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Madeleine Rees

University of Cambridge
mljr2@cam.ac.uk

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The Palatalisation of the Voiceless Velar Fricative in Santiago, Chile: A Variationist Analysis

Madeleine Rees

University of Cambridge

Abstract. Allophonic palatalisation of velar consonants in Chilean Spanish has been hastily attributed to the inevitable anticipatory assimilation that occurs between a back consonant and front vowel. In this study, the extent of palatalisation of the voiceless velar fricative /x/ was measured before /e/ and /i/, in male and female speakers, and in controlled and casual speech, to ascertain the relationship between palatalisation, the gender of the speaker and the speech style, from a variationist standpoint. Using reading and interview tasks, a total of 1586 /x/ tokens were taken from 14 participants from Santiago. Results show a significant drop in frequency (indicative of lesser palatalisation) in casual speech from males, but not in casual speech from female speakers. Concurrently, the following vowel also influenced the degree of palatalisation. It can be proposed that palatalisation is dictated to an extent by articulatory effort and caution, linked to differences in sociolinguistic behaviours of both genders. [h] has also been registered as a more infrequent allophone of /x/, serving as a replacement for [x] and [ç].

Plain English Abstract. Palatalisation is the production of soft palate-originating (velar) consonants further forward in the mouth than typically expected. In Chilean Spanish, this process has been hastily attributed to the physical limitations on articulation when a speaker articulates a sound originating in the back of the mouth followed by one originating in the front. However, gradient changes like palatalisation may also be controlled by social pressures exerted on speech: the variationist analysis here follows the reasoning that no socially-driven language variation of this type is random. In this study, palatalisation of the voiceless velar fricative /x/ (as in the first sound in ‘gente’ – /'xen.te/) was measured before front vowels /e/ and /i/, in male and female speakers, and in controlled and casual speech, to determine the relationship between palatalisation, speaker gender and speech style. Using controlled reading tasks and informal interviews, 1586 instances of /x/ were obtained from 14 participants from Santiago. Results indicate that the following vowel mediates palatalisation to an extent. Concurrently, male speakers show significantly less palatalisation before /e/ in casual speech, while female speakers maintain relatively constant levels of palatalisation in both speech styles. It is proposed that palatalisation is mediated by both physical articulation pressures, caused by the following front vowel, and by social pressures, particularly gendered differences in speech styles.

Keywords: velar palatalisation; Chilean Spanish; variationism; coarticulation; sociophonetics; language variation

1 Introduction

1.1 Overview

The allophonic palatalisation of the voiceless velar fricative /x/ into [ç] before [e], [i] or [j] is especially marked in Chilean Spanish (González, 2014) (see Figure 1). Currently, the most prevalent opinion surrounding this allophone suggests that it is produced from assimilation between a velar fricative and a following front vowel. The front location of the vowels /e/ and /i/ in the oral acoustic space causes the tongue dorsum to move forward anticipatorily, in turn causing the fronting of the previous consonant (Hualde, 2014). To a certain extent, the production of slightly palatalised velar fricatives is inevitable in all dialects of Spanish, due to the subconscious nature of coarticulation. However, in Chile, this

process seems to intensify: as such, the voiceless palatal fricative [ç] has been added as an allophone to its phonetic alphabet (Sadowsky & Salamanca, 2011).

