

Paraguayan Guarani: Tritonal pitch accent and Accentual Phrase

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Abstract

This paper investigates the intonation system of Paraguayan Guarani in the Autosegmental-metrical (AM) framework of intonational phonology. Previous work on Guarani intonation stated that Guarani has two types of pitch accent, rising (L*+H or LH) and falling (H+L* or HL), and there is no prosodic unit between a word and an Intonational Phrase. But these findings seem to have resulted from the limitation of the data examined. When longer words/sentences and various syntactic structures are examined, it was found that Guarani has one type of pitch accent, a tri-tonal HLH*, and has an Accentual Phrase (AP). The tonal pattern of AP is /H HLH* Ha/, i.e., it has one pitch accent and its edges are marked by a H tone. However, because the pitch accent is tri-tonal, AP edge tones are realized only when an AP is longer than four syllables and stress is not final, suggesting that the function of AP boundary tone is not marking word prominence as in other AP languages. Instead, an important function of Guarani AP seems to mark specific syntactic categories and groupings. These findings are compared with other AP languages and discussed in terms of the typology of word-prominence type.

Index Terms: intonation, Paraguayan Guarani, tri-tonal pitch accent, Accentual Phrase, prosodic typology

1. Introduction

This paper investigates the intonation system of Paraguayan Guarani in the Autosegmental-metrical (AM) framework of intonational phonology [1, 2, 3]. Paraguayan Guarani (henceforth Guarani) is a Tupi-Guarani language, and together with Spanish, is an official language of Paraguay. Guarani is a highly agglutinative language, and the default word order is Subject-Verb-Object (SVO), though the location of arguments can vary depending on informational properties. [4, 5, 6,].

For word prosody, Guarani has lexical stress, typically located at the end of a lexical item. But the location of stress in a word can change depending on the type of suffix ([4, 7, 8]). Some suffixes are stressed (e.g., desiderative modal *-sé*) and others are not (e.g., prospective aspect/modal *-ta*, locative *-pe*). When a stressed suffix is added to the root/stem, word stress shifts to the stressed suffix. For example, stress on the verb */hó/* remains the same when an unstressed */-ta/* is added as in *[o-hó-ta]*, (3p-go-Prosp) ‘(S)he is going to go’. On the other hand, the stress shifts to the following suffix when a stressed suffix */-sé/* is added as in *[o-ho-sé]* (3-go-desiderative) ‘(S)he wants to go’. When a word has more than one stressed morpheme, the last stress is realized. Stress is not marked orthographically when stress is on the word-final vowel or a nasalized vowel, which is marked by a tilde. Otherwise, stress is orthographically marked by an acute accent on the stressed vowel (e.g., *ñandu* ‘ostrich’ vs. *ñandúre* ‘ostrich-at’; *porã* ‘well’ vs. *porãta* ‘well-future’;

mercádo ‘market’ vs. *mercádope* ‘market-Locative’). Acoustically, stressed syllables are longer and stronger in intensity than unstressed syllables.

1.1. Previous studies on Guarani Intonation

Intonation of Guarani has been understudied. To date, descriptions of Guarani intonation are found in only a few studies. [4] describes pitch shape on a stressed syllable in short declarative sentences: a rising pitch movements on non-final stressed syllables and either rising or falling pitch movements on the right-most stressed syllable in a phrase (from [7], p.231). More recently, [7, 8, 9] examined Guarani intonation, related to the prosody of focus within the AM framework of intonational phonology [1, 2, 3]. [7, 9] examined intonation patterns of two-word utterances composed of a proper name subject and a verb, produced in three focus conditions (verb new focus, verb contrastive focus, subject contrastive focus). They varied the length of the verb root from one to three syllables and varied the location of stress in the verb by adding a different number of unstressed suffixes, creating verb-final stress when no suffix is added, penultimate stress when the perfect aspect suffix *-ma* is added, and antepenultimate stress when two suffixes are added (i.e., *-ta* and *-ma*).

