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**Author**

Nielsen, Kuniko Y.

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## **Kiche Intonation<sup>1</sup>**

Kuniko Nielsen  
kuniko@humnet.ucla.edu

### **Abstract**

Kiche is a Mayan language spoken in Guatemala. Compared to other aspects of the language, its prosody, in particular its intonation system, is relatively understudied. This project aims to present an analysis of Kiche intonation in the framework of the autosegmental-metrical (AM) model of intonational phonology. Our data indicate that Kiche is an edge language with stress-driven pitch accent, and its intonation properties can be transcribed by a model which assumes 1) an Accentual Phrase (AP): [LH\*, L\*, H\*, (Ha)], 2) an Intermediate Phrase (ip): [H-, L-], and 3) an Intonational Phrase (IP): [H%, L%]. Similar to many other languages analyzed in the same framework, intonation in Kiche appears to cue some syntactic as well as semantic structures.

### **1. Introduction**

This project aims to investigate the phonological aspects of Kiche intonation by applying the autosegmental-metrical (AM) model of intonation (e.g., Pierrehumbert 1980, Beckman and Pierrehumbert 1986, Pierrehumbert and Beckman 1988, Ladd 1996). Although the AM model has been applied to various languages (Jun, 2005), there is no Mesoamerican language that has been studied in the framework, and it is hoped that modeling prosodic/intonational structure in Kiche will deepen our knowledge of the language as well as the language family as a whole.

Kiche is a language of the Quichean branch of the Mayan family spoken in Guatemala. The language consultant for this project is Mr. Pedro U. García Mantanic, who is a native speaker of the Cantel dialect of the language (a.k.a. West Central Kiche) which has approximately 250,000 speakers (Ethnologue). Previous research (Larsen, 1988, among others) has revealed a great amount of knowledge about the language and contributed to understanding the nature of the language. However, it appears that its prosody, in particular its intonation system, is relatively understudied.

All the data discussed here are provided by Mr. Pedro U. García Mantanic, and were recorded in a sound booth in the UCLA Phonetics Laboratory. The recordings were digitized at 22050 Hz and analyzed using Sciconrd's *PitchWorks*.

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<sup>1</sup> Many thanks are due to Mr. Pedro U. García Mantanic, for his patience and the hard work he devoted to teach Kiche to our Field Methods class. I would also like to thank Sun-Ah Jun as well as everyone in the UCLA Kiche Field Methods course 2004-2005: Pam Munro, Charles Bigelow, George Aaron Broadwell, Laurence Cheung, Andy French, Jeff Heinz, Sameer Kahn, Aaron Lee, Reiko Okabe, Manola Salustri, Molly Shilman, Lauren Varner, Calvert Watkins, and Heather Willson. This study could not have been completed without their generous help and support, although all errors and misrepresentations are my own.

Stress in Kiche is always word-final (Larsen, 1988). Stressed syllables are marked by pitch, duration, intensity, and loudness. Most importantly, Kiche stress is marked by a rise of the fundamental frequency (F0) on the stressed syllable. Kiche is not a tonal language, although some segments with higher glottal pressure (i.e., ejectives and phonemic glottal stop) seem to raise F0 in preceding vowels.

### 1.1. Intonational Phonology

Ladd (1996) defined the term 'intonation' as follows: the use of suprasegmental phonetic features (pitch, intensity, duration, etc) to convey 'post-lexical' or sentence-level pragmatic meanings in a linguistically structured way. According to the Autosegmental-Metrical (AM) model of intonational phonology, an intonation structure defines prosodic grouping and prominence relation among the items within the group. The prosodic grouping and prominence relation are represented by distinctive pitch targets (High, Low, and their combinations). Since intonation and prosodic organization differ from language to language, and often from dialect to dialect (as do phonological rules), a model of intonational phonology of one language should not be used to describe the intonation of other language. Intonational phonology has developed extensively in the past decade, deepening our understanding of the linguistic aspects of prosody. Studies have also revealed that intonation plays an important role in the subfields of linguistics such as syntax, semantics, and pragmatics (e.g., Beckman & Pierrehumbert, 1986; Hirschberg and Pierrehumbert, 1986; Pierrehumbert and Hirschberg, 1990).

In intonational phonology, prosodic units above the Prosodic word are defined by intonation. The largest prosodic unit is an Intonational Phrase (IP). In between a Prosodic word and an IP, there could be an Intermediate phrase (ip) or an Accentual Phrase (AP), or both. The presence of these units is language specific. Figure A shows a schematic representation of prosodic structure (above prosodic words) which has both an Intermediate Phrase (ip) and an Accentual Phrase (AP).

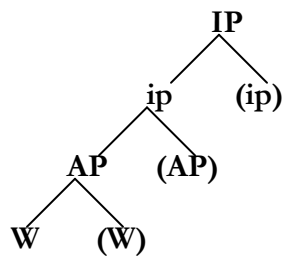


Figure A: Schematic representation of prosodic structure

Previous research (see Jun, 2005 for typological review) suggests that languages can be divided into two groups in terms of their prosodic structure: head vs. edge language. Head languages are Pitch Accent languages, and they mark the head of a prosodic unit with pitch accents associated with lexical stresses (e.g., English, German, Greek, Spanish, etc). On the other hand, Edge languages are Accentual Phrase languages and they mark the edge of a prosodic domain by a tone (Korean, Japanese, French,

Bengali, etc)<sup>2</sup>. One of the goals of this paper is to determine which typological category Kiche belongs to. In the next section, I will propose an AM model of intonational phonology for West Central Kiche based on the utterances produced by our consultant, Mr. García Mantanic.

## 2. The proposal and the model

Based on our data, I propose the following features of Kiche intonation:

1. Kiche is an edge language with lexical stress.
2. Kiche has the following prosodic phrases:
  - Intonational Phrase (IP)
  - Intermediate Phrase (ip)
  - Accentual Phrase (AP)

### 2.1. Accentual Phrase

Given that Kiche is a language with stress, the first question is to determine if the stress is lexical (as in English) or post-lexical (as in French). As mentioned earlier, stress in Kiche is always word-final, and thus there are no minimal pairs contrasting in terms of stress. However, two separate observations lead to the conclusion that Kiche has lexical stress. First, unlike French, post-clitics exist in Kiche and the presence of post-clitics does not change the locus of stress. For example, in (1), the stress stays on the last syllable of content word *xupus* (cut) even after adding a trace-marker 'wi' (see Figure 1).