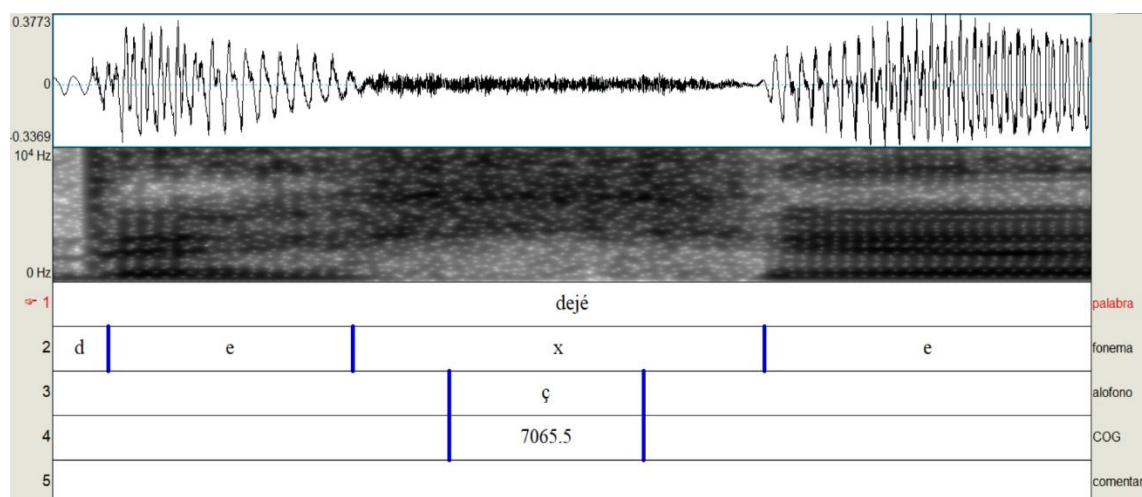


Figure 1: *Voiceless palatal fricative (tagged), female speaker.*

This topic has, so far, not been explored in depth. This investigation seeks firstly to fill a gap in the literature, which has been communicated explicitly. Sadowsky (2015, p. 82) notes that “it cannot be discounted that sociolinguistic variation may have gone undetected in other phonetic or phonological phenomena, such as the degree of palatalisation of the allophones [c], [ɟ, ɟ̟, ɟ̟̟] and [ç] of /k/, /g/, and /x/, respectively”¹.

Furthermore, there is another gap in previous research: the key feature of the studies on this variation, carried out by Tapia Ladino and Valdivieso (1997) and Flores (2016), is that they used speech samples obtained from television and radio, from people whose speech tends to be judged by the standards of a professional environment (Ávila, 2003). As such, the most probable result of this is that these people will change their speech to align with a more neutral professional standard. Up until now, there has been no investigation using more naturalistic speech samples taken from reading tests and linguistic interviews. Similarly, previous literature only mentions one study (Flores, 2016) in which this phenomenon has been measured using spectrograms and spectra. Therefore, this experiment seeks to analyse, instrumentally, the extent of allophonic palatalisation in natural Chilean speech.

Specifically, this paper will analyse the extent of palatalisation before two front vowels (/e/ and /i/), in male and female speakers and in two speech styles (careful and casual) following a variationist paradigm, which will be discussed more in Section 1.4. Variationism focuses on the links between the speech, social characteristics and social motivations of speakers. As such, characteristics like socioeconomic strata (Labov, 1966), gender (Eckert, 1989), perceived ethnic identity (Barrett, 1999), level of schooling (Silva Corvalán, 1987 [2001]), degree of social integration into the immediate community (Labov, 1972), and style in different contexts (Spolsky, 2003) can be influential factors in the choice of certain linguistic variants. Variationism is an interesting point of view from which to study this phenomenon, given that it is not known with certainty why palatalisation occurs, aside from the proposed theory of assimilation.

¹ “No se puede descartar que exista variación social aún no detectada en otros fenómenos fonético-fonológicos, tales como el grado de palatalización de los alófonos [c], [ɟ, ɟ̟, ɟ̟̟] y [ç] de /k/, /g/ y /x/, respectivamente” (Sadowsky, 2015, p. 82)

1.2 Palatalisation in Spanish

Many Spanish dialects do not see such a strong palatalisation as that of Chilean Spanish. In Mexico, /x/ tends to be realised as voiceless velar fricative [x] regardless of the following vowel, although in some cases the place of articulation changes to be pharyngeal or even laryngeal (Butragueño, 2014). Similarly, in southern Spain and the Caribbean, the velar fricative tends to be realised as the voiceless glottal fricative [h] (Coloma, 2011), again regardless of the following vowel.

Some dialects show different changes in place of articulation of /x/ before a front vowel. In Spain, especially in central and northern areas, /x/ tends to be realised as the uvular fricative [χ] with certain inevitable coarticulatory velar advancement to a postvelar place of articulation (Hualde, 2014). Other dialects also show a minor advancement before front vowels: a certain degree of palatalisation has been seen in Uruguay and the high Andean territories of Peru (Lipski, 1996). In Bolivian Spanish, /x/ encompasses many allophones: before front vowels, its place of articulation can extend to post-palatal (Quilis & Sanz, 2003, cited in Aleza Izquierdo, 2010). Meanwhile, in Paraguayan Spanish, /x/ is realised as [x] except before a front vowel, whereupon it becomes [h] (Krivoshein & Corvalán, 1987). It can be concluded that although the frontness of the following vowel habitually affects the allophone of /x/ produced, the process in Chile comprises a degree of fronting quite apart from that of other Spanish dialects.

