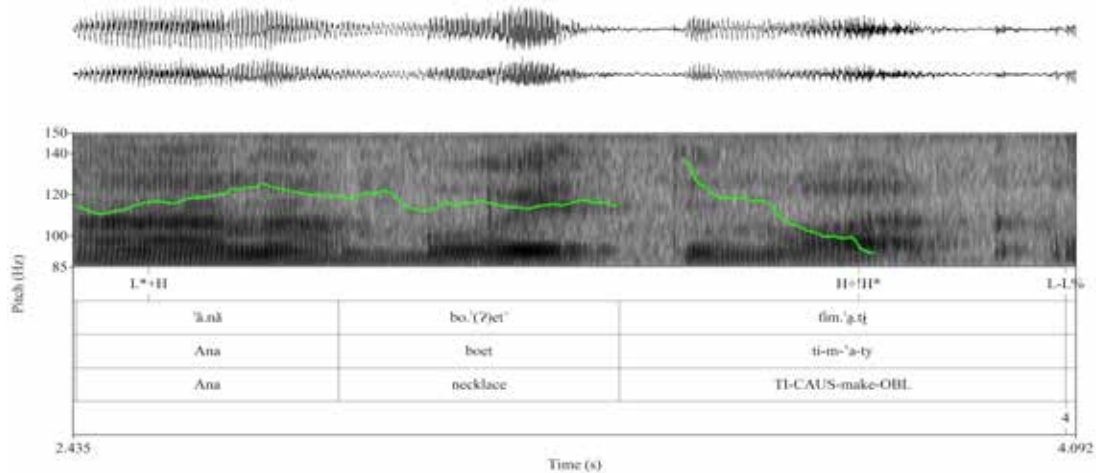


Fig. 8. Waveform and F0 for ‘... Ana boet tim’aty.’ (‘... the necklace that Ana made’) – Speaker R_OBJ9

In Figure 9, the subject of this object relative clause is ‘soty’ ([so.ʔi]). One can see a brief valley followed by an ascending line on the stressed syllable [ʔi]. The fact that there is a small peak when the F0 starts to rise is unimportant, because what truly matters here is the upward movement following the L tone, indicating the presence of an underlying H. Even though both target tones seem to occur on the same vowel (as [so.ʔi] has its stress on the last syllable), the L* is perceptually more prominent.

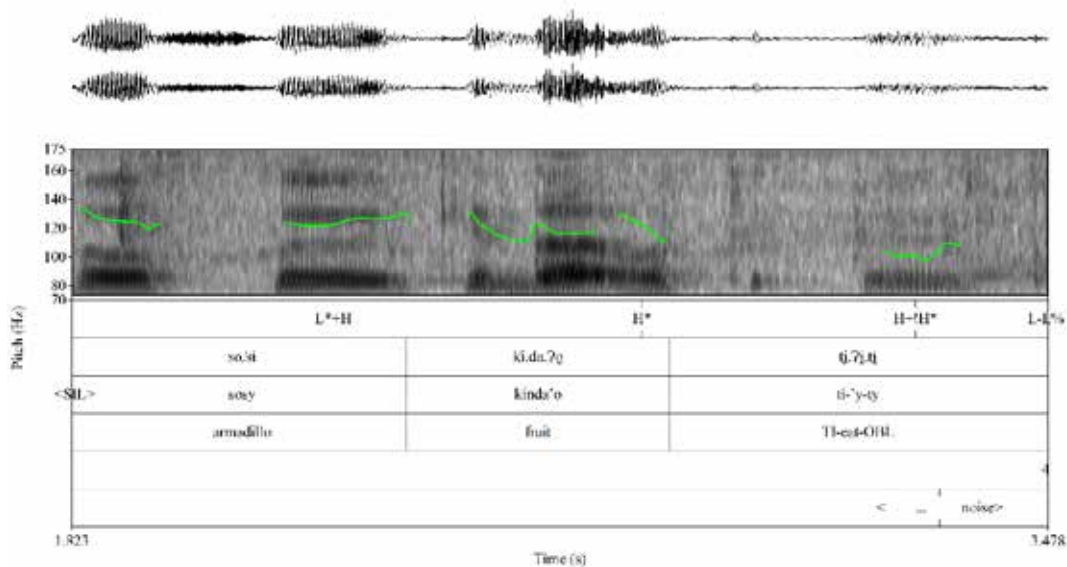


Fig. 9. Waveform and F0 for ‘... soty kinda’o ti’yty’ (‘... the fruits that the armadillo was eating’) – Speaker R_OBJ2

