

On the social and linguistic implications of unstressed vowel weakening in Cochabambino Spanish

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Resum: Sobre les implicacions socials i lingüístiques del debilitament vocàlic en l'espanyol de Cochabamba. Aquest article ofereix una anàlisi dels factors socials i lingüístics que afecten el debilitament vocàlic de les vocals, fenomen existent en un dialecte poc estudiat dels Andes, l'espanyol de Cochabamba. Aquest treball és, a més, la primera anàlisi del dit debilitament en l'espanyol, basat en dades compilades a partir d'una tasca de lectura en veu alta.

Paraules clau: Espanyol de Cochabamba, debilitament vocàlic, Teoria H&H, lectura en veu alta.

Abstract: On the social and linguistic implications of unstressed vowel weakening in Cochabambino Spanish. This article offers an analysis of the social and linguistic factors affecting unstressed vowel weakening (UVW) phenomena in a little studied Andean dialect, Cochabambino Spanish. This work is also the first analysis of Spanish UVW that relies on data collected through a read-aloud task.

Keywords: Cochabambino Spanish; unstressed vowel weakening; H&H Theory, read-aloud task.

1. Introduction

Unstressed vowel weakening (UVW) has been studied for several languages such as Japanese, Lezgi, Turkish, and Korean among others (Beckman and Shoji 1984, Jun and Beckman 1993, 1994, Jannedy 1995, Tsuchida 1997, Chitoran and Babaliyeva 2007, Mo 2007). Phonetic experiments have shown that UVW consists of a progression of devoicing phenomena ranging from partial devoicing to complete elision (Jun and

Beckman 1993, 1994) and can be analyzed as the result of gradual gestural overlap (Browman and Goldstein 1990). UVW has also been reported for a variety of Spanish dialects (Boyd-Bowman 1952, Canellada and Zamora 1960, Lope Blanch 1972, Matluck 1952, Gordon 1980, Delforge 2006, 2008a, 2008b, 2009, Lipski 1990); however, differently from the studies conducted on other languages, the analysis of Spanish UVW has been exclusively based on data extracted from sociolinguistic corpora containing free-speech interviews, never in more controlled experiments.

The present article will focus on UVW phenomena in a Spanish dialect for which they have never been closely analyzed: Cochabambino Spanish. This work is also the first study on Spanish UVW that utilizes a read aloud task. Phonetic and social variables (gender, age) are analyzed to determine the internal and external factors regulating UVW variability among middle-class Cochabambino Spanish speakers. Findings are further analyzed in light of the theoretical framework provided by Articulatory Phonology (Browman and Goldstein 1989) and Hyper and Hypo Theory (H&H Theory) (Lindblom 1990).

The rest of this paper is organized as follows: section 2 reports the findings of previous studies on UVW; section 3 introduces data and methodology; section 4 presents the results; section 5 discusses the social and linguistic findings. Finally, section 6 concludes.

2. Previous studies

Vowel devoicing and elision have been reported for a variety of languages. During the last decades experimental research has shown that these phenomena are dependent on several phonetic factors such as vowel quality, accent, consonant context, and speech rate. Han's (1962a,b) pioneering studies on Japanese UVW indicate that vowel weakening depends on whether or not the vowel is accented and on the type of adjacent consonants. Jun and Beckman (1993, 1994) show that Japanese and Korean UVW is favored by high, unaccented vowels, especially when adjacent to voiceless consonants and at a fast reading rate. They suggest, within the Articulatory Phonology framework (Browman and Goldstein 1989), that vowel weakening is the result of a process involving gestural overlap and hiding of glottal gestures.