1.3 Palatalisation in Chilean Spanish

It is common to hear high frication juxtaposed with a sound similar to a palatal approximant, before a front vowel, in Chilean Spanish. The presence of the palatal fricative [ç] was noted for the first time by Rodolfo Lenz around 1890 (Lenz et al., 1940). As has been mentioned, this process differs from lesser coarticulatory fronting in other Spanish dialects, which implies that Chilean Spanish palatalisation may have social or stylistic connotations.

Studies dedicated to this phenomenon have so far been few and far between. In some cases, it only receives a brief mention: Gladys Cepeda (1991) in her book ‘Las Consonantes de Valdivia’ [Consonants of Valdivia] mentions a stronger degree of palatalisation in the speech of female speakers, while Cartagena (2002, p. 347) proposes that palatalisation “is found in all social strata and registers of language”².

With regards to more in-depth investigations, Tapia Ladino and Valdivieso (1997) analysed speech samples taken from television, finding no correlation between the gender of the speaker and the degree of palatalisation in their speech. Flores (2016), using speech samples from Chilean radio programmes, also did not find any correlation between the prevalence of any [x] allophone and the gender of the speaker. However, the results of this study bring to light various interesting results: in the ‘Talk’ genre, consisting of formal conversations, the palatal fricative was more frequent, but in sports broadcasts dominated by male speakers, the popularity of the palatal variant dropped.

Finally, Huskey (2010) shows that realisations of /x/ before both /e/ and /i/ have equally high centre of gravity frequencies, adding that her results showed no significant difference between the places of articulation of /x/ before both /e/ and /i/. This proposition would suggest that allophones of /x/ before /e/ were produced with the same degree of palatalisation as the /x/ allophones before /i/, which may imply that the extent of palatalisation is not dictated entirely by the extent of coarticulation, and that palatalisation is a separate process less inevitable than first thought. Importantly, from a

² “se encuentra en todos los niveles sociales y registros de lengua” (Cartagena, 2002, p. 347)

sociophonetic point of view, it can be proposed that in this instance, if palatalisation is separate, it is not avoided on purpose by speakers, nor is it stigmatised. This result raises the question of whether a certain degree of palatalisation can possess social or stylistic connotations.

1.4 Variationism

Fundamentally, the variationist paradigm supports the view that linguistic variation does not exist in a vacuum, without being subject to social and sociolinguistic pressures (Labov, 1972). Here, it cannot be assumed that linguistic variation is free nor accidental, but instead that it is dictated systematically (Milroy & Gordon, 2003). It is also not assumed that trajectories of synchronic and diachronic linguistic change are separated (Weinreich et al., 1968, p. 188): patterns of variation in specific speech communities help to understand the trajectory of a given linguistic change over time. These notions may be useful with regards to palatalisation, with its scarcity in different Spanish dialects worldwide raising the questions of the linguistic factors involved, as well as the extent and permanence of such a change.

The intensification of this palatalisation process uniquely in one country suggests that a certain quantity of social variation, as well as the extent of assimilation, may dictate its presence in Chilean Spanish. Previous experiments by multiple linguists support the notion that speech can be influenced by the gender of the speaker and the formality of the conversation. Women tend to favour the standard speech variety, especially during a formal conversation which demands a more controlled speech style, whereas male speech tends to focus on higher usage of nonstandard variants (Trudgill, 2000; Tagliamonte, 2011; Kiesling, 2011). Having mentioned the concept of normativism and standard versus nonstandard variants, it is important to add to this the concepts of overt and covert prestige (Trudgill, 1972). The prestige of a variant has the power to dictate the behaviour of speakers and their choice of preferred allophone, according to the characteristics of the speaker and the social environment in which the speech act takes place. Female speakers tend to choose standard variants, which enjoy overt prestige within the speech community and on a broader societal level, whereas male speakers tend to favour variants with covert prestige, which have a certain prestige amongst the members of the immediate speech community, but not necessarily in larger society.

