

INTONATION IN QUECHUA: QUESTIONS AND ANALYSIS

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ABSTRACT

Research on the suprasegmental system of Quechua has largely focused on the placement of stress within a word. Previous descriptions of Quechua intonation found in the literature offer a schematic representation of the intonation contour. In order to examine Quechua intonation within the current framework of Autosegmental Metrical (AM) phonology, data from field recordings in Cuzco of Southern Peruvian Quechua have been analyzed. The current paper offers a preliminary sketch of the basic units of intonation employed in Quechua, including pitch accents and boundary tones. This analysis may provide additional data in the cross-comparison of intonation systems and also aid in the task of applying the principals of the AM model to less-commonly studied intonation systems.

Keywords: intonation, Autosegmental Metrical (AM) model, Quechua, pitch accent, boundary tone

1. INTRODUCTION

Quechua intonation has previously been represented in the literature using schematic representations and numeric notation of the relative height of contour levels [4, 5, 10, 13]. These characterizations, which appear to be impressionistic in nature and based on speaker knowledge of the language, show a peak at the end of the utterance and the direction of the final contour. A noted exception is the recent work by Hintz [6] on stress Southern Conchucos Quechua, a Central Peruvian variety, which also includes acoustic measurements of fundamental frequency. The purpose of this paper is to provide a preliminary description of Quechua intonational phonology by employing the Autosegmental Metrical (AM) model. To do so, an acoustic analysis of semi-spontaneous utterances as produced by Cuzco Quechua speakers has been conducted. In addition to providing instrumental support for previous descriptions, this study includes a detailed analysis of the tune-to-text timing of the contour to the utterance and adds new

information about the peaks and valleys occurring in non-final position within the utterance.

2. BACKGROUND

Quechua is an agglutinative language with SOV word order which is spoken by approximately 8 million people primarily in Peru, Bolivia and Ecuador and also in parts of Argentina, Colombia and Chile [2]. The Quechuan language family can be divided into two main varieties, Central and Peripheral [8, 15]. In Peru the Peripheral variety with the greatest number of speakers is Southern Peruvian Quechua [3]. Cuzco Quechua, one of the Southern Peruvian varieties, has been chosen for this description of intonation given its large distribution of speakers.

3. STRESS IN QUECHUA

Quechua has a fixed location for primary stress. As noted in Cerrón-Palomino [2:128], research on Quechua suprasegmentals has focused mainly on stress placement across different varieties: "The phenomena of accent, rhythm and intonation are the least understood points within Quechua phonology....Of the prosodic elements mentioned, only stress has received greater attention due to its relatively discreet character" (My translation). In most Quechua varieties, stress is consistently placed on the penultimate syllable, including in Southern Peruvian Quechua [2, 5]. As suffixes are added to a word, stress remains on the penultimate syllable, as in (1)-(4) below, where ' denotes primary stress:

- | | |
|---------------------|-------------------|
| (1) 'wa.si | "house" |
| (2) wa.'si.pi | "in (the) house" |
| (3) wa.si.'ku.na | "houses" |
| (4) wa.si.ku.'na.pi | "in (the) houses" |

In words with more than three syllables, an additional secondary stress may be observed on the initial syllable. However, in other varieties, primary stress is found on the first syllable of a word, such as in Central-Northern varieties of Peruvian Quechua. In addition, secondary stress is often on the penultimate syllable and may also appear on alternate preceding syllables moving

from the end to the beginning of the word [6]. In either case, primary stress may shift to the last syllable if one of a series of emphatic suffixes is added. Summarizing the prior descriptions and reconstructions, Cerrón Palomino [2] notes that this word-initial primary stress may likely be due to the original stress pattern in Proto-Quechua. Since tonal movements are associated with stressed syllables [7], the penultimate syllable will be observed in the following analysis of Cuzco Quechua.