As for Spanish, a variety of studies have examined UVW phenomena. Lope Blanch (1972) identifies instances of UVW in Mexico City Spanish. He points out that UVW should not just be analyzed as a case of vowel deletion, as previously suggested by Canellada and Zamora (1960); rather, he stresses the fact that UVW manifests itself under a variety of phenomena, ranking from partial devoicing to complete elision. Amongst the most important linguistic factors affecting the variation, he points out consonant environment. The author, in fact, highlights that voiceless segments (in particular /s/) appear to favor UVW. As for the external factors patterning the variation, Lope Blanch is not able to pinpoint any clear social variable (1972, p. 56). Gordon (1980) carries out

an impressionistic study on Highland Bolivian Spanish and points out that unstressed vowels were often devoiced and deleted, especially when found in the /tVs/ consonant context. He also mentions that UVW is more common in informal speech than in formal one. A decade later, Lipski (1990) conducts a study on Ecuadorian Spanish and provides a more detailed quantitative account. The author shows that the segments /e/ and /i/ tend to be affected the most by UVW processes, in particular when in contact with /s/. Lipski provides an account of vowel deletion rates according to the vowel position in the word. In final syllable the percentages of deletion are as follows: /e/ 75%, /o/ 10% and /a/ 4%, with /i/ and /u/ showing a negligible amount of deletion, likely due to the fact that their occurrence in final syllable position is not frequent in Spanish. In non-final syllable: /i/ 50%, /e/ 30%, /u/ 5%, with minimal deletion for /a/ and /o/. The author points out that vowel weakening in final syllable is more likely to occur, since /e/ appears as the default vowel in plural morphemes (e.i. *canciones* ‘songs’), and /o/ is morphologically predictable in first plural person verb conjugations (e.i. *tomamos* ‘we drink’).

Delforge (2006, 2008a, 2008b and 2009) analyzes UVW phenomena in Cusco, Peru. She shows that UVW used to be a common feature of the Cusco dialect and that it has become stigmatized in recent times. Due to this recent stigma, UVW has gradually lost ground and it has almost completely disappeared from the speech of young Cusqueños. Findings indicate that women present lower rates of UVW (5.8%) than men (9.79%) and middle class women present the lowest levels of weakening (3.28%). Delforge (2008a) provides the UVW rates for each vowel, or “the number of reduced tokens of a particular vowel divided by the total number of times it occurs in unstressed syllables” (Delforge 2008a, p. 113) (/e/ 20%, /o/ 13%, /i/ 13%, /a/ 8%, and /u/ 5%). She offers an analysis of UVW phenomena by adopting the Articulatory Phonology framework (Browman and Goldstein 1989), where syllable realization is presented in terms of articulatory gestures. She indicates that voiceless consonant contexts with late glottal opening (i.e. /s/) are more likely to favour UVW phenomena, since they are inherently more predisposed to overlap the articulatory gesture of the nearby segments. In her analysis, highly frequent filler words like *pues* ‘well’, *entonces* ‘then’ and *digamos* ‘let’s say’, which are generally produced as [ps], [eɲtons] and [diɣams], were not counted. This was done to avoid overrating the frequency of vowel reduction in the final word contexts [p_s], [s_s] and [m_s].

3. Methodology

The use of free-speech interviews, a fieldwork technique that has been repetitively adopted to collect data on Spanish UVW, has the advantage of providing big sets of data, which are quantitatively rich in variation phenomena. The corpora created by relying on this methodology are usually stratified according to a variety of social (external) factors (Tagliamonte 2006, p. 32). Thus, they are well-suited for sociolinguistic studies, in which certain socioeconomic, ethnic and gender parameters have often been identified as the main

drivers of language variation and change (Blas Arroyo 2005). Nevertheless, the collection, transcription and codification of such speech information require significant fieldwork research—as well as financial resources—and do not often provide a precise picture of how the linguistic (internal) factors influence the phenomenon under investigation. On the other hand, highly controlled lab experiments (i.e., read aloud tasks based on word lists) can be designed to pinpoint the exact effects of certain linguistic (internal) factors (i.e., word frequency, surrounding phonological context, etc), and since they do not generally aim at accounting for social dynamics, they do not require a vast number of speech participants. Therefore, besides the comparatively more detailed level of linguistic analysis, these methodologies also have the advantage of consuming less time and resource. However, these strategies of data collection are not without problems. In fact, in line with the well-known Observer's Paradox, they are not compatible with the study of phenomena that may be less likely to be produced in systematized speech tasks, when people are expected to pay close attention to the way they speak (i.e., socially stigmatized phenomena) (Labov 1972).