They found two most common contours: one is a sequence of a rising pitch accent (L*+H) on the subject and a falling pitch accent (H+L*) on the verb, which they called a hat contour, and the other is a sequence of two rising pitch accent on each word (L*+H L*+H), called two peak contour. The hat contour was found more often for the contrastive focus on the subject condition than the contrastive focus on the verb condition. The two tonal contours were equally common in the verb new focus and contrastive focus conditions. They also found that the two contours had a high plateau between the two pitch accents. The high plateau in the hat contour could be explained by interpolation between the H target of L*+H and the H target of the following H+L* pitch accent, but it couldn’t be explained in the two peak contour where the second pitch accent starts with a L target (L*+H). So, the authors stated in [9] that “further exploration of the pitch accent categories of Guarani is needed to determine the full inventory of pitch accents and how phonetic interpolation between pitch accents is realized” ([9], p. 256). [7] provides that the Low target of L*+H was consistently aligned with the stressed syllable and the High target occurred on the following syllable for the subjects and verbs except when the verb had stress on the final syllable, in which case the High target occurred late in the syllable (footnote 8). For prosodic units larger than a word, [7, 9] found a big prosodic break, called an Intonational Phrase (IP), which is characterized by pauses and final lengthening, between the subject and the verb.

Burdin and colleagues [8] further examined prosodic realizations of focus in Guarani (as one of the four languages they examined), based on focus marking within a noun phrase,

Noun + Adjective (e.g., *yellow dog*), produced in a sentence (e.g., *Put the yellow dog in box one*). They confirmed the findings of [7, 9] with some revision in the tonal label. That is, they found two types of contours (a hat contour and two peak contours) and two pitch accents, LH and HL (i.e., without a star (*) or ‘+’), by pointing out that the tone-syllable alignment does not seem to be contrastive. They also found that nouns were sometimes deaccented but more likely so when the following adjective is focused, and that there was no intermediate phrase between a word and an Intonational Phrase (IP).

The organization of the paper is as follows. Section 2 describes the data and methods of analyzing intonation in the present study. Section 3 provides a new model of Guarani intonational phonology, focusing on the pitch accent and a prosodic unit slightly larger than a word, called an Accentual Phrase. Finally, Section 4 discusses the intonation model of Guarani from the view of prosodic typology, especially the typology of word prominence marking [10], and concludes.

2. Present Study

2.1. Methods and Procedures

The present study is part of our on-going research on syntax-prosody interface in Paraguayan Guarani [11, 12]. Therefore, intonation contours of sentences were examined by varying sentence types, morpho-syntactic structures, and word orders (e.g., declaratives and interrogatives, SV, SVO, SOV, SV-LowAdverb, complex predicates, conjunction, subordinate structure), information structure (new, focused) as well as the length of a word and the location of stress. Sentences of target structures were embedded in a dialogues to improve natural conversational speech production, and each dialogue was produced two times. We also used randomized list of sentences to complement the dialogues. To investigate whether a tonal target is marking prominence, i.e., pitch accent, or a word boundary, the inter-stress interval was increased across a word boundary, as suggested in [13].

Data was collected from three speakers of Paraguayan Guarani. The bulk of our data comes from two speakers, a female in her 50s (our primary participant) and a male in his 20s (our secondary participant), and occasional recordings from a third speaker (a female in her 40s). The three participants are bilingual Spanish/Guarani speakers who acquired Guarani in early childhood and continue to use it actively in their daily lives. The recordings were made with *Audacity* via *Skype* (due to the pandemic) and segmented with *Praat*. Each utterance was labeled on five tiers: tones, words, English gloss, the meaning of the sentence, and a miscellaneous tier. F0 contours were analyzed as a sequence of tonal targets by referring to the location of stress and syllable/word boundaries as well as spectrogram/waveform. Surface tonal targets were labeled following the conventions proposed in [13].

3. Results

We found that Guarani has only one type of pitch accent and its tonal pattern is HLH*, a tri-tonal pitch accent, instead of two bitonal pitch accents as proposed in [7, 8, 9]. We also found that Guarani has an Accentual Phrase (AP). (Our data also suggest that Guarani has an Intermediate Phrase, which is between an AP and an IP, but this paper will focus on an AP only). Section 3.1 provides evidence of a tritonal pitch accent and Section 3.2 provides evidence of an AP.