4. METHODOLOGY

4.1. Speakers

The participants in this study were ten Quechua speakers from the Department of Cuzco who were residing in the city of Cuzco at the time of the study. All were male speakers, ages 20-39, who had received or were enrolled in post-secondary education, with the exception of one person who had completed secondary school. Of the ten, five were native Quechua speakers (NQS 1-5) who later learned Spanish upon entering the school system, and five were native Quechua-Spanish bilinguals (NQSS 1-5) who spoke both languages during childhood and considered themselves to be bilingual as adults. For the purposes of this description, the data from both groups of speakers will be considered together, since speakers rated themselves as speaking from “somewhat well” (value 3) to “without a problem” (value 5). A more fine-grained analysis with a larger data set may indicate differences between these two groups.

4.2. Recordings

The data set described here was collected as part of field research on Spanish and Quechua intonation in Peru [9]. Recordings were made of semi-spontaneous speech through the use of a picture description task and a self description task. In the picture task, speakers were asked to describe a series of related drawings from the textbook *Quechua: Manual de enseñanza* [14]. Several of these drawings depicted conversations between figures, including interrogative symbols used to represent questions being asked. In the self-description task, speakers were asked to discuss their studies or work, their family, and their hobbies and other interests. At the end, they were also invited to ask the researcher, the present author, similar questions in Quechua. From these recordings, 140 utterances were extracted consisting of 87 declaratives and 53 interrogatives.

Only those utterances which were not interrupted by pauses and which exhibited the canonical verb-final word order were included for this preliminary description of Quechua intonation.

4.3. Data Transfer and Analysis

The recordings were transferred to the computer at 44.1 Hz (16 bit) sampling rate. Segmentation of utterances was performed using the *Praat* software program [1] by examining the sound wave and spectrogram. The fundamental frequency (F0) was extracted using an autocorrelation method within the software program and measured in Hz.

4.4. Research Questions

The overall research question of this paper is the following: What is the tonal inventory of Cuzco Quechua? To address this matter more specifically, the following subset of questions have been asked:

- Where does the pitch accent occur (with the penultimate or initial syllable?)
- Is there another pitch accent associated with secondary stress?
- How many pitch accents occur per utterance? If more than one if found, is there downstep?
- What elements may receive a pitch accent?
- Are pitch accents monotonal or bitonal?
- Is there displacement of rises?
- Are different pitch accents used along with the morphological marking of focus?
- Do compound words show one pitch accent or two?
- Do questions show a higher final peak than declaratives?
- Are final rises observed for certain question types?

5. QUECHUA INTONATIONAL PHONOLOGY

The analysis of Quechua intonation will employ the Autosegmental Metrical framework [7, 12] which posits two tonal levels, H(igh) and L(ow), which are relative to each other throughout a given contour and are associated with specific levels of prosodic structure within a particular utterance. The discussion of these tonal events includes the analysis of pitch accents followed by that of final boundary tones and intermediate phrase boundary tones.

5.1. Pitch Accents

In Cuzco Quechua, primary stress is considered to fall on the penultimate syllable of a word. As

shown in Fig. 1 below, a peak (H) is observed during the stressed syllable of the given word. In longer words the peak still occurs during the penultimate syllable, as in Fig. 2. In some cases secondary stress may be perceived aurally. However, only a slightly higher F0 excursion was observed in some examples, as in Fig. 3.

Figure 1: H* pitch accent on stressed syllable
rīma-chka-nku 'They are talking'
 speak-PROG-3PL (NQS 2)

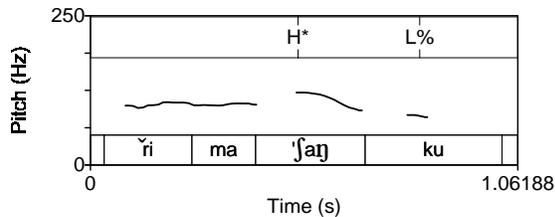


Figure 2: L+H* Pitch accent on stressed syllable
parla-paya-chka-n
 speak-PART-PROG-3SG 'He is talking
 (participating in the conversation)' (NQS 4)