UVW in Andean Spanish is quite stigmatized (Delforge 2006, 2009), thus a highly controlled methodology would face serious barriers during the phase of data collection. Conversely, a purely quantitative analysis based on free-speech interviews would require a higher investment in time and resources and would result in a less standardized analysis of internal linguistic factors. For these reasons, an experiment was designed with the purpose of balancing the aforementioned research needs without losing sight of the phenomenon under analysis, and coping with a limited budget. The main goal, in this specific case, was to develop a standardized task that could provide a set of homogeneous linguistic stimuli, which however did not automatically imply the complete elimination of UVW phenomena from the corpus as a consequence of a huge rise in speakers' metalinguistic awareness.

This study took place in Cochabamba, in a residential neighborhood called *Barrio Telefónico*. Twelve middle-class speakers, selected according to gender (male and female) and generation (generation a: 18-29; generation b: 45-57), were asked to read aloud a text extracted from the Spanish pronunciation book *Catálogo de Sonidos* (Morgan 2004, p. 211) and entitled *El Caballo de Troya* 'The Trojan horse'. The recordings were carried out in the speakers' apartments. The data were recorded directly onto a laptop computer using WaveSurfer 1.8.5 and a Plantronics DSP microphone with a sampling rate of 44.1 kHz.

The participants were native speakers of Cochabambino Spanish and did not speak any other language proficiently, some of them indicated they had some basic knowledge of English, but would not be able to carry a conversation in this language.

The speech segment analyzed for this experiment lasted approximately one minute. It contained 122 unstressed vowels. Participants had to read the text twice, so that a total of 244 unstressed vowels could be collected for each participant. Adopting a read aloud task provided better control over linguistic factors, since every speaker had to produce exactly the same vowels in the same phonological contexts. In addition, since Lipski (1990) indicated that /e/ and /o/ tended to be reduced more often when found in plural

morphemes (i.e. *canciones* ‘songs’) and in first person plural present verbs (e.i. *tomamos* ‘we drink’), I used for my stimuli a text in which these contexts were not present. In this way, I excluded from my stimuli contexts that were likely to favor vowel weakening not because of their inherent phonology, but rather because of their morphological predictability.

Data were classified according to three different categories, which represent an adaptation of Delforge’s (2008a) classification. Vowels were labelled as partially devoiced when their voice bar was half of their total duration or longer¹ (Figure 1); segments were labelled as “completely devoiced” when the length of their voice bar was less than half of their total duration (Figure 2) and the vowel was classified as “apparently elided” when it was not possible to observe it in the spectrogram, as /o/ in *troyanos* ‘Trojans’ (Figure 3).

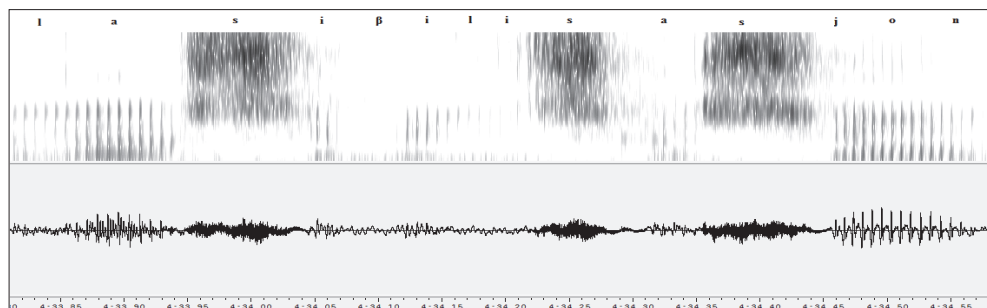


Figure 1. Partially devoiced /a/ in *civilización* ‘civilization’.

