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Velar palatalization in Chilean public speech

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This is a socio-phonetic study that employs an acoustic analysis and a speech accommodation analysis following a variationist sociolinguistic framework. The acoustic analysis provides a phonetic characterization of the variation of /x/ in Chilean Spanish using spectrographic support, which fills a gap in current literature on this specific sound change. The linear regression analysis and speech accommodation analysis work together to identify the motivators for velar palatalization in this variety of Spanish and its acquisition of overt prestige. The results of this study update previous literature on Chilean palatalization regarding internal and external motivators, while adding variant usage patterns based on interlocutor age effects and speech style differences. Public speech data is used in this study to show the extension of velar palatalization into the most formal registers of Chilean Spanish.

Keywords: Palatalized fricative; speech accommodation; center of gravity

1 Introduction and background

1.1 Palatalization of /x/ in Chilean Spanish

Lenz (1940) was the first to document the palatalization of the velar fricative /x/ to the palatal fricative [ç] before front vowels /i/, /e/, and the glide /ie/ in Chilean Spanish. While it is common for many Spanish speakers to palatalize /x/ before a high front vowel /i/ or glide /ie/, palatalization preceding a middle vowel /e/ (/xe/ → [çe]) is unique to the Chilean variety (Hualde 2005). Both Oroz (1966) and Hualde (2005) consider the Chilean variant a palatal fricative [ç], but there are no acoustic studies to date that provide detailed phonetic descriptions of the variants. Figures 1 and 2 illustrate examples of the two principal variants of the variable /x/ in the /xe/ context.

Most of the work on Chilean palatalization has been sociolinguistic or ethnographic. Oroz (1966) noted that palatalization of /x/ before /e/ was common throughout most of mainland Chile¹ but only among the lower classes, especially the working class residents of Santiago; an observation that was challenged in a later study (Cepeda 1991). Cepeda (1991) maintains that the palatalized fricative [ç] is a feminine marker used by all classes and age groups in Valdivia, and is considered prestigious among 24–42 year olds. Though earlier reports (Lenz 1940) had attributed the assimilation to contact with indigenous languages, Oroz's work (1966) rejected this motivation given the spread of the variation across Chile, including areas with no indigenous language contact.

¹ Oroz (1966) describes the language spoken in southern Chile (north of the Lakes region), but primarily focuses on the more populated cities of the central region. Araya (1968) studied the language of southern Chile and the island of Chiloé and did not find velar palatalization, but rather weak aspiration [h] of /x/ preceding front vowels.

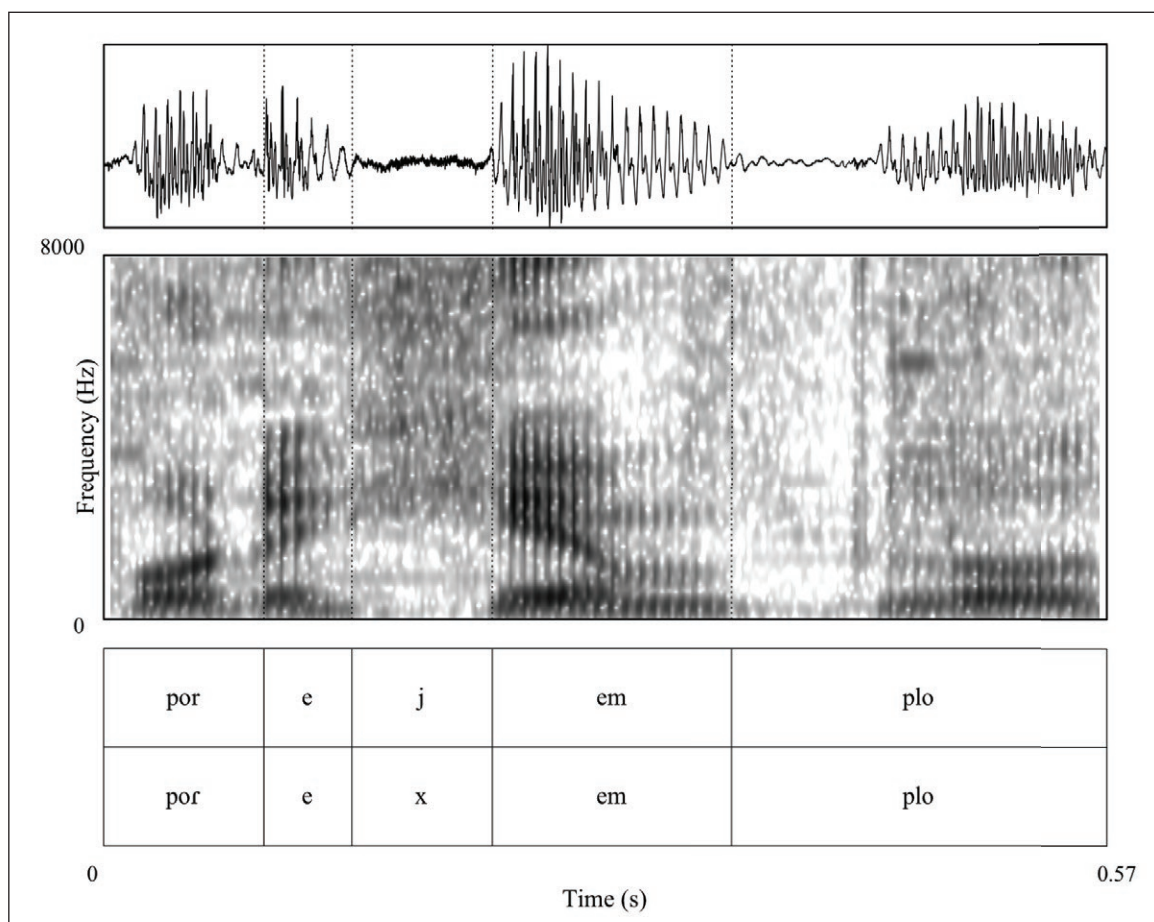


Figure 1: Token *por ejemplo* ‘for example’ [po.re.xem.plo] with a velar [x] production by male speaker MHRU.