3.1. Pitch Accent

Most words in Guarani are typically realized with a pitch accent, but the surface tonal shape of a pitch accent varies depending on a few factors, especially the number of syllables before and after the stressed syllable, the location of the word in a phrase, and a tonal context.

When stress is word-initial, the most common tonal shape of a pitch accent is a rising tone, LH*, though the L tone is often not fully realized unless the syllable is lengthened or begins with a sonorant onset. When there is one syllable before stress, the pre-tonic syllable shows a falling f0, which can be ambiguous between L (of LH*) or HL (of HLH*), because it is immediately preceded by a H tone of the preceding word, as can be seen in Figure 1. When there are two or more syllables before stress, the pitch accent clearly shows three tonal targets, HLH*, forming a falling-rising tone. See Figures 2 and 3. That is, when there are enough number of tone-bearing-units (TBU) before the stressed syllable, the High target of a falling tone is clearly realized before a rising tone, suggesting that the underlying tonal category of Guarani pitch accent is tri-tonal, /HLH*/.

As for the syllable-tone alignment of the tri-tonal targets, no consistent pattern seems to exist except for the final H*. The H and L tonal targets of the HL falling tone can each be aligned with each of the two pre-tonic syllables (i.e., H.L.H*; a period refers to a syllable boundary), or realized together on the syllable immediately before the stressed syllable (i.e., HL.H*). Further, the L tone can sometimes be realized at the beginning of the stressed syllable, creating a late rising tone on the stressed syllable (i.e., H.LH*). This suggests that the tone-syllable alignment of the two tonal targets before H* is not distinctive, as hinted at [8]. Therefore, at the moment, we do not add any ‘+’ symbol within this tri-tonal pitch accent (e.g., HL+H*). However, in labeling the f0 contour on the tones tier, we label HL and H* separately (i.e., HL at the f0 minimum before the stressed syllable and H* at the f0 peak during the stressed syllable) because the middle L occurred more often with the preceding H (HL) than the following H (LH*).

As mentioned earlier, previous studies [7, 8, 9] might have not noticed that a pitch has three tonal targets probably because the target roots in their dataset had only one or two syllables before stress. When they saw a high plateau between two pitch accents (a high plateau is more visible when the first pitch accented syllable is followed by multiple unstressed suffixes and the second pitch accented syllable is preceded by multiple unstressed syllables. This will be shown in Section 3.2), they did not incorporate the end of a high plateau as a part of the pitch accent. [9] seems to consider the high plateau as a result of a different pitch accent type or an interpolation output. This may also reflect the fact that a tri-tonal pitch accent is rare cross-linguistically. Figures 1, 2, 3 illustrate pitch tracks of a sentence fragment, *He saw one ostrich/fox/cat* (this phrase is followed by *under the tree*, with a big break in between, which is not shown here), where stress in the last word (marked in red box) is preceded by one, two, and three syllables, respectively.

Finally, the realization of H* in the tri-tonal pitch accent also varies depending on the location of the word in a phrase or whether the word is focused. When a word is phrase-initial where pitch range is largest in a phrase or focused where pitch range is expanded, the H* is fully realized, but when a word is phrase-medial, H* is typically realized as a downstepped H* (!H*), i.e., f0 is lower than that of the preceding H of HL. When a word is phrase-final, ending with a Low boundary tone (L%), H* is realized as either !H* or a low tone (L*), which may be

still slightly higher than the following L%. Finally, H* can be substantially undershot (and can be categorized as L*) in the context of tonal crowding, i.e., when an accented syllable is short and AP-final, or when an accented syllable is right before another accented syllable (like stress clash). Undershoot is more common when produced at fast speech rate or in casual speech style.