- 1) Jäs ruk' k-ø-u-pús=wi le ankney?  
 what with CMP<sup>3</sup>-3sA-cut=trace D banana  
 'What did he cut the banana with?'

Second, some recent loan words show non-final stress, such as *mángo* 'mango' and *pláto* 'plate'. AP languages without stress (e.g., Korean) or with post-lexical stress (e.g., French) would not show this pattern.

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<sup>2</sup> See Jun (2005) for further description of head vs. edge languages.

<sup>3</sup> List of Abbreviations

CMP	complete aspect
INCMP	incomplete aspect
1sA	first person singular set A (A-ergative, B-absolutive)
D	determiner
C	complementizer
Q	Yes-No question marker
MDP	Modal particle (i.e., wa')
N	negative marker

Having concluded that Kiche has lexical stress, the next questions are what type of pitch accent exists in Kiche and how many levels of prosodic units/domains the language has. Our data suggest that Kiche intonation has three types of pitch accent: LH\* L\*, H\*. Among these, LH\* is the default pitch accent, almost always occurring on the stressed syllable of a content word. Only when an AP has more than 3-4 syllables, the first syllable (often determiners) is realized as H\* (= rhythmic high). L\* occurs only at the beginning of yes-no questions, realized on the question-marker *a* (more details will be discussed further in 2.3.2). Unlike LH\*, which often makes up an AP alone, H\* and L\* do not make up an AP by themselves, and thus always co-occur with LH\* within an AP<sup>4</sup>.

LH\* pitch accent, which marks the prominent syllable of a word, also marks the boundary of a small prosodic unit. I call this unit an Accentual Phrase (AP) because the edge of this prosodic unit is marked by a tone and its size is slightly larger than a Word. When the LH\* pitch accented syllable is not AP-final, i.e., when the word has post-clitics or when there are more than one word in an AP, the High tone (of LH\*) stays high until either the end of the post-clitics (e.g., *kupus-wi* 'cut + trace marker' in Figure 1) or the end of the next content word (e.g., *xutij jrän* 'drank water' in Figure 3).

All the data collected so far can be explained if we assume the following points: 1) an AP in Kiche is made of one content word with LH\* pitch accent as the default, 2) post-clitics cannot make up an AP by themselves, and they need to be added to the same AP as their preceding content words, and 3) more than one content word can make up one AP if the combination is a very frequent expression (e.g., drink-water, years-ago). LH\* marks an AP boundary as the default, but when the LH\*-syllable is not the AP-final syllable, the syllable(s) intervening LH\* and the AP boundary is/are realized with a high tone. In this case, Ha is used to mark an AP boundary. That is, Ha is shown only when an AP does not end with a LH\* pitch accented syllable. Figure 1 shows an example where the LH\* pitch accented syllable and the AP-final syllable do not coincide. As can be seen below, the high pitch is maintained until the end of an AP to mark the AP boundary.

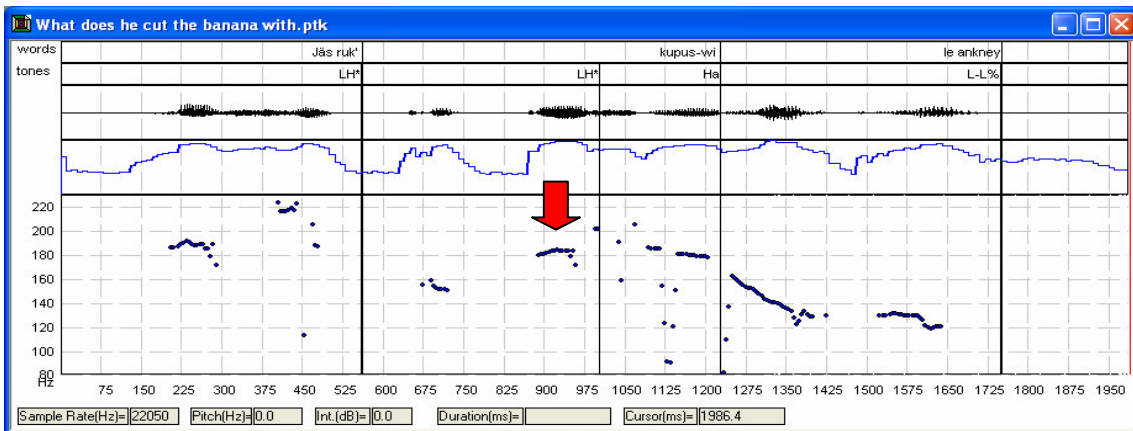


Figure 1: Example pitch track of the sentence in (1). The arrow shows the location of H\* of LH\* pitch accent. Note that the pitch stays high until Ha.

<sup>4</sup> Although three types of pitch accents sound equally prominent in our data, it is possible that only LH\* is actually a pitch accent, and H\* and L\* have different status. If that is the case, we can say that one AP has only one \* tone, which is the common assumption in other AP languages.

Figures 2 and 3 show the differences in pitch patterns of two words when they make up two APs (Figure 2) and when they make up one AP (Figure 3). As can be seen in Figure 2 below, *xutij* and *uwa* make up two separate APs (one LH\* for each word; the arrows point to H\* of each pitch accent). The sentence in Figure 2 is given in (2).

- 2) Lal Pam x-ø-u-tij u-wa iwäx.  
 D Pam CMP-3sA-eat 3sA-food yesterday  
 'Pam ate her food yesterday.'