The current study combines a variationist and speech accommodation framework based on acoustic measurements. This study seeks to update the literature on Chilean palatalization by providing (1) a phonetic description of the variation based on acoustic evidence; (2) an examination of the internal and external factors that motivate variation; and (3) an analysis of speech accommodation based on listener traits that affect the production of the palatalized variant.

1.2 Phonetic framework

Browman and Goldstein’s articulatory approach (1990) will serve as a theoretical framework for the current study. According to Browman and Goldstein (1990), palatalization can be explained mechanically as the result of the temporal overlap of a non-palatal consonant with a neighboring palatal (or front vowel) segment. This explanation suits the velar palatalization of /x/ in Chilean Spanish, as it occurs before front vowels [i] and [e]. Further, Browman and Goldstein’s framework is compatible with the acoustic methodology being conducted in this study.

Forrest et al. (1988) developed a method to calculate place of articulation for voiceless obstruents using spectral means, that is, the average of the energy peaks that occur within the noise segment of the consonant. This method has since been applied to other types of consonants and has been shown to be particularly effective with voiced and voiceless fricatives (Jongman et al. 2000; Silbert & de Jong 2008; File-Muriel & Brown 2011). This

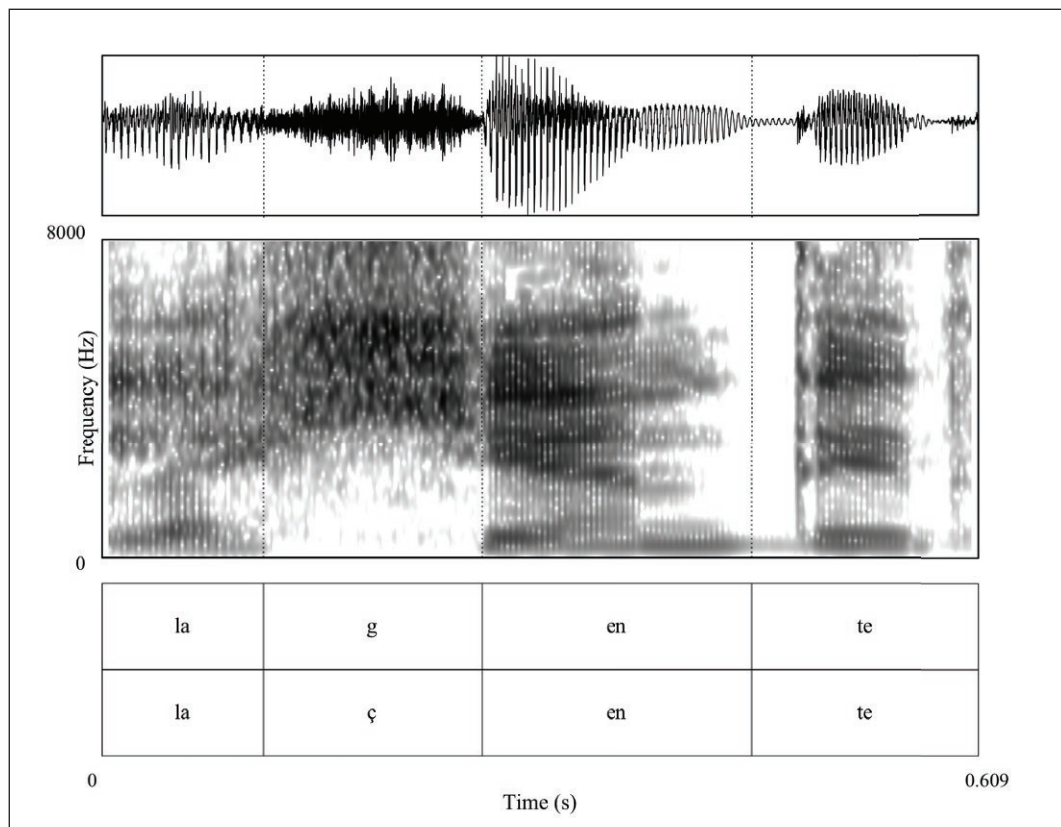


Figure 2: Token *la gente* “people” [la.çen.te] with a palatalized fricative [ç] production by a female speaker FGCC.

method is adopted here, as this study analyzes variation of voiceless fricatives. Studies on fricatives in English (Jongman et al. 2000) have found that place of articulation is highly correlated with spectral means: the more forward in the vocal tract the constriction of air flow, corresponding to place of articulation, the higher the spectral mean. In current literature, including this study, the term “spectral means” is interchangeable with “center of gravity” and “centroid.”

1.3 Variationist sociolinguistic framework

This study follows the variationist framework, which proposes that language variation is not random and can be motivated by both language internal and external factors, such as the sex, age and socioeconomic class of the speaker. These social factors can also indicate the linguistic prestige of innovative variants and help predict their path of diffusion.

Previous sociolinguistic research has established a strong relationship between how high and low prestige variants are used by each gender. In cases of stable variation, men have a tendency to use innovative variants, including stigmatized forms and/or variants with covert prestige, while women favor variants with the greatest overt prestige, which are usually standard forms. Labov (1990) outlined the differences between men and women’s use of variant forms expressed here as “generalizations” in sociolinguistic studies. Trudgill (1983) refers to men’s higher use of vernacular forms as “the single most consistent finding to emerge from sociolinguistic studies over the past 20 years” (Trudgill 1983: 162). Studies show that female speakers are “more sensitive toward using the ‘correct’ norms”

(Silva-Corvalán 2001: 98).² Spanish sociolinguistic studies have corroborated this relationship between speaker sex and prestige. Cedergren (1973), for example, showed that Panamanian women were more conservative than men in their production of /s/, favoring retention of /s/ over aspiration or elision. Though s-aspiration is a trait of Panamanian Spanish, retention is preferred in formal situations.