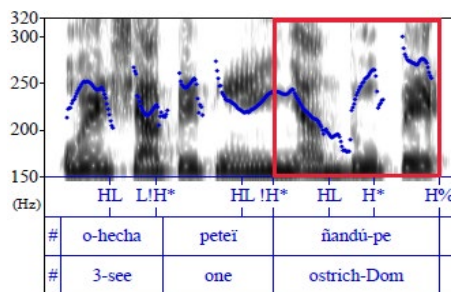


Figure 1: The last word has one syllable before stress: the 1st syllable of [ñandü] ‘ostrich’ shows a falling tone (HL), just before H* on the stressed syllable [dü].

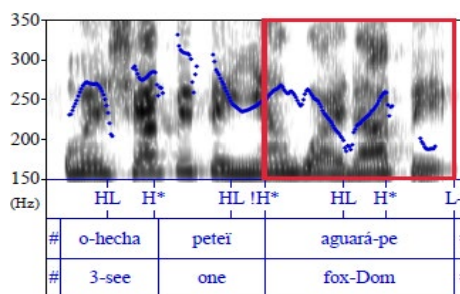


Figure 2: Two syllables before stress: the 1st syllable of [aguará] ‘fox’ shows a high tone, the 2nd syllable shows a falling tone, and the stressed syllable [rá] shows a H tone (H*).

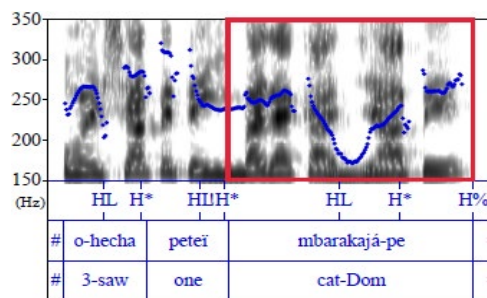


Figure 3: Three syllables before stress: the first two syllables of [mbarakajá] ‘cat’ show a high tone and the 3rd syllable shows a falling tone (HL), just before H* on the stressed syllable [já].

3.2. Accentual Phrase

An Accentual Phrase (AP) is a prosodic unit slightly larger than a word and smaller than an Intermediate Phrase (ip). It is tonally defined and can include at most one pitch accent, if the language has a pitch accent [2, 13, 14]. An AP can have a pitch accent AP-initially and a boundary tone AP-finally as in Bengali or Georgian [L* Ha] (Ha is a H tone marking the end of an AP; ‘a’ is a diacritic denoting an Accentual Phrase) [15, 16], or have an initial boundary tone and a final pitch accent as in French [L H*] [18, 19], or both initial and final boundary tones as in Japanese [H- (H*+L) L%] [17] and Korean [L Ha] [20, 21].

We found that, like other AP languages, an AP in Guarani includes one word most of the time, but can include more than one word when the words are closely related syntactically or semantically. When an AP includes more than one word, only the last stressed syllable of the AP-final word carries a pitch accent. That is, an AP is the domain of a pitch accent. An AP also has an initial boundary tone (H) and a final boundary tone (Ha). Thus, an underlying tonal pattern of Guarani AP is /H HLH* Ha/. However, the surface realization of AP tones differs depending on the length of the AP and the location of the pitch accented syllable and the tonal pattern of adjacent syllables.

Every AP in Guarani has a pitch accent, so the number of pitch accents in a phrase is equal to the number of APs in a phrase. However, the edge tones of AP are optionally realized. Since the pitch accent is tri-tonal, realized over up to three syllables, the edge tones are not visible if an AP has fewer than four syllables and accent is AP-final. The AP-final boundary tone (Ha) is visible only when there is at least one unstressed syllable after the accented syllable, and the AP-initial boundary tone (H) is visible only when there are three or more syllables before the accented syllable. Phonetically, the Ha tone is typically higher than H* (see Figure 4), but the AP-initial H is about the same f0 level as the first H of the pitch accent HLH* (see Figures 5-8). One might think that Ha being higher than the preceding H* might be due to a delayed peak of H* (or the H is realized on the post-tonic syllable as in [7, 9]). However, a higher f0 after H* stays high until the end of the word/AP over multiple syllables, if available, suggesting that there is a H tone target at the end of an AP. See Figure 5. Here, a red box includes an accented syllable and three unstressed post-accentual syllables in the first word/AP. It shows that f0 is higher after the accented syllable [chá] and stays high till the end of the word/AP. In this figure, the boundary between APs does not seem to be clearly marked, though the second AP’s initial H looks slightly lower than the first AP’s final H (AP-initial H is not labeled when it’s right after Ha). So, one may think we may only need one H tone, not both AP-final and AP-initial H boundary tones. But an AP-initial pitch rest is more visible when an AP is focused because a focused AP’s initial H tone is slightly higher than the preceding AP’s final H, suggesting the presence of two separate H tones at AP edges. An AP-initial H tone is further shown when an AP begins a higher phrase. See Figure 6. Here the second AP begins an ip (which is cued by slight lengthening of the preceding AP’s final syllable without changing the tonal shape, labeled H-; Due to lack of space, prosodic units higher than an AP are not described in detail in this paper.). Here, a pitch range is clearly reset at the beginning of the second AP, but the high f0 is maintained until it falls for the HL pre-accentual syllable.