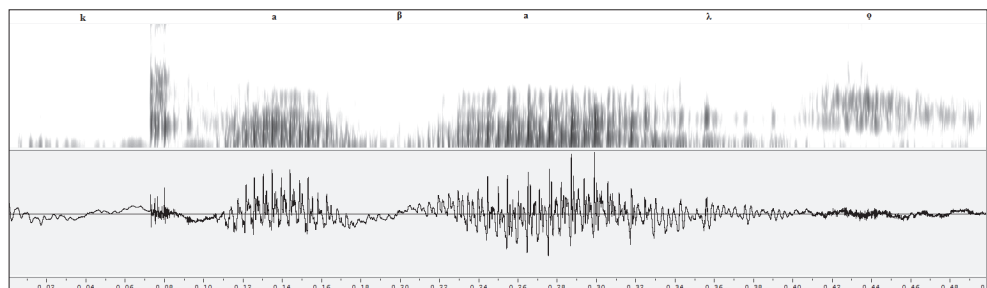


Figure 2. Completely devoiced /o/ in *caballo* ‘horse’.

1. In order not to classify fully voiced vowels as partially devoiced, only those which had at least 5% of devoicing were included in this category.

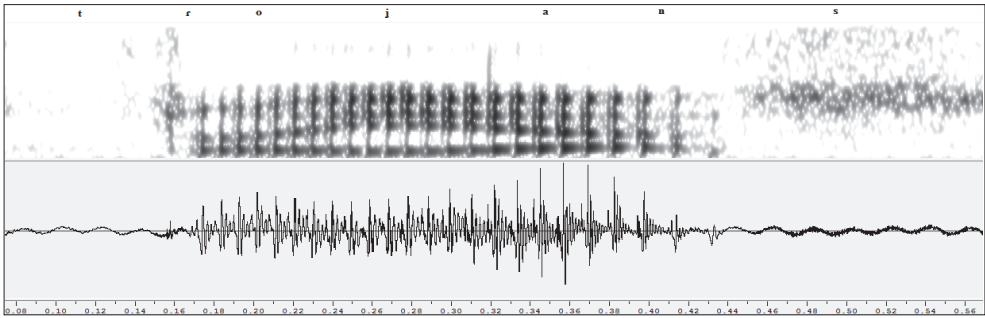


Figure 3. Apparently elided /o/ in *troyanos* ‘Trojans’.

4. Results

4.1. Phonetic findings

Out of a total of 2928 unstressed vowels collected during the experiment, 2909 were analyzed, while 19 had to be discarded due to poor recording quality. 5% of these tokens were identified as weakened (147 instances). These tokens were classified according to the three categories depicted in Figure 1, 2 and 3; thus 71% of them were partially devoiced, 23% were completely devoiced, and 6% were labelled as apparently elided.

Table 1 provides the percentage of unstressed vowel weakening and their weakening rates. Data indicate that vowels are affected differently by UVW phenomena depending on their category: /o/ shows the highest percentage of weakening (32%), followed by /i/ (24.5%), /a/ (23.1%), /e/ (22.2%) and /u/ (8.2%). Nevertheless, since vowels have different frequencies of use, it is imperative to analyze not only the percentage of weakening, but also the weakening rate, in line with Delforge’s observation (2008a, p. 113). The weakening rates show that /i/ is the most affected segment (7.5%), followed by /u/ (6.3%), /o/ (6.1%), /e/ (4.7%) and /a/ (3.4%).

TABLE 1. NUMBER, PERCENTAGE AND RATE OF VOWELS AFFECTED BY UVW

Vowels	Number of Reduced Tokens	Percentage of Weakening	Weakening Rate
/o/	47	32%	6,1%
/i/	36	24,5%	7,5%
/a/	34	23,1%	3,4%
/e/	18	12,2%	4,7%
/u/	12	8,2%	6,3%

Table 2 shows that vowels tend to present higher levels of UVW in final syllables than in non-final ones, in line with previous research (Lipski 1990; Delforge 2008a, 2009). This tendency could not be corroborated for /i/ and /u/, which were never found in such a context in my corpus.