López Morales (2004, pp. 56–57), adds that choice of variants can be determined jointly by linguistic and social factors. Therefore, it would be useful to investigate the interface of coarticulation and sociolinguistics factors, to see the results of the union of physical factors (which cause ‘inevitable’ allophonic realisations of a given phoneme, out of the control of the speaker) and social factors (which cause productions of a given phoneme to be chosen on purpose). Having said this, if it becomes evident that no social variation controls the palatalised allophone, it can be proposed that the variation is now a concrete change, and that the degree of palatalisation has social connotations which are at least neutral, to avoid its eradication at the hands of speakers.

2 Aims of the investigation

2.1 Objectives

This investigation will focus on three facets of this phenomenon. Firstly, linguistic variation can be dictated by purely linguistic factors (Moreno Fernández, 2009). Therefore, it is necessary to compare degree of palatalisation before both /e/ and /i/: given that /e/ is articulated slightly further back in the oral space, it would be logical to suggest that palatalisation should be lesser before /e/.

Secondly, this investigation will focus on the effect of two speech styles on palatalisation. The first style is careful speech, measured from a reading task, while the second is casual speech, obtained during a free conversation interview with no fixed questions. It is assumed that the speech style obtained from the reading task will be more formal, with higher usage of standard variants, than during the more informal interview.

Thirdly, this paper will investigate if the gender of the speaker affects their propensity to palatalise more, which can be an indicator of the prestige of a variant. The combination of gender and style has the possibility to further illuminate the prestige of palatalisation, as a combination of female gender and formal conversation has been shown previously to lead to the use of the most prestigious variants.

2.2 Hypotheses

- (1) $H_{0(1)}$: The following vowel exerts no effect on the degree of palatalisation.
 H_1 : The following vowel influences palatalisation, with /i/ triggering a more fronted realisation of /x/ than /e/.
- (2) $H_{0(2)}$: Palatalisation is not influenced by any environment or speech style.
 H_2 : Coarticulation increases in informal speech (Browman & Goldstein, 1987).
 If the allophone is produced by assimilation, we would expect a greater degree of palatalisation in casual speech elicited by informal interview.
- (3) $H_{0(3)}$: Palatalisation is not influenced by gender of speaker.
 H_3 : Differences in the degree of palatalisation produced by male and female speakers: previous research (Cepeda, 1991; Flores, 2016) suggests that female speakers will favour a more palatal realisation of /x/.

3 Investigation Design and Methodology

3.1 Speaker Sample

3.1.1 Speaker Characteristics

The speaker pool was composed of 7 men and 7 women, all monolingual Chilean Spanish speakers from Santiago Metropolitan Region and all between 25 and 40 years old. No participant had lived outside Santiago for more than 2 years. No participant reported any speech or hearing difficulties. To avoid unexpected sociophonetic variation dictated by membership of a socioeconomic stratum or group of strata (see Haska, 2016) all participants belonged to socioeconomic strata ABC1 (pre-October 2018) according to their answers to a sociodemographic questionnaire (based on UK NRS (Ipsos MediaCT, 2009)). Participants were recruited through social media: 2 pairs of the 14 participants knew each other previously and habitually interacted with each other; the other 10 did not know each other. The researcher was functionally bilingual in Spanish, but not a native speaker of the Chilean variety.

3.1.2 Ethical Protocol

Participants were reminded of their right to retire from the investigation at any point, without repercussion or the need to provide an explanation. To maintain anonymity, all participants received a

code to replace their name. Sensitive data was password protected. Interview locations were well connected and structurally protected in case of earthquake.

3.2 Elicitation Tools

Two individual tests were administered in one session. Firstly, participants carried out a reading task consisting of a presentation of phrases and short texts, designed to elicit productions of /x/ read out loud (see Appendix). The test contained 30 instances of /x/ before /e/ and 30 instances of /x/ before /i/. Slides were changed by the participant using a keyboard, which let each speaker read the slide at their own pace. During this section, the investigator left the room, so as not to influence the speech style of the participant. This test also contained various texts without /x/, so as not to reveal the motives of the experiment. The reading task was followed immediately by a casual conversational interview without pre-prepared questions, with the aim of generating a more casual speech style in participants.