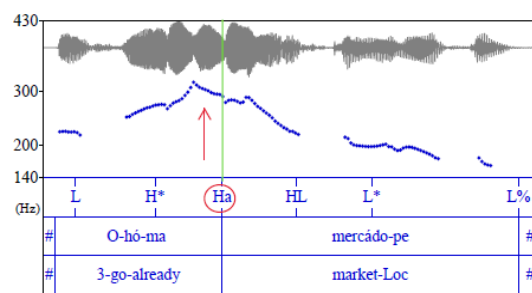


Figure 4: H* is followed by a higher f0, which is Ha, marking the end of an AP. (This sentence means “(S)he is already going/has gone to the market.”)

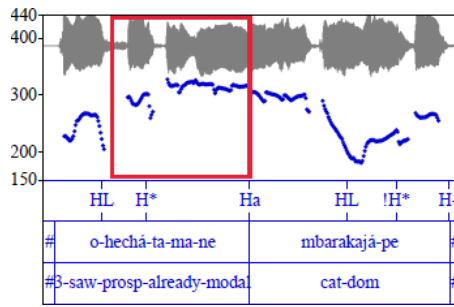


Figure 5: In the first AP, f_0 is higher after H^* and stays high till the end of AP, which is explained by an AP-final H tone (Ha). (“(S)he might already see/have seen the cat”)

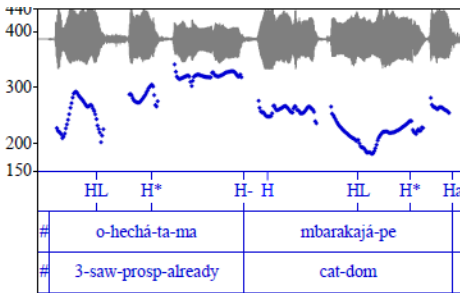


Figure 6: The break between the two words is bigger than an AP (i.e., an Intermediate Phrase, marked by $H-$ tone and final lengthening). The second AP begins with a H tone in a reduced pitch range and stays high until it falls at the HL syllable. (“(S)he is already going/has gone to see the cat”)

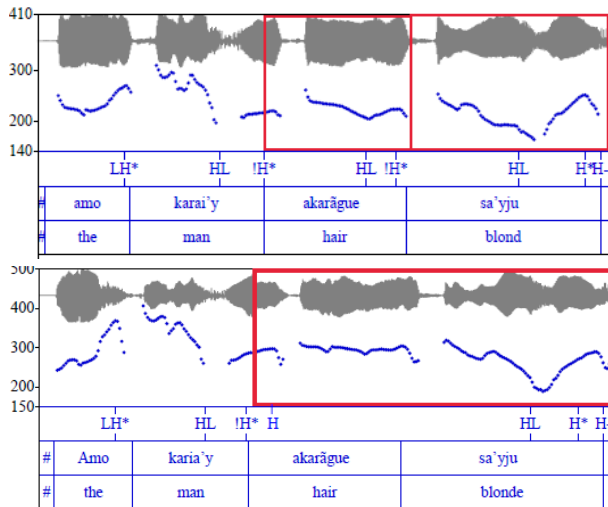


Figure 7: A 4syll-Noun and a 3syll-Adjective each forms one AP (on top) and together form one AP (the bottom).