In regards to speaker age, sociolinguistic literature has found that speakers between the ages of 25 and 50, the “professional age group,” tend to avoid stigmatized variants (Silva-Corvalán 2001: 102). According to this literature, speakers aged 25–50 are more attuned to the linguistic prestige of innovative variants and make linguistic choices based on how these choices can affect their careers. In Gran Canaria, Spain, for example, Samper-Padilla (1990) found that the speakers with the lowest percentage of the stigmatized fricative realizations of /r/ were those in the 35–54 age group. The linguistic prestige of innovative forms may be even more important in public speech (such as the data used in this study) than in sociolinguistic interviews, because speakers are actually exercising their professional speech. Linguistic research on media speech (Lipski 1983; Ávila 2001, 2003) claims that standard language norms, as opposed to regional or dialectal traits, are maintained in the media because they carry greater prestige and are comprehensible to wider audiences.

Social class is the third basic social consideration in sociolinguistic studies. Sociolinguistic studies have revealed a general tendency for lower class speakers to produce innovative variants at higher rates than middle and upper class speakers (i.e. Cedergren 1973 and Lafford 1982 on s-aspiration; Samper-Padilla 1990 on r-fricativization). In this study, the speakers are all middle and upper class due to the nature of the corpus, radio speech recordings. Sixty of the 61 speakers in this corpus have a college degree or are university students. Although this corpus is not examining variation based on social class differences, it is important that variation was found in this dataset because previous literature on this variable would predict otherwise.

1.4 Communication Accommodation Theory and Audience Design

Speech/Communication Accommodation Theory (Giles & Powesland 1975; Coupland 2007; Giles et al. 2010) maintains that speakers modify their speech consciously in an effort to identify with or away from their addressee(s). According to this theory, a speaker’s style shifting to match the speech style of their addressee (“convergence”) signals that the speaker is trying to identify with the addressee. Similarly, if a speaker wishes to establish a different identity from that of his/her addressee, the speaker will shift away from the addressee’s speech style. These accommodations can include phonological style-shifts. One of the most often cited examples of style shifting is an analysis of Oprah Winfrey’s monophthongization of /ay/ > [a:] when speaking to African-American guests (Hay et al. 1999). The study found that lexical frequency and ethnicity of her addressees were significant predictors of the variation in Winfrey’s productions.

The Audience Design framework (Bell 1984, 2002) is based on the same basic premise as Communication Accommodation Theory (CAT), but was specifically designed for radio speech where speakers modify their speech style to a target audience rather than a specific addressee. The Audience Design framework provides a method for creating cell groups of interlocutor pairings and analyzing factors of interest (such as sex and age) among these. Bell’s model allows previous claims about the palatalized variant of /x/ serving as a feminine marker (Cepeda 1991) and lower class marker (Oroz 1966) to be tested via

² My translation: “La mayor sensibilidad de las mujeres hacia normas de conducta ‘correcta’ (se demuestra además en el hecho de que se autocorrijen mucho más que los hombres en contextos formales)...” (Silva-Corvalán 2001: 97).

interlocutor relationships. Previous accommodation studies have shown that phonetic variables can be used as identity markers,³ such as social class marker in the newsreader study (Bell 1984) and ethnic identity marker in the Oprah study (Hay et al. 1999).

The present study examines how phonetic style shifting is used (or no longer used) to mark social class, gender, and age group affiliations. Gender and age-group marking will be examined via speaker group interactions. Speakers, direct interlocutors (in-studio co-host or guest), and target audiences for each show are all coded for sex and age group. According to Audience Design, style-shifting patterns can be compared using speakers within the same cell group (same sex and age group for example); it does not require the same individual speaker to make the shifts as in Bell's newscaster study (1984). Therefore, for example, data from a 35-year-old female speaking to a 50-year-old male can be compared to data from a different 35-year-old female speaking to a 50-year-old woman in the same study where control factors (such as dialect, program genre, etc.) were held constant.

The lack of direct verbal exchanges between radio speakers and listening audience is an important consideration in Bell's Audience Design framework. In general, studies on mass media speech, particularly news speech, can only address style shifting that is initiative rather than responsive⁴ because in most cases "there is no mutual convergence because the audience does not (generally) talk back" (Giles et al. 2010: 73). However, media speech studies, such as this study, that have data from co-hosts and/or hosts with their guests provide opportunities to examine two levels of style shifting: the immediate level between the two radio speakers, and a second level between radio speakers and the listening audience. Although the Audience Design model was designed to analyze accommodation between radio speakers and the absent listening audience, Bell (2010) acknowledged that the audience of mass media speech is "at least two-layered." Bell describes the two layers as an "inner" or "embedded audience" which includes physically present addressees (co-hosts, guests, studio audiences) and an "outer" audience that is the mass listening audience "separated in space and often in time from the embedded communication situation" (Bell 2010: 76). Bell's earlier work (1984) showed that the effect of the audience in speech accommodation decreases according to their distance from the speaker. Based on this distance, radio speakers would be expected to accommodate to the speech or social traits of their immediate interlocutor (co-host or guest) before accommodating to the perceived speech or traits of their listening audience. In cases where there is no immediate interlocutor, the radio speaker is expected to accommodate only to the perceived listening audience.

2 Materials

2.1 *The corpus and data collection*

The data used for this study come from over 20 hours (1,223 minutes of either 30 minute or 60 minute episodes) of Chilean radio programming recorded between August 2011 and September 2012 (Flores 2014). All of the recordings were collected from publicly available live online transmissions and supplemental podcasts. The live shows were recorded in wav format using Audacity 1.2.5 while being directly streamed through Soundflower audio application on a MacBook laptop with a Mac OS X version 10.6.7 operating system at a 44 kHz (44100 Hertz) sampling rate. The podcasts were downloaded and converted

³ Following Labov's use of the term, *markers* are "sociolinguistic variables that show variation in both 'social' and 'stylistic' dimensions" (Coupland 2007).

