VOWEL DEVOICING IN CUSCO COLLAO QUECHUA

Ann Marie Delforge

Montclair State University, USA
delforgea@mail.montclair.edu

ABSTRACT

This paper presents the first description of vowel devoicing in Quechua. The characteristics of the process as well as the environments most conducive to its occurrence are reported based on an analysis of 4062 vowels extracted from interviews with 16 speakers of the Cusco Collao dialect. Patterns of Quechua vowel devoicing appear to be generally consistent with the gestural overlap model that has been utilized to explain similar phenomena in other languages. The finding that Quechua vowel devoicing is morphologically conditioned, being largely concentrated in a small group of frequently-occurring suffixes, is interpreted as a usage-based effect.

Keywords: Quechua, vowel devoicing, usage-based phonology

1. INTRODUCTION

While many characteristics of a number of Quechua varieties have been extensively documented and analyzed, the existence of vowel devoicing in the language has thus far been the subject of only one passing comment in a text describing the syntax of a Bolivian dialect [7]. This brief mention simply indicates that Quechua vowels sometimes devoice when followed by a voiceless consonant. The present study provides a detailed description of vowel devoicing in Cusco Collao Quechua, a variety spoken in parts of Southern Peru, based on the analysis of 4062 vowels (721 devoiced) extracted from the conversational speech of 16 informants. Analysis of the data indicate that occurrence of this weakening process is determined by both phonetic and morphological factors.

2. BACKGROUND

Quechua has three vowels, /i, a, u/. In the Cusco Collao dialect, all of which exhibit quality changes when in contact with uvular consonants /q/, /q^h/ and /q'/, with /i/ being realized as [ɨ], [ɛ] or [e], /u/ as [ʊ], [ɔ] and /a/ as [ə]. Several vowel-glide sequences, /aj/, /uj/ and /ij/, also occur in Cusco Collao Quechua. The most notable aspect of this dialect's consonantal inventory, shown in Figure 1, is the existence of three series of stops and affricates; plain, aspirated and ejective. Cusco Collao Quechua is also known for its frequent lenition of syllable-final consonants. These weakenings have produced the low-yield phonemes shown in parentheses en Figure 1.

Figure 1: The consonants of Cusco Collao Quechua.

voiced	***unaspirated***	***aspirated***	***ejective***
m w	p (φ)	p^h	p'
n l r	t s	t^h	t'
ɲ ʎ j	tʃ (ʃ)	$tʃ^h$	tʃ'
	k (x)	k^h	k'
	q (χ)	q^h	q'
	h		

Quechua is an agglutinative language and, with the exception of occasional stem reduplification and several infixes, suffixing is its only morphological process. Suffixes are of three types, derivational, inflectional and sentential or discourse-level which are added to stems in that order. The small group of discourse-level suffixes may be added to both nouns and verbs and are of two basic types, validators, which express the relationship between the speaker and the information reported, and connectors which mark the relationship between the different elements of a conversation. The following examples illustrate word formation in Quechua:

Awa	*ku*	*shanku*	*ña*
Root	benefactive (derivational)	progressive (inflectional)	inceptive (discourse)
	'to begin to weave for them'		
Tarwi	*cha*	*kuna*	*pis*
Root	diminutive (derivational)	plural (inflectional)	connector (discourse)
	'and little lupines'		

3. DATA

Data were collected in two rural areas near two villages, Umasbamba and Patacancha, located in the Southern Peruvian Department of Cusco. In both places, a community member bilingual in