TABLE 2. RATES OF UVW ACCORDING TO SYLLABLE POSITION

	Non-final Syllable	Final Syllable
/a/	1,5	5,0
/e/	4,5	6,3
/i/	7,5	-
/o/	3,6	6,9
/u/	6,3	-

Results in Table 3 indicate the number of weakened vowels according to preceding and following contexts. Data show that vowel weakening is more likely to occur when preceded by a voiceless segment, especially /s/. This result supports Lope Blanch's and Delforge's analyses, who reported similar findings for the Mexican and Peruvian dialects respectively. However, Table 3 provides findings for voiced segments, which have

generally not been reported by previous researchers (Lipski 1990; Delforge 2008a,b). Table 3 shows that vowel weakening may occur also when the reduced vowel is adjacent to a voiced consonant, as in the following cases *desarrollo*, *soldados*, *cruzar*, etc.

TABLE 3. NUMBER OF TOKENS AFFECTED BY UVW ACCORDING TO PRECEDING AND FOLLOWING CONTEXTS.

Voicing	Sound Class	Segment	Preceding the Reduced Vowel	Following the Reduced Vowel
Voiceless	Stops	t	16	8
		k	22	6
		p	16	0
	Affricates	tʃ	10	0
	Fricatives	s	45	30
		x	0	17
		f	5	0
		r	0	6
Voiced	Stops	d	10	3
		b	0	9
	Nasals	m	4	6
		n	0	16
	Laterals	ʎ	14	3
		l	0	6
		ʎ	5	11
	Vowels	V	0	13
Pause	Pause	##	0	13
Total			147	147

4.2. Social Findings

Sociolinguistic results clearly indicate that the factor ‘generation’ shows a significant effect on the phenomenon analyzed (χ^2 (df 1, n 2909) = 26,767, $p < .001$) (Figure 4). In fact, UVW is a distinctive linguistic feature of middle-aged individuals (7.0%), and it is more limited in the speech of younger speakers (3.0%). Conversely, the factor ‘gender’ does not seem to have a significant effect on UVW variability (Figure 5), even though, overall, women favor weakening over men (χ^2 (df 1, n 2909) = 2,573, $p < .1$). Nevertheless, the rates of UVW across gender groups do not appear to follow parallel paths of evolution cross generationally. Indeed, it is interesting to note that women went from being the most reducing group to the least reducing one within one generation (Figure 6).

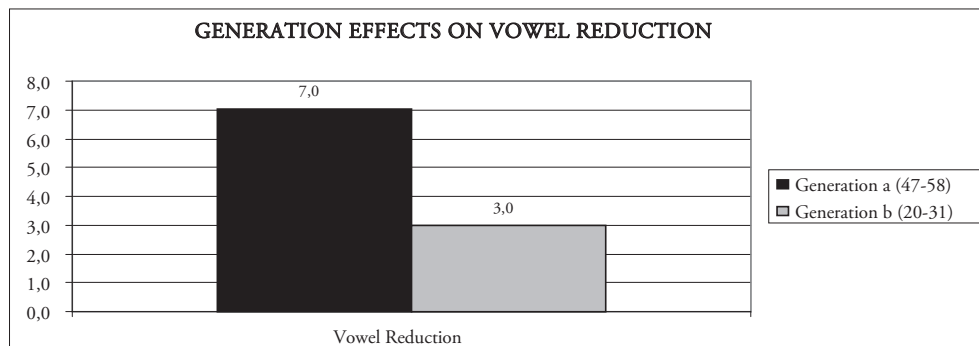


Figure 4. UVW distribution across generations.

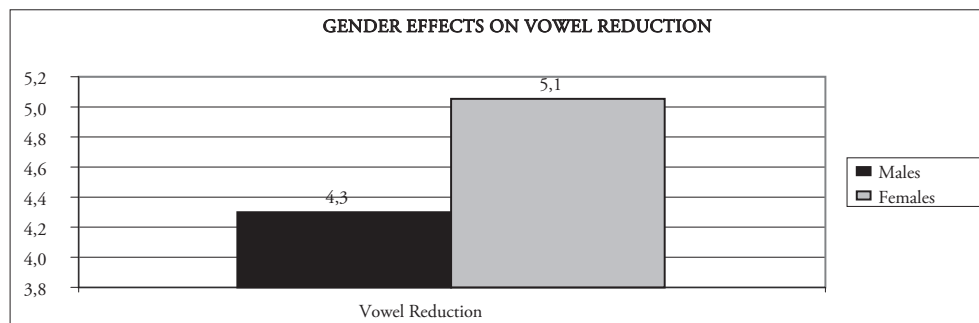


Figure 5. UVW distribution across genders.