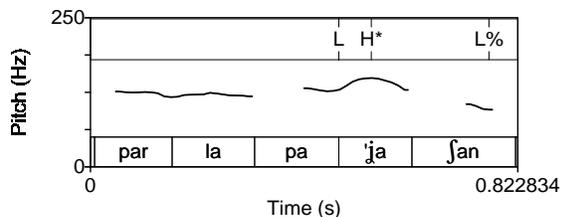


Figure 3: Slightly higher f0 on initial syllable
huñu-naku-spa mikhu-chka-n
 gather-RECIP-GER eat-PROG-3SG
 'Gathered together they are eating' (NQS 2)

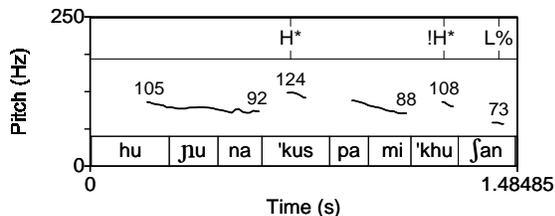
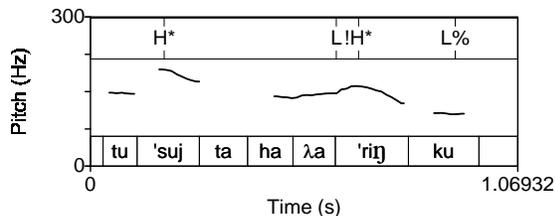


Figure 4: Prenuclear H*, downstepped nuclear L+!H*
tusuy-ta qallari-nku
 dance-ACC begin-3PL
 'They begin to dance' (NQS 4)



Within a given utterance, more than one pitch accent may appear, as shown in Figs. 3-5. Nouns

and verbs generally receive sentence-level prominence; adjectives, adverbs, numerals, demonstratives, and question words may also receive sentence level prominence and may bear a pitch accent. Quechua does not employ determiners and marks case through the use of suffixes added to the end of a word prior to stress assignment. The final pitch accent is provisionally taken as the nuclear pitch accent and non-final pitch accents as prenuclear. However, other acoustic features such as final lengthening in nuclear position need to be further examined. When more than one pitch accent is found, downstep may be observed, as in Figs. 3 and 4, marked with a ! diacritic; in Fig. 5, upstep is marked with a ^ diacritic. Note that a difference of 7 Hz has been used as an operational cutoff for the just noticeable difference (JND) between subsequent tonal target heights [11].

Figure 5: Upstepped nuclear pitch accent ^H*
allin-ta puri-chka-ni
 good-ACC walk-PROG-1SG
 'I am doing (Lit. walking) well' (NQSS 3)

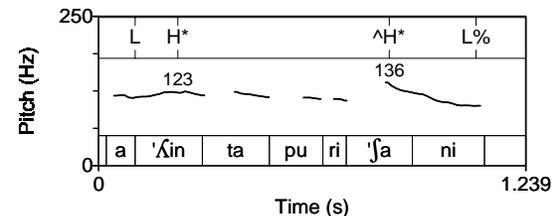
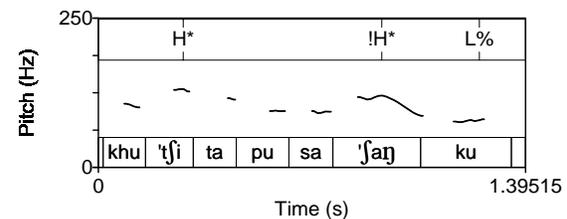


Figure 6: Tonic-aligned prenuclear and nuclear peaks
khuchi-ta pusa-chka-nku
 pig-ACC lead-PROG-3PL
 'They are leading the pig' (NQS 2)



Of the 67 prenuclear-nuclear peak pairs analyzed, downstep was found most frequently (63% of the instances), followed by neighboring peaks with an even height (28%), and subsequent upstepped peaks (9%). More data are needed to determine if there are differences in pragmatic meaning between the use of these different peak height relationships. Another further issue to consider is if lower peaks are the result of a general downtrend. Since downstep was most frequently produced in these description tasks, this peak-to-peak height configuration is a likely candidate for a

neutral interpretation in Cuzco Quechua. In addition, further examination of a larger set of utterances will help to determine if relative differences in F0 height may be the result of microperturbations due to segmental effects.