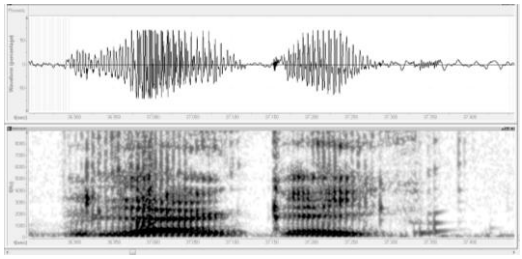
Quechua and Spanish conducted interviews with informants. Eight men and eight women, ranging in age from 18 to 57, participated in the study. None had any reported speech or hearing problems and all were functionally monolingual in Quechua although several did know some basic phrases in Spanish. Recordings were made in informants' homes or in their fields using a Sony MZ RH910 mini disc player and a Sony ECM MS907 microphone. A native speaker of Quechua who teaches the language professionally later orthographically transcribed two minutes of each informant's speech and provided an analysis of the texts that indicated the meaning and grammatical function of all morphemes. All vowels in the sample adjacent to at least one voiceless consonant or to a pause were analyzed spectrographically. Vowel-glide sequences were also examined but not included in the analysis as none were observed to exhibit devoicing.

4. FINDINGS

4.1. Acoustic characteristics

Like vowel devoicing in Japanese [1], Greek [3], Turkish [6], Quebec French [2] and a variety of less-studied languages [4], Quechua vowel produces an array of phonetic results ranging from weakening and shortening to complete devoicing as well as apparent elision. Criteria employed by several previous studies [2, 6] of vowel devoicing were used to divide tokens affected by the process into three descriptive categories. Vowels were labeled as partially devoiced/shortened when the length of their voice bar was 30 ms or less as in Figure 2.

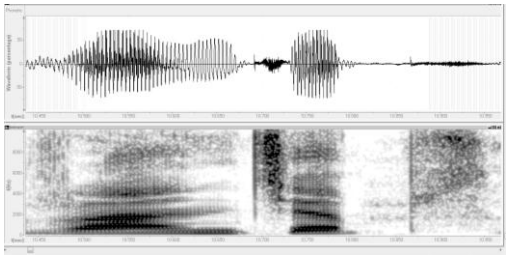
Figure 2: Weakly voiced /u/ in *llankayku* 'we work'.



/ ʎ a n k a j k u̥/

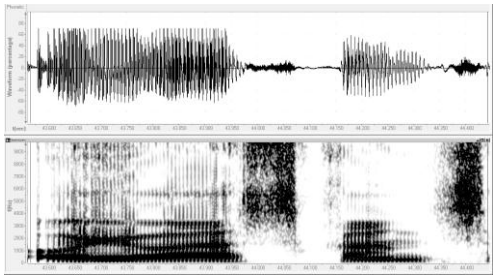
Where no glottal tone was present but some energy could be observed in the first and second formants and the syllable did not appear to be temporally reduced, vowels were considered "completely devoiced" (Figure 3). If neither formants nor voice bar were present and the syllable did seem to be shortened as in Figure 4, vowels were classified as "apparently elided". The application of these criteria led to the labeling of 626 vowels (86.82% of affected tokens) as completely devoiced, 53 (7.350%) as partially devoiced and 42 (5.83%) as apparently elided.

Figure 3: Completely devoiced /i/ in *ranchapis* 'and fungus'.



/ r a n tʃ a p i̥ s/

Figure 4: Apparent elision of /i/ *uywasqanchis* 'we are bringing'.



/ u j w a s q a n tʃ i̥ s /

4.2. Phonetic context

The data demonstrate that vowel devoicing in Cusco Collao Quechua is conditioned by the same phonetic factors found to affect the occurrence of devoicing in other languages. The majority of these are consistent with proposal that the process is a result of gestural overlap in which the vocal fold abductions required to produce adjacent voiceless consonants prevent the adduction necessary for full voicing of intervening vocalic segments. Such an account of Quechua devoicing is, of course, admittedly speculative in the absence of articulatory data.