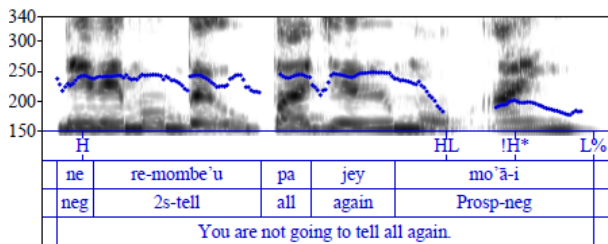


Figure 8: An AP containing a verb and a low adverb (total 11 syllables). Shows a long H plateau before HL on pre-tonic syll.

So far, we have shown an AP including only one word. But as in Figure 7, an AP can include more than one word. Figure 7 shows pitch tracks of the same phrase, ‘the man with blond hair’, produced in two accentual phrasing. The top figure shows when a 4-syllable noun (‘hair’) and a 3-syllable adjective (‘blond’) each forms one AP, with a falling-rising pitch accent per word. But in the bottom figure, the two words together form one AP, showing only one pitch accent on the stressed syllable of the adjective and no pitch accent on the noun. The noun lost its pitch accent and created a long high plateau between the AP-initial H and the H of HL tone.

AP phrasing is optional, reflecting the syntactic/semantic/pragmatic relations among words as well as the length of the words/phrase. However, in Guarani, a certain syntactic grouping always forms an AP. A verb and a low-modifier, which form a Complex Predicate, always form one AP, not constrained by the length of the phrase as commonly found in other AP languages [15-22]. Low modifiers are stative predicates that specify a quality (e.g., ‘well’, ‘ugly’), the manner in which the event unfolds (e.g., ‘slowly’), certain aspectual properties of the event such as frequency, recency, and ‘again’ [23, 24]. Figure 8 shows an 11-syllable long VP, including a verb (‘tell’) and a low adverb (‘again’) and accompanying suffixes. The whole phrase forms one AP, with a pitch accent on the penultimate syllable of the phrase (realized as $HL!H^*$ before $L\%$) and a long high plateau starting from the first syllable to the syllable before HL. This syntax-marking function of AP is very unique among AP languages.

4. Discussion and Conclusion

Our data show that Guarani intonation has a tri-tonal pitch accent and an AP. A tri-tonal pitch accent is rare cross-linguistically and has been proposed for only a few languages, e.g., $L+H^*+L$ in Pisa Italian [25] and Argentinian Spanish [26]. If there are multiple pitch accents that are contrastive in a language, maintaining the tonal shape of a pitch accent would be critical. However, in Guarani, the underlying tonal shape is not maintained when there is not enough number of TBUs, probably because there is only one pitch accent. Given that one or two syllable APs are often realized with a rising pitch accent, the LH^* part seems to be the core of the HLH^* pitch accent.

Guarani is also unique in the view of prosodic typology, especially the typology of word prominence type. According to [10], languages that have lexical stress with strong acoustic correlates (e.g., English, belonging to “head”-prominence languages) are not expected to have an Accentual Phrase, tonally marking the edge of a word. Languages that have an AP typically have a fixed stress location and weak acoustic correlates (e.g., Bengali, Georgian; these languages belong to “head/edge”-prominence languages) or no lexical stress (e.g., Korean, Mongolian, W. Greenlandic; these languages belong to “edge”-prominence languages). Therefore, it was hypothesized that if the head (stress) of a word is not prominent, the edge of a word would be tonally marked (by edge tones of AP or Prosodic Word). Since Guarani has lexical stress and its acoustic correlates are strong, having an AP seems to be an exception to the typology. However, given that AP boundary tones in Guarani are only visible when the AP is long, mostly when it marks a syntactic group, the function of AP edge tones in Guarani may not be marking word prominence, but rather a small syntactic grouping. That is, Guarani may still belong to ‘head’-prominence languages, and not be an exception to the typology of prominence marking types.

5. References

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