Finally, one can see in Figure 10 the L* more clearly, as it forms a deep valley in the F0 track aligned with the stressed syllable [so] of the subject ‘jonsõ’. The ascending line is somewhat irregular, but as in the example above, the general upward movement is what counts as an H tone:

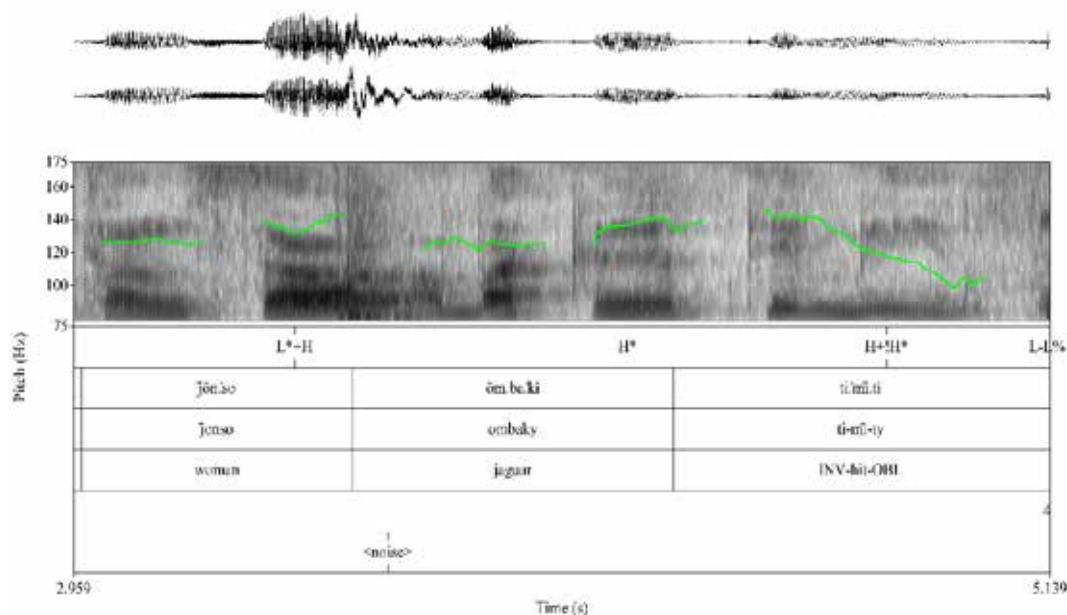


Fig. 10. Waveform and F0 for ‘... jonso ombaky timĩty.’ (‘... the jaguar that the woman hit’) – Speaker F_OBJ8

All these examples show that SOV object relatives have a fixed intonation, since all F0 tracks display an obligatory L*+H on the stressed vowel of subjects. On the other hand, the same pitch pattern is not obligatory in OSV object relative clauses. In this word order, the form of the contour on stressed vowels of objects is much freer than in SOVs. In Figures 11 and 12, for example, there is a clear rise in the F0 track, creating a clear peak different from the valley-rise pattern observed in SOVs.

For instance, Figure 11 shows an OSV object relative. In the first element of this clause – the object ‘kinda’o’ –, one can see a clear peak aligned with the stressed syllable [ʔo]. This pattern indicates the presence of an H*, and it generates a different tune from the aforementioned L*+H.