As shown in Table 1, devoicing primarily targets /i/ /u/ and the schwa-like allophone of /a/ produced in proximity to uvular consonants, vowels whose limited duration can be expected to increase the probability that their voicing will be impeded by contiguous voiceless consonants. It should be noted that the identity of the vowel in 144 tokens of the additive discourse-level suffix *pas* 'and' could not be determined. This morpheme is alternately spelled as *pas* and *pis* and, as these

tokens were completely devoiced, there was insufficient acoustic evidence to classify them as potentially containing either /i/ or /a/. They are therefore represented with an 'x' in Table 1. Because the vowel in the 14 voiced tokens of the suffix, variably transcribed as *pis* or *pas* by my consultant, were short and very centralized, it seems probable that the vocalic target in the voiceless tokens was also a schwa.

Table 1: Devoicing percentages by vowel.

vowel	% devoiced
/i/	14.50
/a/	4.98
[ə]	22.00
/u/	16.00
'x'	91.00

Two of the contextual factors that propitiate devoicing are also associated with decreased vowel length. Vowels are much more likely to be devoiced in closed than open syllables (28% versus 11%) and particularly likely to devoice in syllables closed by a voiceless consonant (44%). Unstressed vowels are devoiced far more often than stressed vowels (16.57% versus 3.32%). While the comparative length of vowels in closed versus open syllables and in unstressed versus stressed syllables has not been established for Quechua, cross-linguistic tendencies for vowel length to be reduced in closed and in unstressed syllables [8, 9] suggest that Quechua vowels may also be shorter in these contexts.

One aspect of the relationship between devoicing and the characteristics of surrounding consonants is consistent with a gestural overlap explanation of the effect. Thirty percent of vowels located between two voiceless consonants, and thus doubly likely to be hidden by the glottal opening gestures of adjacent sounds, were classified as devoiced while just 1.56% of those flanked by only 1 voiceless consonant were affected by the process. However, the finding that only one instance of vowel devoicing occurred following an aspirated affricate and no devoicing was observed in vowels following aspirated stops is unexpected under the gestural overlap model. As these sounds presumably have large glottal openings, they would be predicted to frequently prevent the voicing of vowels they immediately precede.

Results also demonstrate that, as in many other languages [4], Quechua vowel devoicing is strongly associated with the final position of both words and phrases. Thirty-six percent of vowels located in word-final syllables were devoiced while only 6.06% of word medial syllables and 1.11% of word-initial syllables were affected. Devoicing was observed in 42% of vowels in pre-pausal syllables, but occurred in just 12% and 1.43% of phrase-medial and phrase-initial syllables, respectively. While neither of these effects appears to be related to gestural overlap, devoicing in phrase-final, pre-pausal syllables finds a ready explanation in the reduced subglottal air pressure at the end of utterances. The tendency for word-final vowels to devoice, on the other hand, is unlikely to be the result of aerodynamic factors. While some Quechua words are quite long, the length of the average word in the current corpus contains only 4.3 syllables, a length that seems unlikely to cause a significant drop in expiratory airflow.

4.3. Morphological context

An examination of the morphological context of devoicing reveals that 65% of devoiced tokens were located in 8 suffixes (Table 2) with the discourse level suffix 'and' alternately spelled as *pas* and *pis* alone accounting for 20% of all devoiced vowels in the sample.

Table 2: Devoicing Rates in Suffixes.

suffix	suffix type	devoiced /total	% devoiced
pas/pis	discourse	144/158	91
chu	discourse	57/74	77
taq	discourse	52/70	65
paq	derivational	50/83	60
qa	discourse	23/43	52
pi	derivational	26/55	47
chis	inflectional	38/89	43
ta	derivational	65/185	35

An additional 14% of devoiced tokens were found in a ninth phonetic sequence *ku* which forms part of several different verbal inflections. As many of the suffixes associated with devoicing are closed syllables in which vowels of limited duration are flanked on the both sides by voiceless consonants, they provide an optimal phonetic environment for the effect. However, their strong relationship with devoicing cannot be entirely attributed to phonetic factors; the devoicing rate for /i, u, ə/ located in closed syllables and flanked by two voiceless consonants in word roots is only 17.72% (28/158).