⁴ Bell considers responsive and initiative accommodation to be strategies on a continuum not opposite poles (Giles et al. 2010: 77).

into wav format using Praat 5.1.19 for Mac (Boersma & Weenink 2009), also with 44 kHz sampling frequency. The podcasts were used primarily to supplement data for news reporters and talk show hosts in order to complete token counts within cell groups.

Three types of radio stations were targeted and at least three channels were recorded from each type, (1) University, (2) Working-Class, and (3) Mainstream. The “University” stations are those sponsored by Chilean universities and students typically host the programs. The “Working-Class” stations are self-described as targeting working-class audiences; they are usually affiliated with labor movements, indigenous rights, and socialist politics. The “Mainstream” stations target the widest audiences; they have the widest dissemination and air nationally as well as internationally.

For each of the three types of stations I recorded programs from each of the following radio genres: (a) Newscasts, (b) Sports commentary (not play-by-plays⁵), (c) Interview-style (formal) talk shows hosted by professional journalists and (d) Entertainment-style (informal) talk shows hosted by disc jockeys. Table 1 lists the specific stations and programs that were used based on station type and program genre.

Specific programs were selected based on these criteria: fitting only one of the above-mentioned genres, no background noise or music, in-studio or sportscaster booth recordings only (no phone call segments or on-location news reporting), and individual speaker (news reporters) or 2+ speakers that follow interview-style (turn-taking) speech so that all tokens could be readily matched to the speaker. Commercial segments and segments where hosts were reading announcements or sponsor’s advertisements were excluded.

	News	Sports	Interview	Entertainment
University	U Chile: Radio Análisis	U Chile: Hola Deportes	U Chile: A tu salud	U Chile: Semáforo matinal
	USACH: Informativo Reuch	UCS: Tie break	USACH: Foro universitario	USACH: Cultura Viva
	PUC: Acceso Directo	PUC: Jugo de Pelotas	U Valparaíso: Vuelta en U	PUC: Café Cortado
Worker	Agricultura: Telenoticias	Agricultura: Deportes en Agricultura	Agricultura: Faro Económico	Agricultura: Contigo en sábado
	Tierra: Noticias Internacionales	Agricultura: Deportes en Agricultura	Tierra: Objetivo Zoom	Tierra: Conexión social
	Agricultura: 6PM	Agricultura: Deportes en Agricultura	Paula: La poca vergüenza	Paula: A rio revuelto
Mainstream	Cooperativa: Diario de Cooperativa	Cooperativa: Al aire libre	Cooperativa: Lo que queda del día	Cooperativa: Tus años cuentan
	Infinita: Panorama	Cooperativa: Los sospechoso de siempre	Infinita: Economía global	Infinita: Lo que el viento no se alcanzó llevar
	Duna: Noticias en Duna	Duna: Duna en punto	Duna: Información privilegiada	Duna: Efecto Invernadero

Table 1: Radio programs organized by program genre and station type.

⁵ Play-by-plays are segments where sportscasters verbally describe the action of a game as it is happening. These play-by-plays generally occur from a sportscaster booth or the sportscaster standing on the sidelines of the field. Due to the noise conditions, play-by-plays are not suitable for acoustic analysis and were excluded from this study. Likewise, pre- and post-game interviews of athletes were excluded if they occurred on the field.

A total of 887 tokens of the fricative /x/ + front vowel (/i/, /e/, and /ie/) were extracted from the corpus and of these, 592 were /xe/ tokens used for the analyses. Each of the twelve cell groups (see Table 1) produced approximately 50 tokens, where approximately 10 tokens came from each of the five or six speakers in that cell group. Since the data for this study come from non-elicited speech and the radio programs selected varied in length, all of the tokens produced by each speaker were extracted for possible use in this study.

2.2 The speakers

A total of 61 speakers were selected for this corpus, allotting five to six speakers per socio-linguistic cell group. The criteria for selecting speakers included that they (a) be native speakers of Chilean Spanish and (b) be residents of the Santiago metropolitan area. Attention was given to balancing the sex of these speakers per genre; however, this was not possible because News and Sports genres were male dominated. Of the 61 speakers, 38 were male and 23 were female. There was a fairly even distribution among program genres by speaker sex, except for the Sports genre, which only had 1 female speaker.

All speakers belong to the middle or upper classes, as determined by education level, profession, and in some cases, celebrity status. All speakers are over 18 years of age. Biographical information used to code speaker traits was obtained from: program and/or general radio station websites; programs' Facebook pages; speaker introductions and comments made on the show; the speakers' professional and/or personal webpages on Facebook, Twitter, and LinkedIn; and news stories or online articles about these speakers (Flores 2014).

3 Methods and results

3.1 The acoustic analysis

Spectral energy of the frication segments were measured using Praat software for Mac (Boersma & Weenink 2011). For the spectral energy analysis, center of gravity at the 25%, 50%, and 75% points of each frication segment of /x/ were measured using FFT spectra at power 2. Due to transitional or co-articulation effects into and out of the consonant, the center of gravity (COG) value calculated over the midpoint (the 50% point) of each frication segment was selected as the most reliable value for determining a comparative place of articulation among tokens. These midpoint COG values provide a reference for comparing the place of articulation of each production (Jongman et al. 2000, see Section 1.2). Table 2 presents the results of average center of gravity values by program genre and speaker sex. The standard deviations, in parenthesis following the COG averages, are wide because these values include velar fricative and palatalized fricative productions.

	News	Talk	Sports	Entertainment
Males (n = 389)	2983 Hz (778 Hz SD) n = 102	3400 Hz (1210 Hz SD) n = 74	2786 Hz (875 Hz SD) n = 116	2905 Hz (928 Hz SD) n = 97
Females (n = 203)	2148 Hz (910 Hz SD) n = 21	3542 Hz (1145 Hz SD) n = 120	2537 Hz (105 Hz SD) n = 3	3167 Hz (1307 Hz SD) n = 59
TOTALS (n = 592)	2840 Hz (858 Hz SD) n = 123	3487 Hz (1169 Hz SD) n = 194	2764 Hz (865 Hz SD) n = 119	3004 Hz (1091 Hz SD) n = 156

Table 2: Mean COG values of frication components of /x/ in /xe/ tokens for each genre by speaker sex.