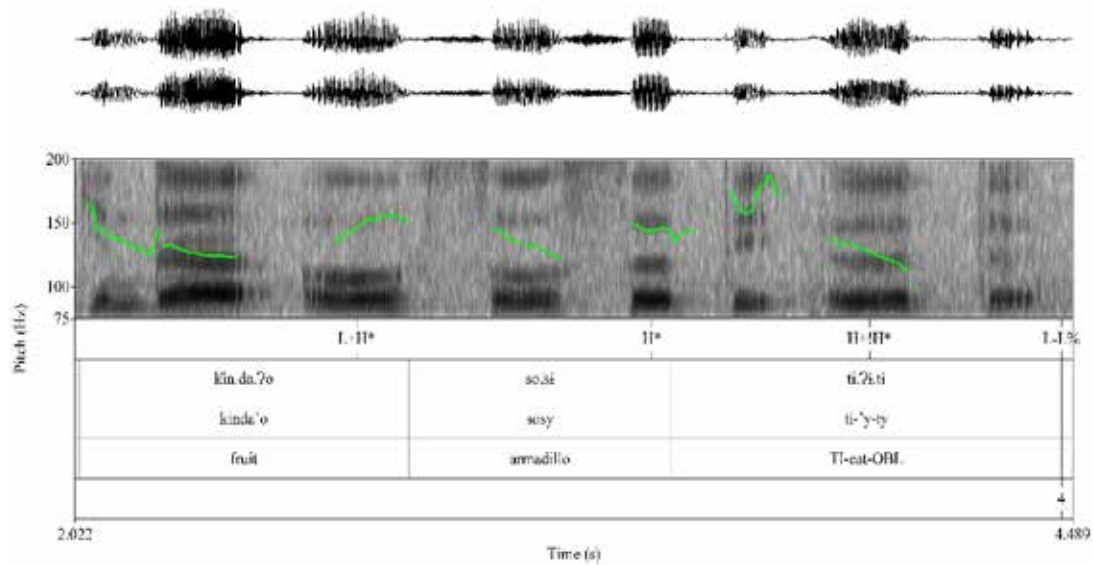


Fig. 11. Waveform and F0 for ‘... kinda'o sosy ti'yty’ (‘...the fruits that the armadillo was eating.’) – Speaker I_OBJ2

In the Figure 12, there is another example of an H* on the object of this relative clause. In this case, one can notice a peak on stressed syllable [bi] of ‘ambi’, indicating the presence of a target H*.

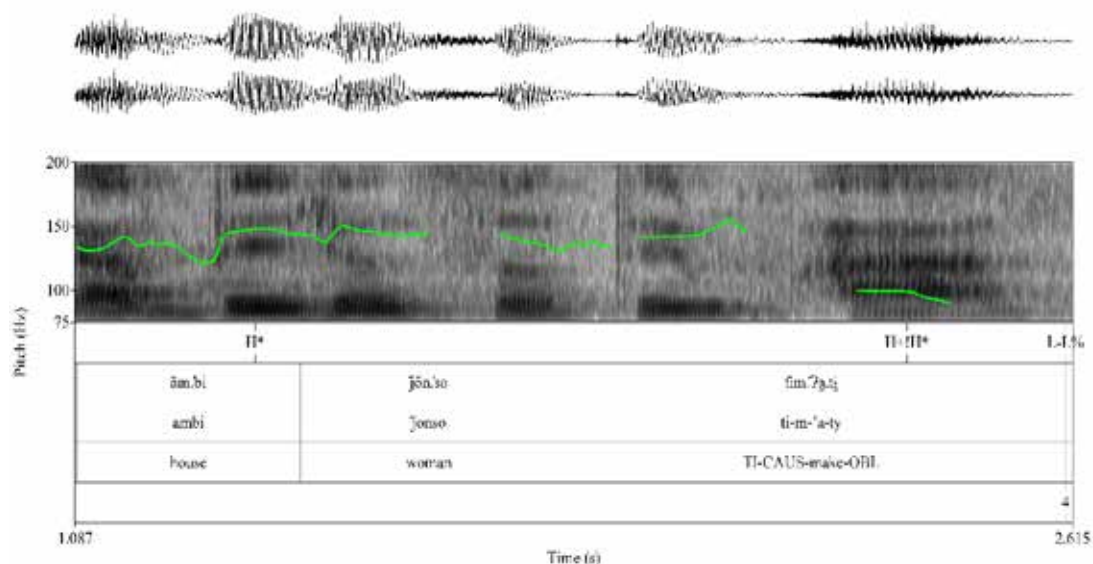


Fig. 12. Waveform and F0 for ‘... ambi jonso tim'aty’ (‘...the house that the woman made.’) – Speaker F_OBJ6

In another example, one can see a rising F0 beginning on the stressed syllable [i] of ‘irip’, indicating the presence of an H*.