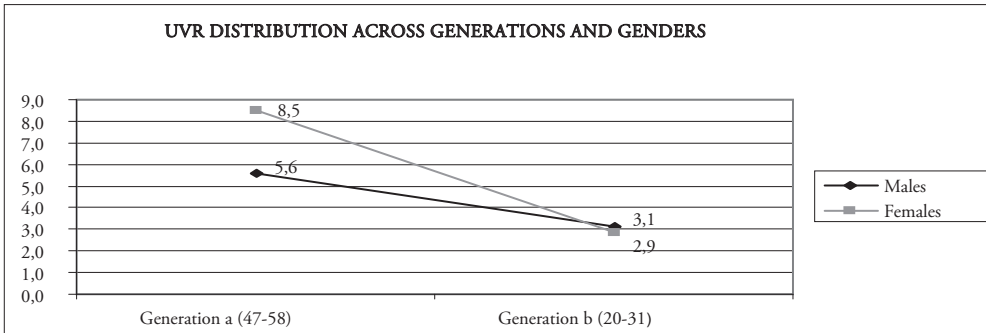


Figure 6. UVW distribution across generation and gender.

5. Discussion

UVW in Cochabambino Spanish, as well as in a variety of other languages, can be described as a continuum of phenomena, ranking from partial devoicing to elision. Studies on Korean (Jun and Beckman 1993, Mo 2007), Japanese (Beckman and Shoji 1984; Tsuchida 1997), Lezgi (Chitoran and Babaliyeva 2007), Ecuadorian Spanish (Lipski 1990) and Peruvian Spanish (Delforge 2006, 2008b), among others, appear to indicate that voiceless sounds with late occurring glottal opening gestures, as aspirated stops and fricatives, strongly favor following high vowel devoicing. Similar findings have also been reported for Cochabambino Spanish, where UVW seems to be favored by adjacent voiceless consonant contexts. This is line with the predictions of Articulatory Phonology (Browman and Goldstein 1989), where syllable production is described in terms of coordination between articulatory gestures. According to this framework, the shorter the vowel gesture is, the more likely it is to be overlapped. For this reason, stressed and low vowels (i.e., /a/) are less likely to be affected by UVW than unstressed and high ones, (i.e., /i/ and /u/) (Delforge 2008a, p. 116-122). In line with Hall's (2004) analysis of homorganic CV pairs, Delforge (2008a, p. 120) indicates that Spanish UVW should be favored when /e/ co-occurs with /s/ or /t/.² In fact, in her view, the reason

2. An anonymous reviewer does not agree with the use of the term 'homorganic' when talking about vowels vs. consonants since, "even if they are apparently using similar articulators in their production, the dynamics of vowels and consonants are so different [that] it makes such a claim pretty much useless". I can understand why the reviewer is skeptical about this point; nevertheless, I adopted the terminology provided by Delforge (2008a) to offer an account of her analysis of vowel weakening phenomena in Cusco Spanish. Whether it is correct to talk about homorganic CV pairs or not is not highly relevant to the present study, since my main point is that word frequency and morphological predictability are probably exerting a significant effect on patterning this variation, independently of the CV pair combinations.

why /e/ is the most affected segment in Cusco Spanish might be explained by the fact that /s/ and /t/ are the two most frequent voiceless consonants in Spanish (Quilis and Esgueva 1980). Delforge's account offers a new way of looking at vowel weakening phenomena; nevertheless, it does not completely explain why cases of UVW can be found also when the consonant segments adjacent to the vowel are voiced and are not characterized by any particularly large glottal opening gesture (Table 3). I am under the impression that Lipski's (1990) earlier observation on the importance of morphological predictability may provide us with further insights into this issue. The Cochabambino results indirectly appear to back Lipski's intuition. In fact, the relatively low rate of /e/ weakening in my corpus (4.7%) might be due to the fact that /e/ never appeared as the default vowel in plural morphemes in the text used to conduct the phonetic experiment.