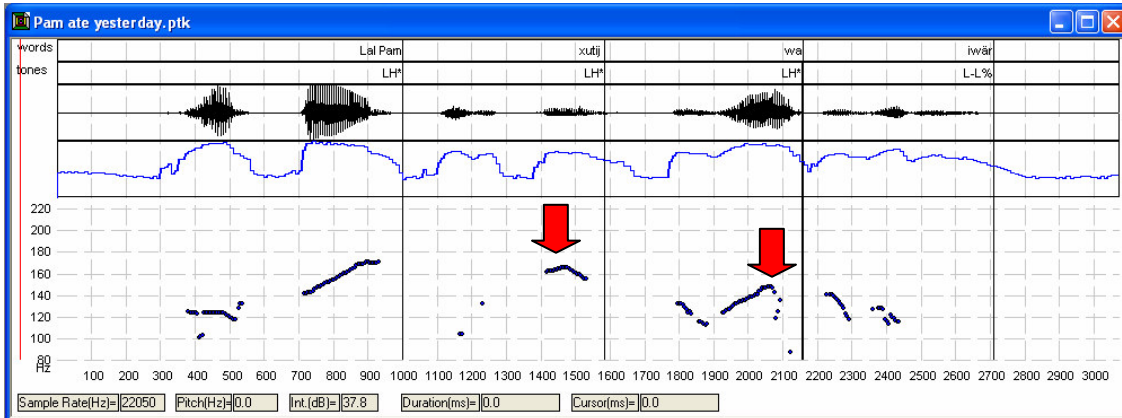


Figure 2: Example pitch track of the sentence in (2). The arrows show the location of LH\*s in two APs.

On the other hand, in (3), *xutij* and *jrän* together make up one AP. Only *xutij* has LH\*, and there is no pitch falling after it as in (2). In other words, the pitch stays high after LH\* until the end of *jrän*, where the AP ends (the arrow points to the H\* of LH\*).

- 3) Lal Pam x-ø-u-tij jrän iwäx.  
 D Pam CMP-3sA-eat water yesterday  
 'Pam drank water yesterday.'

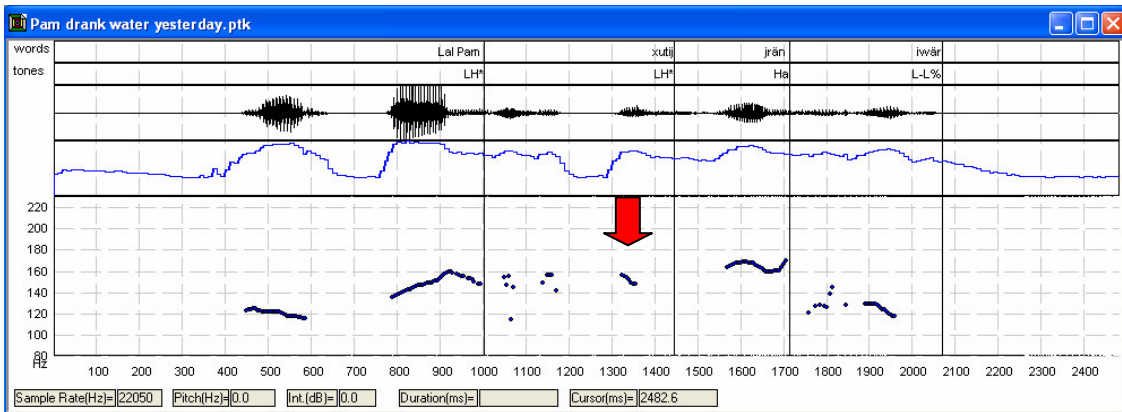


Figure 3: Example pitch track of the sentence in (3). The arrows show the location of LH\* which is not an AP boundary. Unlike Figure 2, F0 stays high after the pitch accent until the end of AP (=Ha).

So far, we saw that Kiche has both lexical stress-driven pitch accent (default = LH\*) and AP. There is one more language documented within the AM framework which

also has both AP and lexical stress-driven pitch accent (LH\*). According to Mahjani (2003) as well as research done at UCLA (in the Intonational Fieldmethod class taught by Sun-Ah Jun in 2003), Farsi also has both lexical stress-driven pitch accent and an AP. Stress in Farsi is generally at the end of a word (e.g., nouns) but earlier for verbs. Stress is realized as a rising pitch accent (L+H\*), but when the stressed syllable is not AP-final, the High tone of the pitch accent stays high until the end of the AP, which is very similar to the pattern we observed in Kiche.

## 2.2 Intermediate Phrase

In the previous section, we have established that Kiche has (lexical) stress-driven pitch accents, and has an Accentual Phrase (AP). The next step is to determine if Kiche has an Intermediate Phrase (ip). My proposal that there is an Intermediate Phrase (ip) in Kiche is based on the observations that there are some sentence-medial junctures with tones higher than AP boundary tones yet lower than the IP boundary High tone, and that there are also some sentence-medial junctures with tones lower than the IP boundary Low tone. For example, in Figure 4, the end of relative clause (*Manola*) is realized in higher pitch than receding pitch accent (LH\*). If the end of AP *lal Manola* was simply an AP boundary, we would not expect to see this higher pitch. On the other hand, it cannot be an IP boundary because the end of the utterance is realized in even higher f0 than the end of *lal Manola*. Given that IP is the highest structure, this sentence-medial high f0 has to represent a boundary between IP and AP, namely ip.

4) A le ne' le utz k-ø-ril l-u-mam lal Manola  
 Q D baby C good CMP-3sB-see D-3sA-grandpa D Manola

(k)-ø-q'aljin-ik latz uwuch?  
 (CMP)-3sB-look- intr busy

'Does the baby who likes Manola's grandpa look busy?'