In terms of horizontal positioning of peaks, final and non-final pitch accents appear to be similar in that the peak (H) is temporally aligned with the stressed syllable. That is, there does not appear to be displacement of rises in non-final pitch accents; see Fig. 6. Of the 87 utterances, 100% of the peaks in nuclear position and 86% (61 of 71 non-final peaks) in prenuclear position were aligned within the stressed syllable.

Along with the peak, a valley low (L) is often observed at the onset of the stressed syllable. For these cases, a bitonal pitch accent L+H* is posited; see Fig. 7. In other examples, a voiceless consonant occurs at stressed syllable onset, producing a break in the F0 contour. Since Cuzco Quechua has eight voiced consonants, three additional voiced consonants in Spanish borrowings, and seventeen voiceless consonants, the presence of a voiceless consonant at syllable onset is a relatively frequent occurrence. Since it is not possible to observe a low tone in these instances, a monotonal pitch accent H* is offered as a conservative analysis of the contour even though the rise does not appear to occur until after the end of the pretonic syllable. Both types of pitch accents are found in both declaratives and questions; see examples of questions in Figs. 8-9.

Figure 7: Prenuclear L+H* pitch accent
huq runa pinsa-chka-n
 another man think-PROG-3SG
 'Another man is thinking' (NQS 1)

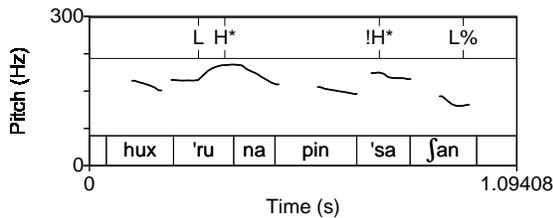


Figure 8: Nuclear L+H* pitch accent in yes/no question
tapu-sa-yki-chu 'Shall I ask you?'
 ask-FUT-2OB1SUBJ-INT (NQS 3)

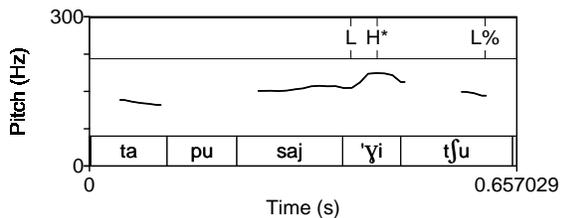


Figure 9: Prenuclear L+H*, nuclear H* in Wh-question
ima-ta-m ruwa-chka-nkichik
 what-ACC-FOC make-PROG-2PL
 'What are you (pl.) doing?' (NQSS 4)

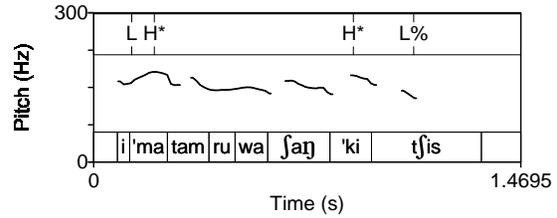
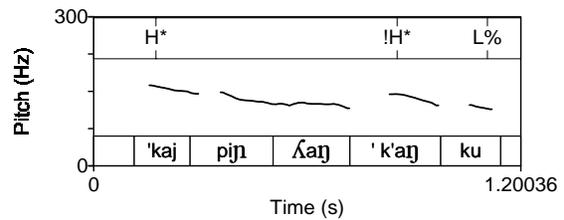
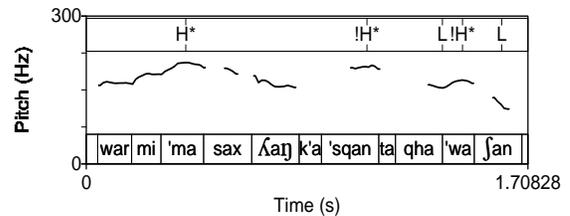