3.2 The sociolinguistic analysis

After the acoustic analysis, the data was entered into a linear regression analysis with random effects using Rbrul (Johnson 2015). The center of gravity values of the frication segment of each /xe/ token were used as the continuous dependent variable. Individual speakers were numbered and used as a random effect. Five linguistic factors and four sociolinguistic factors, listed below and elaborated in Appendix A (see Supplementary File 1), were included as independent variables.

Linguistic factor groups include (1) preceding phonetic context, (2) syllable stress, (3) the position of the phoneme in the word, (4) position of word in sentence/utterance, and (5) lexical frequency. Lexical frequency was coded for each token at the dialectal level using the CREA corpus (rae.es), and counts were limited to Chilean oral speech. The frequency counts were treated as a continuous independent variable, while all other factor groups were treated as fixed variables.

The extra-linguistic factor groups are (5) program genre, (6) radio station type, (7) speaker sex, and (8) speaker age. All four were treated as fixed variables. Program genre includes newscasts, sports commentary, formal interview talk shows, and entertainment-style (informal) talk shows. Radio station type includes university channels, working class channels, and mainstream stations. Speakers were coded for sex and age.⁶ The age group divisions (< 30, 30–50 and 50+) followed the standard consideration in sociolinguistic studies for stage of life (Silva-Corvalán 2001). In this dataset, the majority of speakers under the age of 30 are university students, either hosts of university programming or college athletes interviewed on Sports programs. The speakers in the 30–50 age group are professional journalists, radio celebrities, or professionals being interviewed on the air. The speakers over the age of 50 have established careers in radio (and some in Television as well).

The linear regression analysis indicated which factor groups favored the fronting of the /x/ productions (as indicated by COG values) at a statistically significant level. The analysis included 567 tokens.⁷ The results indicated that both internal and external factors affect variation of /xe/ productions, each with a p value < 0.05. Specifically, three linguistic factor groups (preceding phonetic context, syllable stress, word position) and program genre significantly favor palatalization (see Table 3). A positive coefficient value in this model indicates the factor favored higher COG values (in this case indicating palatalization). The factors not selected as affecting variation are: sentence position, lexical frequency, station type, speaker sex, and speaker age. These implications of these results will be discussed in the Discussion section.

The regression analysis was run with individual speakers as a random effect. The model confirmed an effect for individual speaker, where 27 of the 61 speakers favored palatalization. The R² percentage represents the amount of variation accounted for by the factors tested. In this case, speaker preference accounts for 31% of the variation in this data. These results are presented in Appendix B (see Supplementary File 1) and will be discussed in the Discussion section.

3.3 The accommodation analysis

Following Bell's Audience Design framework, I coded the immediate interlocutors (co-hosts, on-air guests) as well as target listening audiences for the identity factors relevant to the study, sex and age. In selecting the speakers for each cell groups, special care was taken to

⁶ Originally, education level (having or not having a college degree) was also coded as a correlate of social class. However, there were not enough tokens of speakers without a college degree to run this factor group in the regression analysis.

⁷ Twenty-five of the original tokens were excluded from the regression analysis because they were either abbreviated words produced with variable syllable stress or tokens with an unidentifiable sentence position.

Total N			567
Df			14
			p < 0.05
Overall mean			3099.036
Intercept			2922.286
R2.fixed			0.111
R2.random			0.314
R2.total			0.425
	Coefficient	N	Mean
Preceding phonetic context			
Front vowel	223.252	221	3231.748
Alveolar	141.557	148	2998.037
Back vowel	-37.669	179	3015.533
Bilabial or Dental	-128.94	10	3380.935
Palatal	-198.2	9	2848.642
Syllable stress			
Tonic	110.083	291	3180.294
Pre-tonic	72.435	121	3023.159
Post-tonic	-182.517	155	3005.713
Word position			
Initial	276.631	195	3218.111
Intervocalic	-131.977	276	3105.761
Syllable Onset	-144.654	96	2837.831
Program genre			
Talk	483.783	177	3578.032
Entertainment	-35.961	156	3004.133
News	-96.094	120	2850.333
Sports	-351.728	114	2746.992

Table 3: Results of linear regression analysis.

create all four possible combinations of sex and age group among the co-hosts. The control factors that remained constant were Spanish dialect (Santiago metro area) and social class (all speakers were middle or upper class). Speaker accommodation will be evaluated based on comparisons by sex and age cell groups rather than individual speakers' accommodation to various interlocutors. This is consistent with Audience Design methodology.

The absent listening audience that Bell's model addresses was the second level of audience in my study. In order to analyze style-shifts between speaker-listening audience combinations, I collected data from three types of radio stations (mainstream, working class, and university). These station types target different social classes: the working class stations target lower class groups, university stations target educated middle and upper class, and mainstream stations target all groups. The programs I selected from each station are divided into genres (News, Sports, Entertainment, and formal Interviews). These genres also target different types of audiences in terms of sex and age group. In general terms, the Sports genre in Chile is a male-dominated space, for example, while most Interview

programs target women. News and Entertainment tend to be gender neutral, that is, they do not specifically target men or women. As for age groups, programming on University stations target young adults, and programming on other stations varied widely by program. These were the general patterns found, however, my actual coding of sex, age, and social class for the target listening audience was program specific as follows: each individual episode of the programs selected were coded for: (a) radio station type: university channels, working class (blue-collar and farmers) channels, and mainstream stations, (b) genre or program type, (c) specific topic, (d) program slogans and self-reported target audience (if provided), and (e) program sponsorships. The speakers' social factors were coded independently of the show's target audience.