Besides Lipski's remarks on the importance of morphological predictability in patterning variation, Delforge's (2008a) choice to remove from her analysis highly frequent words (*pues*, *entonces* and *digamos*) because they presented UVW almost categorically, indirectly backs the idea that frequency must be a key factor too. For these reasons, besides the factor reported by Delforge (2008a) in her study, it appears to be rational to suggest a potential effect of word frequency and morphological predictability to account for these instances of UVW phenomena reported for several Spanish dialects.

Another model that may help us shed light on the nature of UVW phenomena is the one proposed by H&H Theory (Lindblom 1990). This theory describes speech variability as the result of a human adaptive system, capable of regulating the interplay between production-oriented and output-oriented factors. H&H Theory gives high relevance to factors such as word frequency and morphological predictability in the modeling of speech patterns. The theory assumes that speakers tend to maximize sound discriminability while minimizing effort. To apply this model to our case, we may say that if a word is highly frequent or a morpheme is highly predictable, the effort put in the articulation of their vowels would be minimized, thus potentially favoring cases of vowel weakening.

According to Delforge's (2006, 2009) analysis, UVW was relatively common in Cusco Spanish but in recent years it has lost ground due to its stigma. As a result, it is currently encountered in the speech of middle-aged speakers but almost no traces are found in the younger generations' speech. This tendency appears to match the situation encountered in Cochabambino Spanish, where a statistically significant difference is found between the two generations under study. On the other hand, differently from what is found in Delforge's analysis of Cusco Spanish (2006), in Cochabamba no significant distinctions are encountered between men and women for the production of weakened vowels. Moreover, women tend to show UVW more than men³. This piece of

3. An anonymous reviewer wonders whether the speakers' years of schooling could provide an explanation for these results. This is an intuition that cannot be ruled out. However, all of them had a very similar

information is quite unexpected, since sociolinguistic studies have traditionally shown that women usually tend to use less stigmatized/more prestigious variants than men (Labov 1972). However, if we consider, following Delforge, that UVW only recently became stigmatized, we may understand why young women present the lowest levels of UVW. A more detailed sociolinguistic study focusing on the social stratification of UVW is definitely needed to obtain a better picture on the UVW patterns found in Cochabambino Spanish.

6. Conclusion

This work offers an account of UVW phenomena in Cochabambino Spanish. Linguistic findings suggest that UVW manifests itself as continuum of phenomena, here classified into three groups: partial devoicing, complete devoicing, and apparent elision. Vowels are affected in different ways depending on their quality and on their position in the word. The surrounding phonological environment is among the most important factors patterning the variation; as reported for a variety of languages and for other Spanish dialects (Beckman and Shoji 1984, Chitoran and Babaliyeva 2007, Jannedy 1995, Lipski 1990, Lope Blanch 1972, etc.). Voiceless consonants favor UVW; however, cases of vowel weakening have also been reported for vowels adjacent to voiced segments, thus suggesting a potential mediation of other internal factors (i.e., word frequency and morphological predictability).

Social factors affect UVW variation as well. In line with Delforge's (2006) analysis of Cusco Spanish, Cochabambino results show that middle-aged speakers significantly present UVW to a larger extent than younger subjects. However, in contrast with Delforge's study, gender differences do not appear to have any significant effect for the Bolivian sample analyzed. Nevertheless, it must be pointed out that while Delforge (2009) carried out a detailed sociolinguistic analysis based on a sample of 150 speakers, my number of informants were much more reduced (only 12), thus my sociolinguistic results should not be seen as definitive; rather, I believe that more research still needs to be carried out to shed further light on the social dynamics of Cochabambino UVW phenomena.

The current work is the first analysis of Spanish UVW which relied on data collected through a read-aloud task. More controlled experiments can undoubtedly be run to provide a better testing ground for the linguistic and social factors affecting UVW variability. Nevertheless, this work provided the methodological foundation on which future phonetic and sociolinguistic studies on Spanish UVW may build.

level of education –at least at the high-school level. A part of them also obtained a college degree or were currently attending the university.

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