Figure 10: Prenuclear H* on word with focus -m
kay-pi-m llank'a-nku
 this-LOC-FOC work-3PL
 'they work here' (NQSS 4)



Given the above description, words which are marked morphologically for focus with the evidential suffix *-mi/m* do not appear to bear a distinct pitch accent different from the ones previously described; see Figs. 9-10 above. For example, an expanded pitch range is not found nor is deaccenting observed after the focused constituent. Last, compound words in some cases show one peak, as in Fig. 11, but in others two peaks are found. However, more data are needed to explore these matters further.

Figure 11: Prenuclear H* on word with focus -m
kay-pi-m llank'a-nku
 this-LOC-FOC work-3PL
 'they work here' (NQSS 4)



In sum, the following pitch accents are posited for Cuzco Quechua in (5):

- (5) Prenuclear and nuclear pitch accents
 H*, !H*, ^H*, L+H*, L+!H*, L+^H*.

Utterance Type: Declaratives, pronominal questions, yes/no questions

5.2. Boundary Tones: Final

The majority of declarative utterances end in a low final boundary tone (L%) (71 utterances); see Fig. 12. Likewise, in pronominal questions and in yes/no questions marked morphologically with the interrogative particle *-chu*, a low boundary tone L% predominates (12 utterances and 10 utterances respectively); see Figs. 8 and 9. Other final boundary tones observed for declaratives and questions are a low followed by a very slight rise (LH%) and a lack of or little tonal movement (denoted as Ø%); see Figs. 13-14.

Figure 12: Final L% low boundary tone
winti-chka-nku-ñā
 sell-PROG-3PL-DISC
 'They are selling already' (NQS 2)

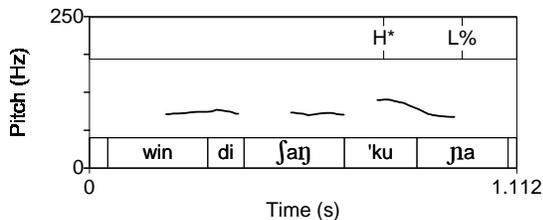


Figure 13: Final LH% low with slight rise
puri-ri-chka-nku-ñā
 walk-INC-PROG-3PL-DISC
 'They have already started walking' (NQS 4)

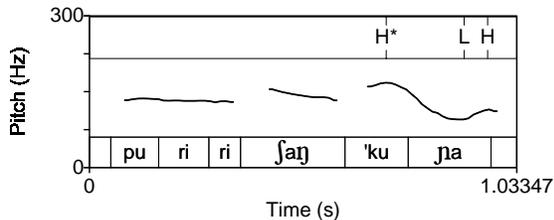
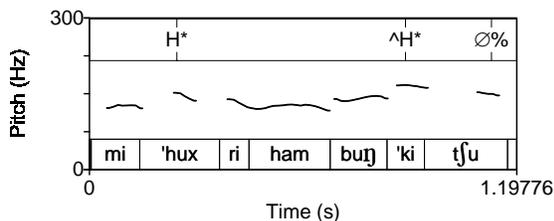


Figure 14: Resumptive question with final Ø%
mikhu-q-ri hampu-nki-chu
 eat-PARTPRES-RESP come back-2SG-INT
 'And will you come back to eat?' (NQSS 5)



In 'non-neutral' questions lacking the particle *-chu*, such as confirmative questions, questions with the resumptive particle *-rí*, and echo questions, a high final boundary tone showing a continuous rise (H%) or a high followed by a slight drop or suspension (HL%) is found; see Fig. 15 and Fig.