Once the social factors of both speakers and target audiences were coded, the interlocutor relationships were charted for all the possible sex-age group combinations (see Tables 4 and 5 below). Groups were created based on the sex and age of the addressees: speakers addressing women, speakers addressing men, speakers addressing age group A, and so on. The proportions of tokens favoring the palatalized variants from each of these groups were compared using two-population binomial tests (also called a two-proportion z-test) in R statistical software (R core team 2013). Like t-tests, the z-test indicates if there are statistically significant differences between two groups; the tests differ in that t-tests compare means and z-tests compare proportions between two populations (groups). The results of the binomial tests help determine if there are differences in variant usage when speakers address males versus females, and older versus younger speakers.

The accommodation analysis examined the ways in which speakers may use the palatalized variant [ç] to affiliate themselves toward or away from their addressees based on social traits, specifically: sex, age, and class/status. Results are organized and presented here according to these traits.

3.3.1 Interlocutor sex effects

For this dataset, the results of the regression analysis (see Section 3.2) suggest the sex of the speaker does not affect the selection of the palatalized variant [ç]. An examination of interlocutor relationships, specifically the co-host pairings on each program, reveals no significant differences in use of the [ç] by sex of the addressee (see Table 4 below). Male speakers produced the variant [ç] at a rate of 56% when their interlocutor was male and 62% of the time with a female interlocutor, which was not statistically different in a two population binomial test: $z = 0.9368$, $p = 0.3488$. For the female speakers, there were also no significant differences between rates of use of [ç] between male interlocutors (56%) and female interlocutors (64%): $z = 1.1131$, $p = 0.2657$.

As shown in Table 4, there were significant drops in rates of use of [ç] when speakers hosted a program alone versus when they had a co-host. For male speakers, the production

Speakers	News	Sports	Talk	Entertainment	Totals
Fem > Fem	0	0	56/88	0	56/88 (64%)
Fem > Male	5/20	3/3	27/47	31/48	66/118 (56%)
Male > Fem	24/41	0	0	61/97	85/138 (62%)
Male > Male	26/49	53/101	0	15/17	94/167 (56%)
Female alone	0	0	4/15	4/11	8/26 (30%)
Male alone	3/21	7/15	0	0	10/36 (27%)

Table 4: Results of accommodation analysis of the /xe/ variable program genre. The ratios represent the number of palatalized variants [ç] over total number of tokens.

rate of [ç] was 59% with a co-host and 27% when they hosted a show alone. This difference between 59% and 27% reached statistical significance in a two population binomial test: $z = 3.5289$, $p < 0.001$. For female speakers, the production rate of [ç] was similar to that of males: 59% with a co-host and 30% when the female speaker was hosting a show alone. This difference also reached statistical significance: $z = 2.7545$, $p = 0.006$. The solo host having a much lower rate suggests that the speaker is accommodating to the target radio audience by suppressing the general high rates found for this variant (over 50% in all other cases).

Because the data for this corpus does not come from elicited speech tasks, but rather naturally occurring observations of /x/ in radio speech, there are empty cells. The empty cells indicate that speakers in the cell group did not produce any words with /x/. Therefore, the results of this table are to be interpreted as proportions of palatalization when the opportunity arose.

3.3.2 Interlocutor age effects

According to the regression analysis, no speaker age group favored the production of the palatalized variant [ç]. However, the accommodation analysis comparing rates of use by interlocutor pairings did reveal two important patterns: (1) the palatalized variant has higher rates of use when at least one interlocutor is 30–50 and (2) there is a lower rate of use of [ç] when speakers address co-hosts/guests who are under the age of 30 than when they address the 30–50 and the 50+ speakers. The highest rate of [ç] production by age groupings (69%) occurs between two 30–50 year old interlocutors. In total, the use of [ç] with addressees who are over the age of 50 (oldest group) is 63% (102/163), and 66% (239/364) with addressees who are 30–50 years old (professional age group). The rate drops to 54% (59/110) when speakers address co-hosts under the age of 30 (youngest group), but this drop did not reach significance between the youngest and oldest addressees and was only marginally significant between youngest and professional age addressees. Based on two binomial tests: (1) the rates of use of [ç] when addressing the youngest group is not significantly lower than when addressing the oldest group: $z = 1.473$, $p = 0.141$, and (2) the [ç] usage when addressing the youngest group is only marginally lower than when addressing the 30–50 group: $z = 2.287$, $p = 0.022$. Table 5 provides the itemization of rates of use of [ç] by interlocutor age pairings.

Age groups: speaker > addressee C = over 50, B = 30–50, A = under 30 years old	[ç] usage/total number of tokens
C > C	16/30 (53%)
C > B	57/93 (61%)
C > A	10/28 (36%)
B > B	159/230 (69%)
B > C	75/114 (66%)
B > A	38/63 (60%)
A > A	19/59 (32%)
A > B	23/41 (56%)
A > C	11/19 (58%)

Table 5: Table shows use of palatalized variant [ç] by interlocutor age group. The > symbol represents direction of speech.

3.3.3 Interlocutor class and status effects

There does appear to be an accommodation effect for social status in the /xe/ data of one of the interlocutor pairs. There are only two interlocutor pairs in this dataset that had a significant social class/status difference between them. For one of those pairs, the rates of use of [ç] are similar and suggest no accommodation by social status: in the case of the news anchors with a significant status difference, both speakers use the variant at a similar rate (29% for the celebrity journalist and 30% for the up-and-coming journalist). However, in the case of the student/doctor pairing, there is a large difference in rates of use: 75% for the younger female student vs. 32% for the male doctor. It is possible to account for the difference with the interlocutor age effects described above, where rates are higher when the addressee is older and drop when the addressee is younger. However, the difference between 32% and 75% is the largest difference in rates of use of [ç] between interlocutor pairs, suggesting there are factors to consider in addition to the age effect, such as social status.