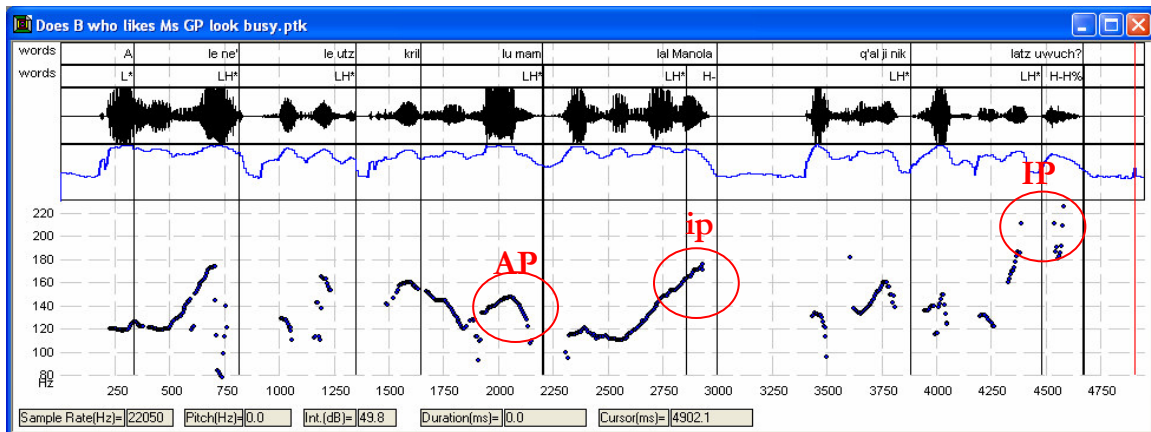


Figure 4: Example pitch track of the sentence in (4). The second boundary tone (IP) is realized higher than the first (ip).

One could argue that the boundary (labeled as ip in Figure 4 above) might actually be H% instead of H-, because 1) it was hypothesized to be H- based on its pitch relative to the H% (labeled as IP above), which could only be seen among yes/no questions, and 2) the pause which comes right after the boundary is quite long. However, we observed another piece of evidence for the existence of ip from Low boundary tone (L-). In Figure 5 below, the end of second *le mam* is realized lower than that of the first *le mam*. If both of the Low boundary tones are L%, we would expect them to sound similar. However, as can be seen in Figure 5, the first Low boundary tone is clearly higher than the second one.

- 5) N-in=taj le mam, are are' le mam.  
 N-1sB=N D grandpa, contrast he D grandpa
- 'I'm not a grandfather, he is a grandfather.'

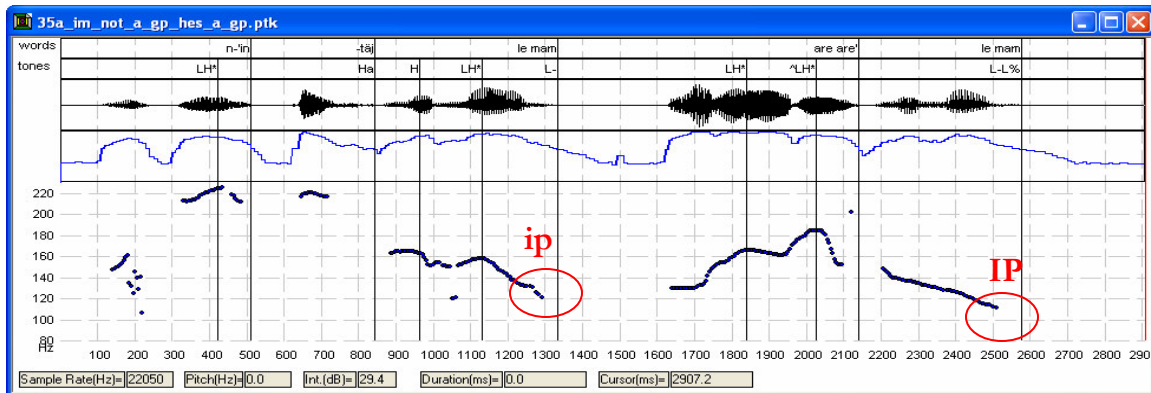


Figure 5: Example pitch track of the sentence in (5). The second boundary tone (IP) is realized lower than the first (ip).

Although both High and Low intermediate phrase boundaries (H-, L-) have been observed in our data, L- seems to be quite rare. In other words, ip boundaries (when they do not coincide with IP boundaries) are realized in H- as the default in Kiche.

### 2.3. Intonational Phrase

As mentioned earlier, the largest prosodic unit in the AM model is an Intonational Phrase (IP). Data show that there are four types of tones at the end of an IP in Kiche: super high, normal high, downstepped high, and low. These four tonal types can be explained by the combination of two ip boundary tones (H-, L-) and two IP boundary tones (H% and L%). That is, the super high tone is represented by H-H%, normal high by H-L%, downstepped high by L-H%, and low by L-L%<sup>5</sup>. In this section, I will describe each of the four combinations in terms of their pitch realizations and sentence types.

<sup>5</sup> Our data do not show any phonetic evidence to support L-H% (such as a change in the tonal direction as in English). If there were no ip, these four tone types at the end of an IP could be represented by a single tone, i.e., ^H%, H%, !H%, and L%, respectively. However, because we assume an ip in this model and an IP boundary tone is preceded by an ip boundary tone (L- or H-) (assuming the Strict Layer Hypothesis, Selkirk 1986), we need to include L- or H- to describe the tonal pattern of an IP boundary.



### 2.3.1 L-L %

The most common ending in Kiche is L-L%, which can be seen in all the declaratives and wh-questions in our data.

- 6) Lu-mam le ne' k-ø-num-ik.  
 D-3sA-grandpa D baby INCMP-3sB-hungry-intr  
 'The baby's grandpa is hungry.'

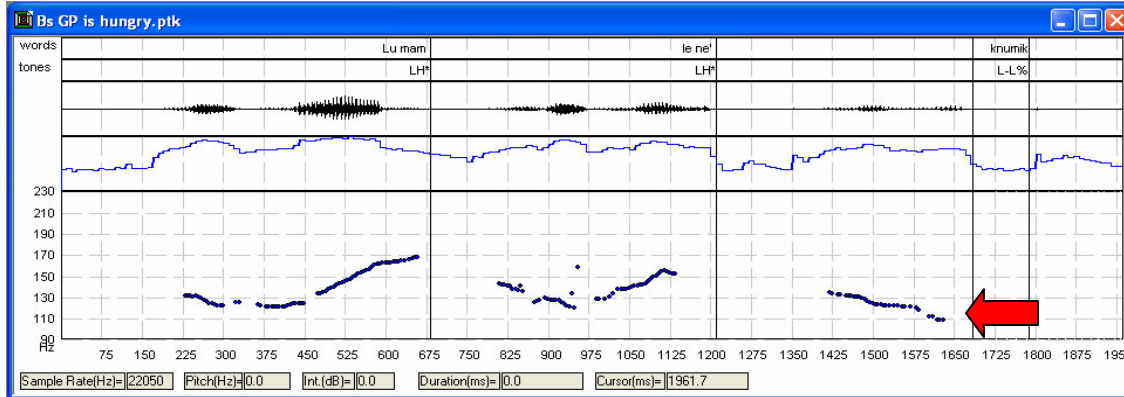


Figure 6: Example pitch track of the sentence in (6). The arrow shows L-L% contour.