16. Note the expanded pitch range with the use of the H% high boundary tone.

Figure 15: Echo question with final H%
Urubama (Name of town)
 Urubama 'Urubamba?' (NQS 1)

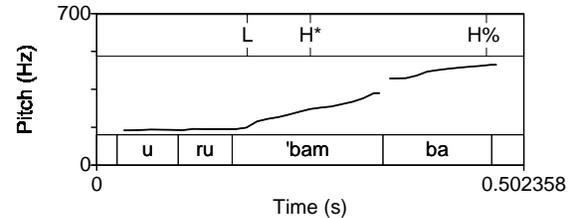
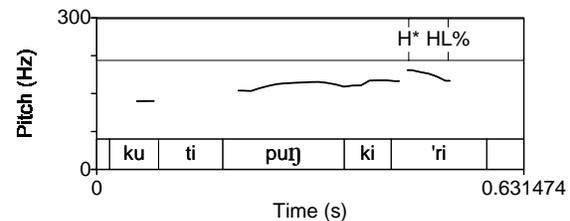


Figure 16: Resumptive question with final HL%
kuti-pu-nki-ri-A'
 return-TRANS-2SG-RESP-EMPH
 'And will you return?' (NQS 1)



5.3. Boundary Tones: Intermediate Phrase

A low intermediate phrase boundary tone (L-) was found prior to the final boundary tone in 44% of the declaratives (37 utterances). In pronominal questions and yes/no questions an L- was also observed; see Fig. 17. In non-final phrases, intermediate phrase boundary tones may also be possible; see Fig. 18 and Fig. 19. However, given that utterances followed by a pause were excluded from this data set, further exploration of this possibility is still needed. In terms of a high tone (H- in particular), instances of posttonic prenuclear peaks may actually be examples of a peak followed by an even higher H-.

Figure 17: Declarative with L- prior to final L%
mikhu-chka-n
 eat-PROG-3SG '(it) is eating' (NQSS 4)

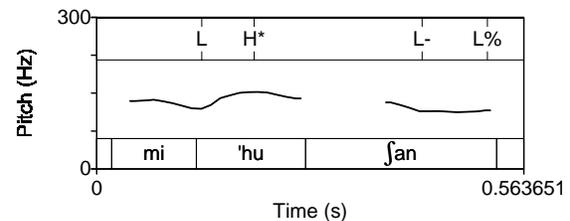


Figure 18: Yes/no question with L in non-final phrase
michi-q-chu *apa-chka-nkichik*
 feed-PARTPRES-INT bring-PROG-2PL
 'Will you (pl.) bring (that pig) to graze?'
 (NQSS 4)

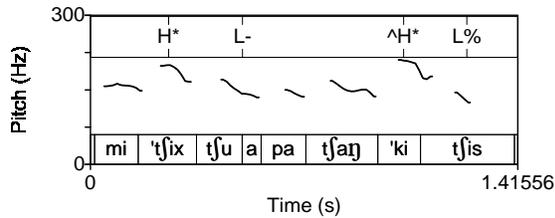
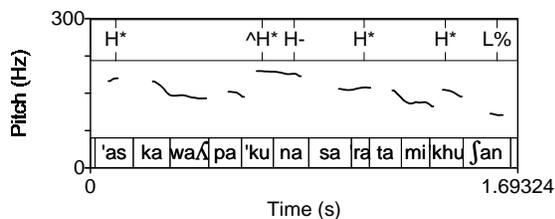


Figure 19: Declarative with H in non-final phrase
Aska wallpa-kuna sara-ta mikhu-chka-n
 many chicken-PL corn-ACC eat-PROG-3SG
 'A lot of chickens are eating corn.' (NQS 1)



To summarize, the following intermediate phrase and final boundary tones are posited for Cuzco Quechua in (6) and (7):

(6) Intermediate phrase boundary tones:

L-, (possibly H-). Utterance type: Declaratives, pronominal questions, yes/no questions, 'non-neutral' questions

(7) Final boundary tones:

L%, LH%, Ø%. Utterance type: Declaratives, pronominal questions, yes/no questions

H%, HL%, Ø%. Utterance type: 'non-neutral' confirmative questions, resumptive questions, echo questions

6. CONCLUSION

The present paper has been offered as an initial analysis of Quechua intonation within the AM model. The current set of recordings of Cuzco Quechua, which includes declaratives, pronominal and yes/no questions, has been used to identify some basic contours for these utterance types. For declaratives, since all utterances included in the data set were verb-final, a similar neutral pragmatic meaning was assumed. An exception to this is the expression of focus with use of the evidential markers *-mi/m*. Preliminary evidence does not show a distinct contour being employed in conjunction with this morphological marking. Like

declaratives, pronominal questions were shown to end in a fall. Yes/no questions, which are marked morphologically with the suffix *-chu*, likewise ended in a fall. Some questions with 'non-neutral' pragmatic meaning have been discussed which do show a different, high final boundary tone. An inventory of pitch accents and boundary tones has been offered but may need to be revised and expanded upon examination of a larger data set with more utterance types. In particular, the same inventory of pitch accents has been proposed for nuclear and prenuclear position. Further analysis is also needed of multiple non-final pitch accents in order to determine the domain of downstep and upstep and the use of intermediate phrase boundary tones, as well as to examine the prosodic structure of Quechua utterances. Nonetheless, the analysis of Cuzco Quechua intonation can be used as a point of comparison with other Quechua varieties, with other languages in contact, such as Spanish and Aymara, and with typologically related and unrelated languages which may still share similar prosodic structure.

7. REFERENCES

- [1] Boersma, P., Weenink, P. 1992-1997. Praat: Doing phonetics by computer. Available from <http://www.praat.org>
- [2] Cerrón-Palomino, R. 1987. *Lingüística quechua*. Cuzco, Perú: Centro de Estudios Rurales Andinos "Bartolomé de las Casas."
- [3] Chirinos Rivera, A. 2001. *Atlas lingüístico del Perú*. Cusco, Peru: Ministerio de Educación, Centro de Estudios Regionales "Bartolomé de las Casas."
- [4] Cole, P. 1984. *Imbabura Quechua*. London: Croom Helm.
- [5] Cusihuamán G., A. 1976. *Gramática quechua, Cuzco-Collao*. Lima: Ministerio de Educación: Instituto de Estudios Peruanos.
- [6] Hintz, D.M. 2006. Stress in South Conchucos Quechua: A phonetic and phonological study. *International Journal of American Linguistics* 72, 477-521.
- [7] Ladd, D.R. 1996. *Intonational Phonology*. Cambridge ; New York: Cambridge University Press.
- [8] Mannheim, B. 1991. *Language of the Inka since the European Invasion*. Austin: University of Texas.
- [9] O'Rourke, E. 2005. *Intonation and Language Contact: A Case Study of Two Varieties of Peruvian Spanish*. Doctoral dissertation, University of Illinois at Urbana-Champaign.
- [10] Parker, G.J. 1969. *Ayacucho Quechua Grammar and Dictionary*. The Hague: Mouton.
- [11] Pierrehumbert, J. 1979. The perception of fundamental frequency declination. *JASA* 66.2, 363-369.
- [12] Pierrehumbert, J. 1980. *The Phonology and Phonetics of English Intonation*. Doctoral dissertation, MIT.
- [13] Samanez Flórez, D.I. 1996. *Gramática del quechua del Qosqo*. Cuzco, Peru: Academia Mayor de la Lengua Quechua.
- [14] Soto Ruiz, C. 1979. *Quechua: Manual de enseñanza*. Lima: Instituto de Estudios Peruanos.
- [15] Torero, A. 1965. Los dialectos quechuas. *Anales Científicos de la Universidad Agraria* 2.4, 446-478.