4 Discussion

4.1 Discussion of the acoustic analysis

The results of this study revealed that center of gravity (COG) measurements can be used to provide acoustic support for the palatalization of the fricative /x/ in Chilean Spanish. Consistent with COG literature (Jongman et al. 2000; Silbert & de Jong 2008) higher center of gravity values reflect a place of articulation further forward along the vocal tract. This indicates that the palatalized variant has a more anterior place of articulation than the velar fricative. Again, center of gravity is not a standardized measure, therefore the exact mean COG values cannot be mapped onto a specific place along the palate; it is the difference in mean COG between the variants that reflects a change in place of articulation (see Background).

4.2 Discussion of the sociolinguistic analysis

For the random-effects linear regression analysis, a total of 567 /xe/ tokens were analyzed. The results of the regression analyses indicate that individual speakers favored the palatalized production, and that linguistic factors and speech context influence the production of the palatalized variant. Specifically, the palatalized variant [ç] is favored when the /xe/ variable is preceded by a front vowel [i] or [e], an alveolar consonants ([s] or [n]), within the tonic and post-tonic syllables, in the word-initial position, and in the Talk genre.

4.2.1 Linguistic factors

Three internal linguistic factor groups were selected as significantly affecting palatalization: phonetic preceding context, syllable stress, and word position. Tokens where the /x/ was preceded by a front vowel significantly favored palatalization. This result can be explained by place assimilation where there is a temporal overlap of the front vowel and the fricative (see Browman and Goldstein 1990). Although lexical frequency of individual token types may have contributed to the syllable stress and word position results, no single token type was responsible for these results. The two most frequently occurring terms (token types) in the corpus were *gente* ‘people’ with 80 observations and *ejemplo* ‘example’ with 73. Although the /x/ variable appears in the tonic syllable in both of these terms, and that stress position favors fronting, these token types do not share other factors.

These two token types do not share a preceding phonetic context, as “gente” usually appeared as “la gente” where the /x/ is coded as having a preceding back vowel while the /x/ of “ejemplo” has a preceding front vowel. The regression model (see Table 3) revealed

that tokens with preceding front vowels significantly favored fronting /x/ while tokens with preceding back vowels disfavored fronting. If these token types were responsible for the results, we would expect that “gente” would average a lower COG than “ejemplo” tokens. However, the opposite is true: 62% of “gente” tokens and 48% of “ejemplo” tokens had a COG higher than 3099 Hz.⁸

Additionally, the /x/ variable in these two frequent token types do not share the same word position. The fricative appears word initially in the term “gente” and intervocalically in “ejemplo.” The regression analysis showed that word initial /x/ position significantly favored fronting and intervocalic position strongly disfavored it (see Table 3). Again, the COG values of the token type “ejemplo” do not indicate a strong disfavoring. There were no other token types with a substantial count within this dataset.⁹

4.2.2 Program genre

The Talk genre in the factor group “Program genre” was selected by the linear regression analysis as favoring the higher COG values of the tokens. Sociolinguistic literature has shown that speakers pay more attention to their speech in more formal contexts, so that innovative forms have higher occurrence in more informal contexts. Based on this literature, the initial hypothesis was that the Entertainment and Sports programming would exhibit greater rates of variation than News and formal Talk shows. However, the regression analysis showed that palatalized variants were significantly favored in the formal Talk genre, and strongly disfavored on Sports and News. Given these results, speech formality does not seem to be a triggering factor for palatalization.

The explanation I propose for the program genre results is that the level of interaction between speakers, specifically conversation-like speech, has a greater influence on palatalization. The Entertainment and Talk genres in this corpus are generally co-hosted programs or involve a host and a guest. However, in the Talk genre in particular, the two speakers spend the larger part of the show in dialogue-mode, rather than talking toward a listening radio audience like the newscasters and sportscasters. The level of direct interaction between two news reporters or two sportscasters is generally limited to introductions and turn-taking cues. The Sports programming in this corpus has different formats on each show. In addition to sportscasts, there are round-table style discussions with as many as five sportscasters per episode who provide sports commentary on athletes and/or sporting events.¹⁰ On these shows, there are several moments of 1-on-1 interactions between two sportscasters, but these are very brief and commonly interrupted or joined naturally by a third speaker. Speakers on these shows do not directly address the listening audience nor do they generally address only one co-host. The round-table Sports shows all have male sportscasters of different ages.

Previous research on the relationship between phonological variation and speech context has also observed similar variant rate of use differences as those described above based on the number of interlocutors. Medina-Rivera (1997) found that palatalized rhotic variants in Caguas, Puerto Rico were most frequent within dialogues between two people, supporting the results of the program genres described above. Medina-Rivera found a pattern where innovative productions were highest in dialogues, then decreased slightly in

⁸ This number was the mean COG of the dataset, and is only used here as a reference point. Since the data was subject to linear regression, there was no official cut-off value to separate tokens into concrete variants.

⁹ The majority of token types had fewer than 10 occurrences with 2 exceptions, “indígena” had a total of 29 occurrences and “general” had a total of 25 occurrences. Each of these accounts for less than 5% of the total number of tokens in the corpus, and each type is only coded with 1 of the specific factors that favored fronting (front vowel preceding “indígena” and word initial /x/ in “general”).

¹⁰ Round-table sports commentary shows are Radio Cooperativa’s “Al aire libre” and “Los sospechosos de siempre” and Radio Agricultura’s “Deportes en Agricultura.”

single-speaker narratives, and decreased greatly in other types of discourse intended for larger audiences, which he refers to as conference-like speech. This pattern of variation seems corroborated by the results of this study, where stylistically the News and Sports genre speech would match the non-conversation-like speech of the Medina-Rivera data.

4.2.3 Speakers

Of the 61 speakers in this corpus, 44% (18 men and 9 women) were selected by the Rbrul analysis as favoring fronting (see Appendix B, in Supplementary File 1). These speakers were distributed among the four program genres as follows: 8 in Entertainment, 8 in Talk, 7 in Sports, and 4 in News. According to the linear regression analysis without considering speakers, the independent variables are able to account for only 11% (see “R².fixed” in Table 3) of the variation found in the data. However, including speakers as a random effect increases the R² of the model to 42.5%. This result confirms that there are individual speaker differences in this dataset.