As can be seen in Figure 6 (as well as in Figures 1, 2, 3, and 5) the end of the utterance (L-L%) is realized in pitch fall, overriding the pitch accent LH\* in the final AP. The pitch at the end of L-L% was always realized lower than the beginning of LH\* as well as L-, indicating that hierarchical prosodic structure is expressed in Low tones as discussed earlier<sup>6</sup>.

### 2.3.2 H-H%

All the H-H% utterances found in the data so far are yes/no questions. Mondloch (1978) described the formation of yes/no questions in Kiche as: "To make this [statement] a question, one merely places the question word "la" in front of the utterance..." (pp20). In our data, this question marker "la" is realized as "a" and is located before the subject. As Mondloch said, this question marker appears to always come at the beginning of the sentence, and is always realized in a very low pitch (see Figure 8). Figures 7 and 8 show pitch tracks of a declarative and yes/no interrogative sentence, respectively.<sup>7</sup>

- 7) K-n-e'-n wa' cho-ja.  
 INCMP-1sB-go-? MDP PRP-home

<sup>6</sup> As mentioned earlier, we found Low pitch accent (L\*) only at the beginning of yes/no questions that always end in H-H%. In other words, L\* and L-L% never co-occurred in the same sentence in our data.

<sup>7</sup> For a more detailed description of yes-no questions in Kiche, please refer to Nielsen (2004) Yes/No Questions in Quiché (ms).

'I should go home.'

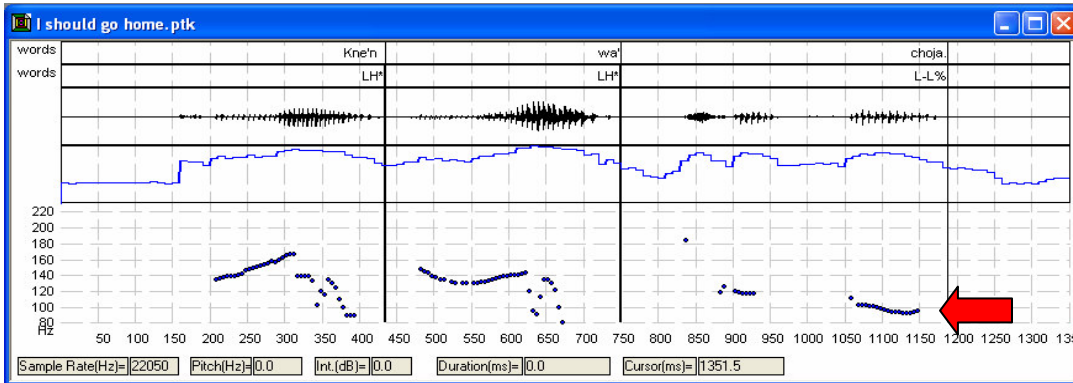


Figure 7: Example pitch track of the sentence in (7). The arrow shows L-L%.

- 8) A k-n-e'-n                      wa'      cho-ja?  
 Q INCMP-1sB-go-?    MDP      PRP-home

'Should I go home?'

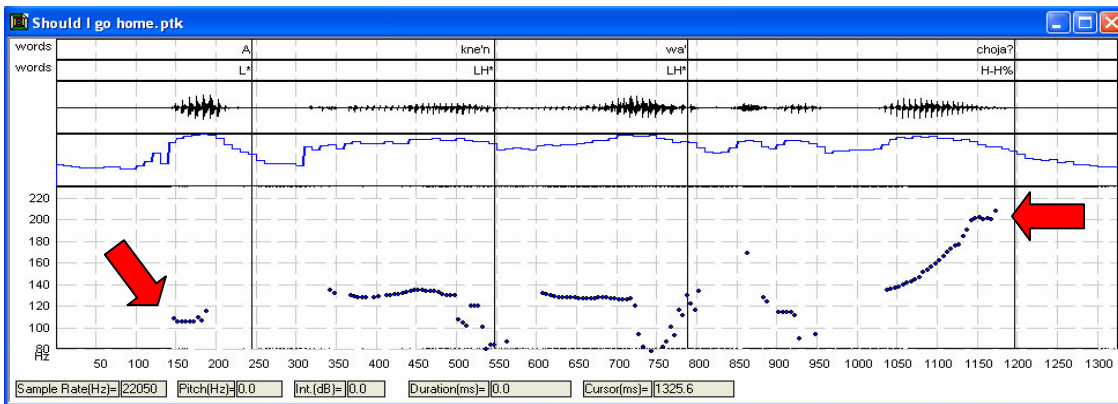


Figure 8: Example pitch track of the sentence in (8). The arrows show the locations of L\* and H-H%.

The pitch of H-H% is realized in the highest point of the speaker's pitch range, often around 200Hz (see Figure 8). Mr. García Mantanic's pitch never reached so high unless it was the end of a Y-N question.

The fact that an IP boundary tone (H%) was always realized higher than an ip boundary tone (H-) indicates that a hierarchical prosodic structure is expressed in the relative height of a pitch range in Kiche. Note that it is also possible to analyze the super-high tone as a type of boundary tone (i.e., ^H%) specifically marking yes-no questions. If so, ^H% would not necessarily represent the hierarchical relation between the sentence-medial H and the sentence-final H. That is, both Hs can be a % tone (H% vs. ^H%). However, given the presence of the Low ip boundary tone (L-) (see 2.2 above), I will assume an Intermediate Phrase in Kiche and thus use a sequence of two tones (i.e., H-H%) to describe the super high tone at the IP boundary.