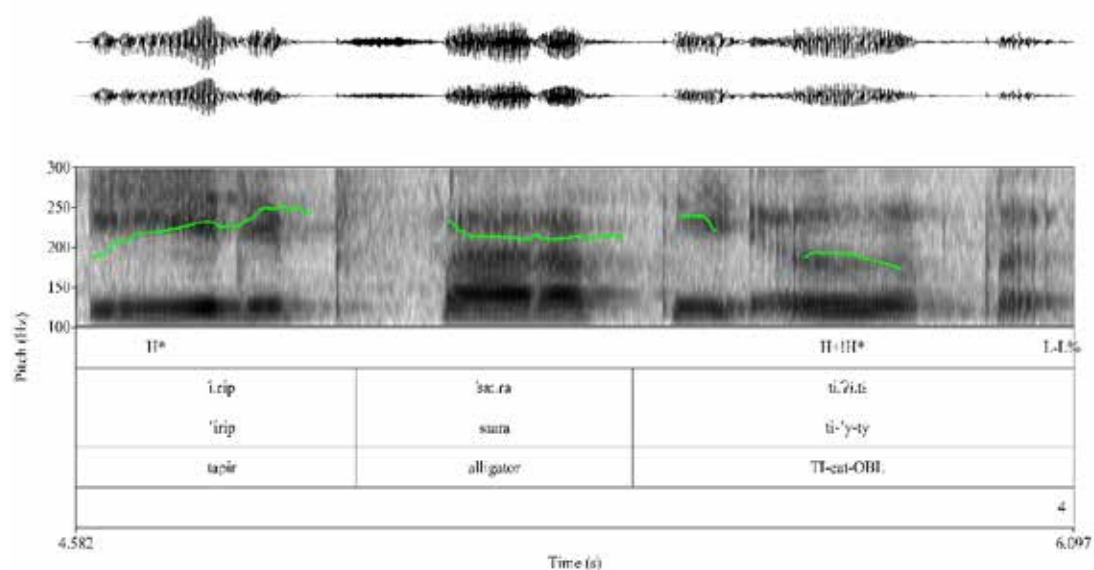


Fig. 13. Waveform and F0 for ‘... irip saara ti’yty’ (‘... the tapir that the alligator ate.’)
– Speaker S_OBJ4

Finally, it is worth mentioning that some examples do seem to display some kind of L*+H pitch accent on objects of OSV relative clauses. Figure 14 shows one of these: the object ‘irip’ has a downward movement of F0 followed by a rise, and the L tone seems to be more prominent in this case. However, one can notice a pause between the object ‘irip’ and the subject ‘asori’, so the rise in this case would be probably due to an IntP boundary marked with H-H%¹⁵:

¹⁵There are other similar cases which do not seem to have an audible pause. Nevertheless, the stressed syllable is long, and this lengthening could indicate the presence of a boundary.