One of the limitations of this study was the uneven male-female speaker distribution within genres. Particularly, there was limited female data on the Sports and News genres due to the reality of demographics for sportscasters and news anchors on Chilean radio.

4.3 Discussion of the accommodation analyses

The results of the accommodation analyses suggest that speakers accommodate their speech to the social traits (sex, age, and social class) of their immediate in-studio interlocutor first, and the social traits of the perceived target listening audience affect accommodation to a much smaller degree. In this section, the effects of sex, age, and social class will be discussed separately.

4.3.1 Interlocutor gender effect

Previous literature on velar palatalization in Chilean Spanish (Cepeda 1991) reported the palatalized form to be a feminine marker based on how strongly female speakers favored the variant. The regression analysis did not find speaker sex to significantly influence the use of the palatalized form. In the accommodation analysis, there were also no statistically significant differences in use of the palatalized form based on the sex of the addressee. Based on the results from both the regression and accommodation analyses, velar palatalization in Chilean Spanish is no longer affiliated with a specific sex, therefore not a gender marker, as was reported in previous studies.

4.3.2 Interlocutor age effect

The results of the accommodation analysis revealed two patterns based on the age of the addressee: (1) the higher rates of use of [ç] occurred when at least one interlocutor was 30–50 years old; and (2) the use of the palatalized variant [ç] significantly decreased when speakers (of any age) addressed interlocutors who were under the age of 30 (see Table 5 in Results).

Sociolinguistic literature on “professional age” (Silva-Corvalán 2001: 102) claims that speakers aged 25–50 are more attuned to linguistic prestige and make linguistic choices based on how selected variants may affect their careers. This consideration may be even more important in corpora of public speech, where the stakes are higher than in private speech to sound professional. Additionally, the literature on media speech reminds us that there are station-imposed pressures and constraints for radio speakers that affect language choices, lexical as well as phonemic (see Background). The data collected for this corpus is taken from the professional context of all of the speakers; most of the speakers in this corpus are radio hosts, but even the guests are being interviewed on the air about topics

related to their careers. The “professional age” literature fits the speakers in this dataset on account of their career timeline. The majority of speakers under the age of 30 in this dataset are university students. The speakers in the 30–50 group have varying levels of celebrity status, but the majority are considered “up and coming” in their careers. The speakers over the age of 50 have established careers in radio (and some in Television as well). The accommodation result regarding higher palatalization rates when one interlocutor is 30–50 (and the highest rate when both interlocutors are 30–50) suggests that the palatalized form has overt prestige.

4.3.3 Interlocutor social class and status effects

At the interlocutor audience level, there was evidence in the dataset that suggests that status affects the use of the palatalized variant. One speaker pairing involved a male doctor in the 30–50 age group and a female student under the age of 30 on a university channel. The difference in usage of the palatalized variant [ç] between these two speakers constituted the largest difference (43%) in the entire dataset; the male doctor had a 32% rate of use and the female student produced the palatal at a rate of 75%. The age effect observed in this case does follow the usage pattern for the dataset in general (production of [ç] decreases when addressing speakers under the age of 30), though the 43% difference between the doctor and student is remarkable. Therefore, it is probable that the difference in these speakers’ social status (doctor-student) is creating or at least affecting the pattern of their variant usage. Future research with more pairs of disparate social status is needed to confirm this possibility.

5 Conclusions

Based on previous literature on this variable and the nature of public media speech, the palatalized variant [ç] was not expected to appear in this corpus, and especially not at the high rates that were found. The speech data in this study is professional (“on-the-job”) speech by professional journalists, radio hosts, and invited guests. The speakers are members of the educated middle and upper class. Previous studies have described the palatalized variant of /x/ as a stigmatized form; however, this study suggests that the palatalized variant has acquired some level of overt prestige in Chilean Spanish during the last 25 years.

There are several specific findings within the acoustic, sociolinguistic, and accommodation analyses of this study that are worth summarizing here. Phonetic variation in the production of /x/ was confirmed using center of gravity measurements.

The regression analysis revealed that both linguistic and extra-linguistic factors motivate the palatalization of /x/. The results support the hypothesis that neither phonetic constraints alone nor speaker traits alone can account for the variation. The results of both the regression and accommodation analyses showed that speakers do exert some control of their productions and that their selections are influenced at least in part by the social profile of their listeners, particularly age group. Speakers accommodated more to their immediate interlocutor (co-host or guest) than to the social traits of their perceived target audience.

The results of the accommodation analyses also indicated a significant difference between shows with conversation-like speech versus one-way speech, corroborating Medina-Rivera (1997). The effect was found not only based on program genres, where the Talk genre exhibited more variation than News and Sports, but also based on individual segments of Talk and Entertainment programs. Co-hosted and host-guest segments produced rates of palatalization between 56–64%, while tokens with higher COG values (indicative of [ç] productions) occurred only 27–30% on segments where hosts were alone on the air.

This study updates and fills several gaps in the literature on velar palatalization in Chilean Spanish. First, the study provides a detailed phonetic characterization of the two variants of /x/ with spectrographic support. Second, it updates sociolinguistic literature on linguistic and extra-linguistic factors that influence variation and examines contextual factors for the first time. Finally, this is the first interlocutor examination of velar palatalization; the analysis revealed external motivating factors related to interlocutor dynamics that have not been considered in previous studies. Along with these specific contributions to Chilean Spanish, this study also furthers our general understanding of linguistic convergence.

Supplementary Files

The supplementary files for this article can be found as follows:

- **Supplementary File 1:** Appendix A, B. <http://dx.doi.org/10.5334/gjgl.105.s1>

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Competing Interests

The author declares that she has no competing interests.

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
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