As mentioned in section 2.1, the question marker *a*, located at the beginning of a Y-N question, is always realized in a very low pitch. There are at least two ways to analyze the low pitch: one is that it is due to Low pitch accent (L\*), and another is that it is due to a Low IP initial boundary tone (%L). For the time being, I decided to use L\* to transcribe the Y-N question marker since L\* is more common than %L cross-linguistically. Further investigation is necessary to understand the true source of the initial low pitch in Y-N questions in Kiche.

In addition to its low-pitch beginning and high-pitch ending, yes/no questions are also marked by a reduced pitch range. That is, in declarative as well as wh-question sentences in Kiche, all AP boundaries (mostly LH\*) are clearly realized in Low and High pitch contour with a natural declination. However, yes/no questions often show reduced pitch range until the end of the sentence, resulting in less pronounced AP boundaries (see Figures 7 and 8 above). This reduced pitch range gives conclusive support for neither the L\* nor %L analysis above, since it can be explained by either scenario: if *a* is L\* as we assumed, given that pitch accent realization is always relative, the next High pitch (the next LH\*) only needs to be slightly higher than '*a*', making all the AP boundary tones relatively lower (and the pitch range smaller) than their default values. On the other hand, if the low pitch attributes to %L, it is possible that the initial IP boundary tone (%L) influences the entire domain except the final IP boundary tone (H%).

### 2.3.3 H-L%

Similar to English (Beckman & Hirschberg, 1994), H-L% in Kiche is phonetically realized as a high plateau: the High phrase accent (H-) of the final intermediate phrase upsteps L% to medium high in the speaker's pitch range. There are two sentence types found among utterances with H-L% so far, namely tag-questions and imperatives. The pitch realization of this boundary tone type is about the same height as an AP boundary tone (LH\*), and thus its pitch contour sounds very similar to that of LH\* plus Ha (e.g., *xupus-wi* 'cut + trace marker') which is about medium high. As far as our data is concerned, this H-L% pattern was observed only when the sentence ended with either a clitic or the tag-question marker '*pa*'. Figures 9 and 10 show examples of H-L%. Although their pitch contours look slightly different (Figure 9 shows a slight rise in f0, and Figure 10 shows a slight fall in f0), the overall melody sounds like suspended medium high after the previous LH\* in both cases, particularly in contrast with L-H%, discussed in Sec. 2.3.4..

- 9) At k-a-b'insaj le ch'ich', pa'?
- 2s INCOMP -2sA-drive D car tag

'You drive a car, don't you?'

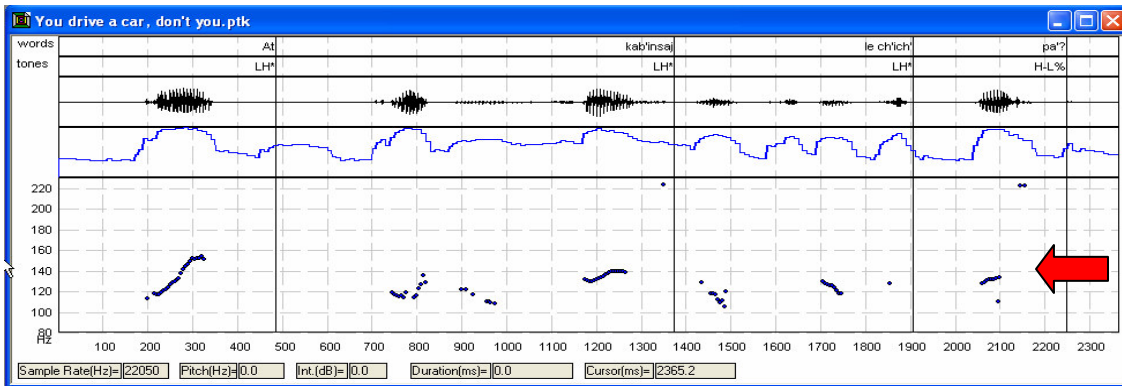


Figure 9: Example pitch track of the sentence in (9). The boundary tones are realized at about the same pitch as the previous LH\*.

- 10) N-k-at-b'ixon=täj!  
 N-INCMP-2sB-sing=irr  
 'Don't ding!'

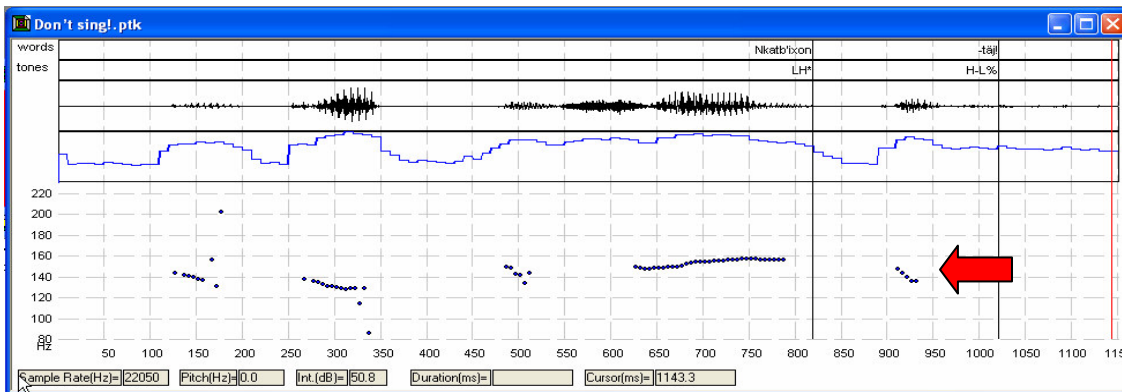


Figure 10: Example pitch track of the sentence in (10).