One possible explanation of the difference between devoicing rates for suffixes and closed

syllables with a C̥VC̥ configuration in word stems is frequency of occurrence. While no official data on word and suffix frequencies exist for Quechua, many of the suffixes in Table 2 can be reasonably classified as frequently-used on an impressionistic basis. On the other hand, none of the roots containing closed C̥VC̥ syllables occurred more than 10 times in the corpus. Furthermore, as Quechua suffixes do not exhibit allomorphic variation [8], apart from vowel devoicing, their frequent occurrence implies the repetition of identical phonetic sequences just as is the case for free morphemes. Thus, higher frequency of use would increase the chances of their production with devoiced vowels in rapid speech, casual speech which could in turn eventually reorganize mental representation in a manner favoring variants with voiceless vowels.

A usage-based model of Quechua vowel devoicing also provides explanations for two aspects of the process not readily explained in purely phonetic terms; the lack of devoicing following aspirated stops and affricates and the association of devoicing with word-final syllables. Aspirated stops and affricates occur only infrequently in Quechua and are limited to a few word stems. They would thus be unlikely to develop a representation in which devoicing predominates. And, the large percentage of devoiced tokens found in suffixes accounts for the finding that devoicing occurs primarily in word-final position.

The data in Table 2 also indicate that, with some minor discrepancies attributable to phonetic factors, discourse level suffixes are more likely to exhibit devoicing than either inflectional or derivational suffixes. This tendency is interesting in light of Mannheim's [8] hypothesis, based on the examination of colonial documents, that consonant lenitions now found in all word positions in the Cusco Collao dialect first developed in discourse level suffixes and later spread, first to other types of suffixes and later to word roots. Vowel devoicing occurred more frequently in the speech of the younger informants who participated in this study. While it is impossible to draw conclusions based on the speech of 16 informants, this tendency at least suggests that devoicing might be a change in progress and could be gradually spreading through the Quechua lexicon following the same trajectory that seems to have occurred with consonantal weakening. It is interesting to speculate that Colonial Era consonant lenition in Cusco Collao Quechua may also have been mediated by a frequency effect.

5. CONCLUSION

This study offers a description of a previously undocumented aspect of Quechua phonetics. The phonetic profile and conditioning of Quechua vowel devoicing is shown to be consistent with cross-linguistic trends and amenable to explanation as the result of gestural overlap. The clustering of devoiced tokens in a small set of often-used suffixes suggests that this weakening process is partially attributable to a usage-based effect.

6. REFERENCES

[1] Beckman, M. 1996. When is a syllable not a syllable? In Otaki, T., Cutler, A. (eds.), *Phonological Structure and Language Processing: Crosslinguistic Studies.* Berlin: Mouton de Gruyter, 95-123.

[2] Cedergren, H. 1986. Metrical structure and vowel deletion in Montreal French. In Sankoff, D (ed.), *Diversity and Diachrony* Amsterdam: John Benjamins, 293-300.

[3] Dauer, R. 1980. The reduction of unstressed high vowels in Modern Greek. *Journal of the International Phonetic Association* 10, 17-27.

[4] Gordon, M. 1998. The phonetics and phonology of non-modal vowels: A cross-linguistic perspective. *Proceedings of the B.L.S.* 24, 93-105.

[5] Harris, K. 1978. Vowel duration change and its underlying physiological mechanisms. *Language and Speech* 21, 354-361.

[6] Jannedy, S. 1995. Gestural phasing as an explanation for vowel devoicing in Turkish. *Ohio State University Working Papers in Linguistics* 45, 56-84.

[7] Lastra, Y. 1968. *Cochabamba Quechua Syntax.* The Hague: Mouton de Gruyter.

[8] Maddieson, I. 1985. Phonetic cues to syllabification. In Fromkin, V.A. (ed.). *Phonetic Linguistics: Essays in Honor of Peter Ladefoged*, Orlando: Academic Press Inc., 203-219.

[9] Mannheim, B. 1991. *The Language of the Inka Since the European Invasion.* Austin, Texas: The University of Texas Press.