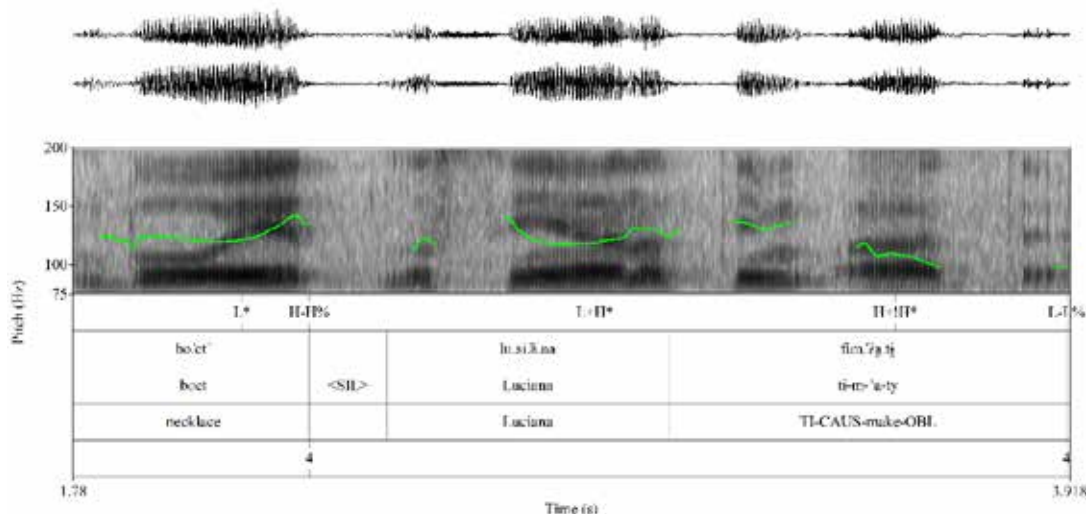


Fig. 14. Waveform and F0 for ‘... boet Luciana tim’aty’ (‘...the necklace that Luciana made.’) – Speaker I_OBJ9

Summing up, there is a tonal event that seems to distinguish OSV and SOV relative clauses. Therefore, we are now able to answer (at least partially) the question introduced at the beginning of this paper: given the variation in word order depicted in (1-2), what are the factors involved in it? So far, we are able to say that one of them is prosody, which differentiates these constructions by means of an obligatory L*+H tune on the stressed syllable of subjects in SOV relative clauses.

4. Final remarks

In this paper, we showed that object relative clauses with OSV and SOV word orders differ intonation-wise, in the sense that only the latter has a marked contour (namely, an L*+H pitch accent) on the stressed syllable of subjects. However, there are still some considerations that need to be made.

First of all, the observations made here need to be tested in future research. Given that there are only ten recorded examples of SOV object relatives, it could be the case that the specific tune in these constructions is an artifact of the low number of available data.

Besides, even though there seems to be a correlation between word order variation and a fixed tune, the exact nature of it remains somewhat unclear. If our conclusion is correct, then one of the word orders permitted in object relative clauses has a special prosody. However, it remains to be clarified whether it is the word order that is triggering a special contour (and if so, how exactly it works).

Another point that still needs attention is the (possible) relationship between the L*+H contour and contrastive focus. As seen in section 4, subjects of the object relative clauses were being contrasted in the experiment; thus, all sentences produced by our speakers can be roughly translated as “I want the clothes that Luciana (and not Ana) sewed”. Therefore, it could be the case that L*+H is the tune for contrastive focus in Karitiana, and that this pitch accent is merely being extended to relative clauses. However, it would still be unclear why this tune does not obligatorily arise on subjects of OSV object relatives, as they were equally contrasted in the experiment. Additionally, such a line of investigation needs to be pursued along with an in-depth discussion of how intonation of contrastive focus works in Karitiana, a topic still under-investigated at this point.

Finally, even though this is a pilot study on intonation and word order variation in Karitiana, we think that the major findings of this paper shed some light onto this topic. Furthermore, it also helps us to better understand the problem of word order variation by investigating how intonation might play a major role in languages with this phenomenon.

Abbreviations

<e.v.>	epenthetic vowel
1	1 st person agreement
1s	1 st person singular pronoun
2	2 nd person agreement
2p	2 nd person plural pronoun
2s	2 nd person singular pronoun

3	3 st person agreement
3s	3 rd person singular pronoun
ABS.AGR.	absolute agreement
ADVZ	adverbializer
ANT	anteriority marking
ASS	assertive mood
CAUS	causativizer
COP	copula
DECL	declarative mood
FUT	future
INT.COP.	interrogative copula
NFUT	non-future
NOM	nominalizer
OBL	oblique
OSV	object-subject-verb word order
PERFVE	perfectivity marking
REL	relative clause
SOV	subject-object-verb word order
TI	{ti-} - inverse voice morpheme
WH-	wh- element

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