### 2.3.4 L-H %

L-H% in Kiche is phonetically realized as a mid-low plateau, lower than the peak of its preceding pitch accent (LH\*) (see Figure 11). It is similar to the downstepped High pitch accent (!H\*) in English. There was only one example of L-H% contour found in our data so far, and its sentence type is imperative. As in L-L%, the pitch accent (LH\*) of the final AP appears to be overwritten by L-, which occurs at the last syllable (i.e., *le ri'* in Figure 11). The High boundary tone (H%) is not realized as High tone, and the Low phrase accent (L-) downsteps the H% to the mid-low level of the speaker's pitch range, creating a mid-low plateau. At the moment, it is unclear if this pitch contour is specific to imperatives, and further data is crucial to understand it better.

- 11) Wilampe' le=ri'  
 Look D=this  
 'Look at this!'

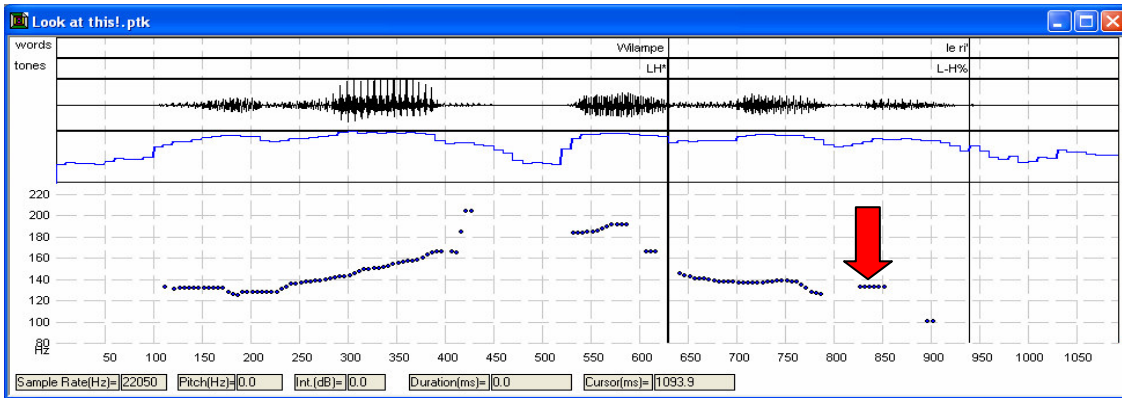


Figure 11: Example pitch track of the sentence in (11). The arrow shows L- which overrides the pitch accent (LH\*)

Figure B shows a schematic representation of pitch contours (combination of phrase accent [-] and boundary tone [%]) in relation to AP boundary tone (LH\*). H- upsteps, and L- downsteps boundary tones.

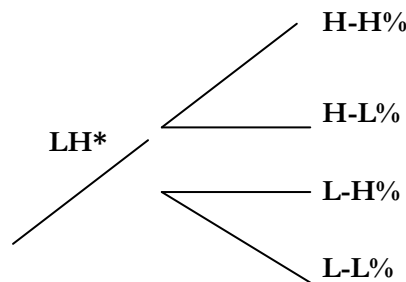


Figure B: Schematic representation of phrasal tones in Kiche

## 2.4. Interim Summary

I have proposed that Kiche has three levels of prosodic units (IP, ip, AP), and each unit is marked by tones. An IP is marked by L% or H%, and an ip is marked by L- or H-. An AP is marked by a bitone (LH\*) except when the AP-final syllable is not stressed (in which case, high tone, Ha, marks the boundary). Using these conventions, pitch contours in all the data collected so far could be transcribed. To illustrate the hierarchical structure, Figure 12 shows a tree diagram and pitch track of (12).

- 12) Aretäq k-in-kwin-ik, k-eb'-en-sk'ij le w-chlal Watemal.  
 when CMP-1sA-can-intr CMP-3pB-1sA-call D 1sA-relative Guatemala

‘When I can, I call my relatives in Guatemala.’

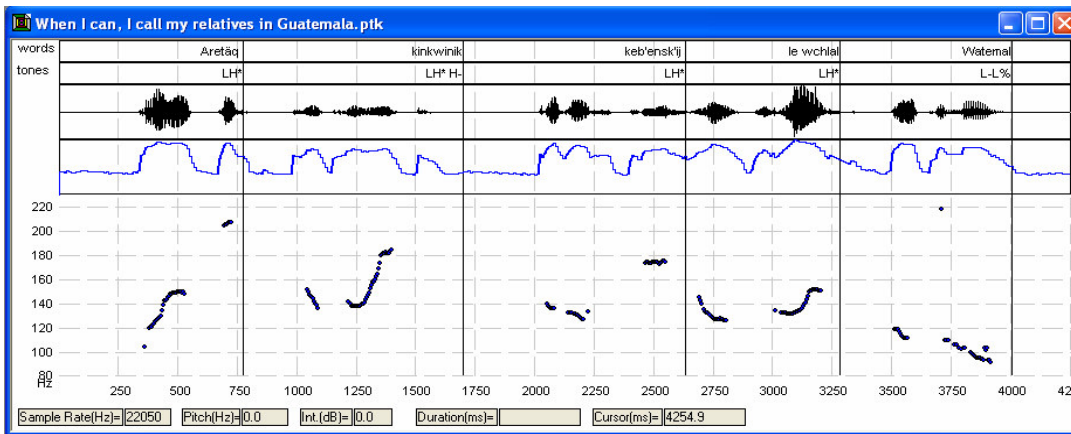
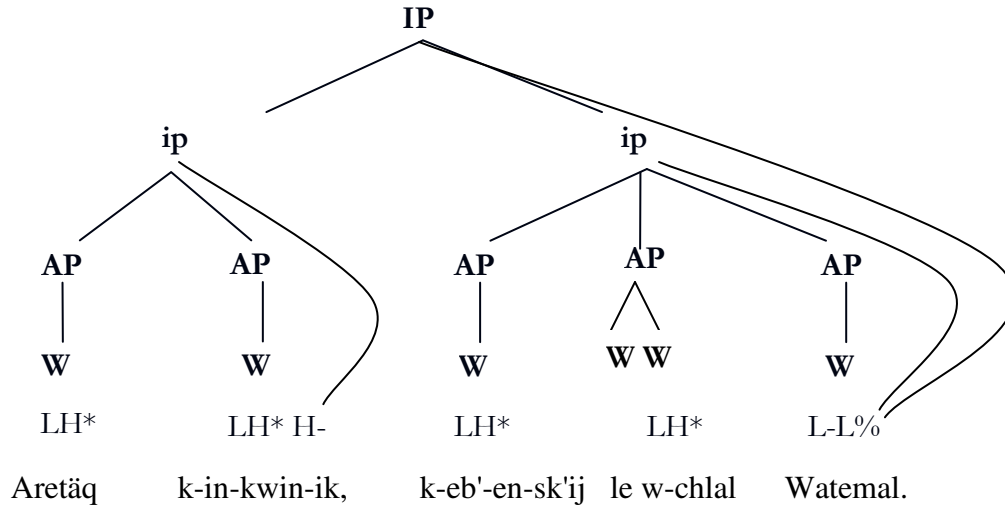


Figure12: Example pitch track of the sentence in (12).

As mentioned before, the hierarchical structure is represented in both High and Low tones (e.g.,  $LH^* < LH^* H- < LH^* H-H\%$ ). Although phrase-final lengthening was observed in every level, no hierarchical structure was observed in terms of duration.

Having proposed an AM model of intonation for Kiche, the following section will discuss some preliminary observations regarding the interaction between intonation and syntactic as well as semantic structures.

### 3. Intonation and Syntax/Semantics Interface

Intonational Phrase (IP) boundary tones appear to signal some semantic/pragmatic as well as syntactic structures in Kiche. For example, similar to English, the Low IP boundary tone ( $L\%$ ) is used to convey the message that the speaker finished her utterance, while a High boundary tone ( $H\%$ ) cue that the speaker's utterance has not yet finished (e.g., Pierrehumbert and Hirschberg, 1990). Most utterances are made of one IP, which is often one sentence (syntactic structure).

Similarly, Intermediate Phrase (ip) boundary tones appear to cue some syntactic constituents. For example, the High ip tone (H-) is often used to signal the end of head nouns and the end of relative clauses, as shown in Figure 13. In addition, in a listing contour (e.g., the speaker lists many fruits, or counts numbers, from one to ten), the end of each item is marked by H- except the last item which is realized in L-L%.

- 13) Le ne' le utz k-ø-ril lal Manola läj utz.  
 D baby C good CMP-3sB-see D Manola very good/nice

‘The baby who likes Manola is very nice.’

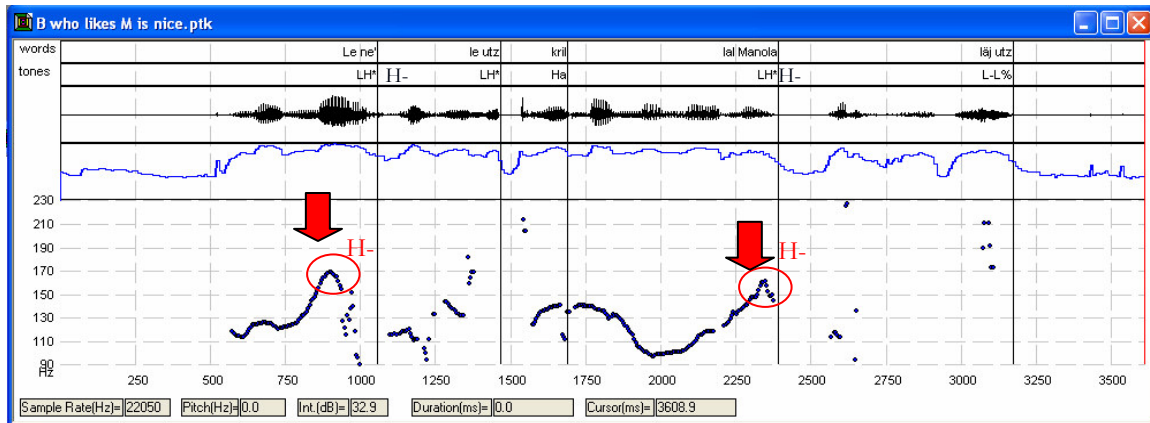


Figure13: Example pitch track of the sentence in (13). The arrows show the end of the head noun and the relative clause.

An AP boundary tone (Ha) also signals the semantic relationship between words. As discussed in 2.1, one word often makes up one AP, but more than one word can make up one AP if they are semantically closely related. Thus, the presence/absence of Ha can signal the semantic relationship between a given pair of words. An AP boundary tone can also cue morphosyntactic information. For example, a monosyllabic word shows a rising contour (= LH\*), but a monosyllabic clitic does not show a rising contour. Instead, the pitch of a monosyllabic clitic stays high (=Ha) from the preceding syllable.

Lastly, there were some up-stepped pitch accents observed in the data (^LH\* = the L tone of the pitch accent starts higher than the previous L), and they seem to appear in one of the following structures: wh-question, contrastive focus, and cleft construction. These conditions appear to be semantically somewhat marked, and it is possible that the semantic markedness triggers the up-stepped pitch accents. In order to further investigate this point, it is crucial to obtain more semantically controlled data.

#### 4. Conclusion

In this paper, the phonological aspects of Kiche intonation were analyzed by applying the AM model of intonation. The following is a summary of our findings.

1. Kiche is an edge language with stress-driven pitch accent.

2. Its intonation properties can be transcribed by a model which assumes:
  - a. Accentual Phrase (AP)
    - Boundary tone: Ha [only when LH\* is not AP-final]
    - Pitch accent: LH\* [AP boundary marker]
    - H\* [rhythmic high]
    - L\* [yes/no question marker]
  - b. Intermediate Phrase (ip)
    - Boundary tone: H-, L-
  - c. Intonational Phrase (IP)
    - Boundary tone: H%, L%
3. In Kiche, intonation cues some syntactic structures as well as semantic information.

As mentioned in the introduction, this paper is based on the data provided by a single speaker, and all analyses are preliminary. To verify our findings, it is crucial to obtain more data from other speakers. For future research, I intend to further investigate the interface between intonation and syntax/semantics by examining more naturally elicited speech data such as narratives or conversation, as well as to develop a ToBI transcription system for Kiche by adding break indices (cf. Beckman & Hirschberg, 1994).

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