3.3 Recording Techniques

Acoustic data was recorded with a Fostex FR-2LE recorder and Audix HT5 microphone with a sampling rate of 24 bits/48KHz. The microphone used was head-mounted, which helped to minimise the obvious and potentially intrusive presence of a recording implement. All interviews were carried out in offices or apartments with some degree of soundproofing: due to the nature of the experiment, it was necessary to record acoustic data without interference from external sources.

3.4 Corpus

The reading task lasted around 20 minutes, while the conversation lasted around 40 minutes. Ultimately, the total corpus collected consisted of approximately 4.6 hours of careful speech from the reading task and approximately 9.3 hours of casual speech from interviews, shared equally between male and female participants.

3.5 Data Analysis and Processing

It was decided to directly measure centre of gravity, instead of assigning one production to allophone [x] or [ç]. The place of articulation of a palatal and velar fricative is not a strict binary difference, but rather more of a continuum, which does not entirely correspond with the assignation of one allophone or another to a recording. Centre of gravity is the average of the frequency components of a sound in a given time period, which shows the highest concentrations of energy in the signal, therefore indicating which frequencies have the highest amplitude (Maniwa et al., 2009). Although raw centre of gravity figures in themselves cannot be directly mapped to a place of articulation, it is widely accepted (e.g., Jongman et al., 2000) that the higher the centre of gravity frequency, the further forward the constriction in the oral cavity that produces the fricative. Therefore, it is possible to measure the difference between centre of gravity frequencies and correlate it with the distance between places of articulation of an /x/ allophone.

Spectrograms of each interview were generated using Praat 6.0.37 (Boersma & Weenink, 2018; latest version Boersma & Weenink, 2020). Tokens of /x/ before /e/ and /i/ were manually found and annotated. Each centre of gravity frequency was taken from a spectrum. Spectra were created from the middle third (selected manually at 33% and 66%) of the frication segment, where frication was most

stable (see Figures 2–3). The program took multiple centre of gravity readings from the selected segment, generating a final average for the spectrum. Centre of gravity values were transferred to a spreadsheet, along with the word in which the segment appeared, the speech style, and participant code.

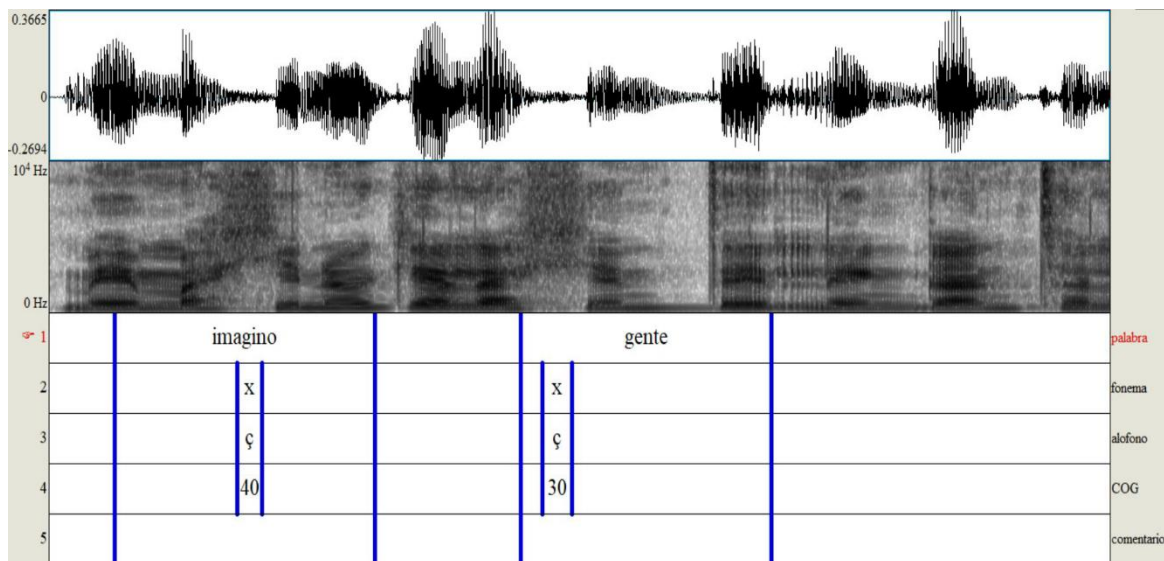


Figure 2: Exemplar spectrogram, female informant.

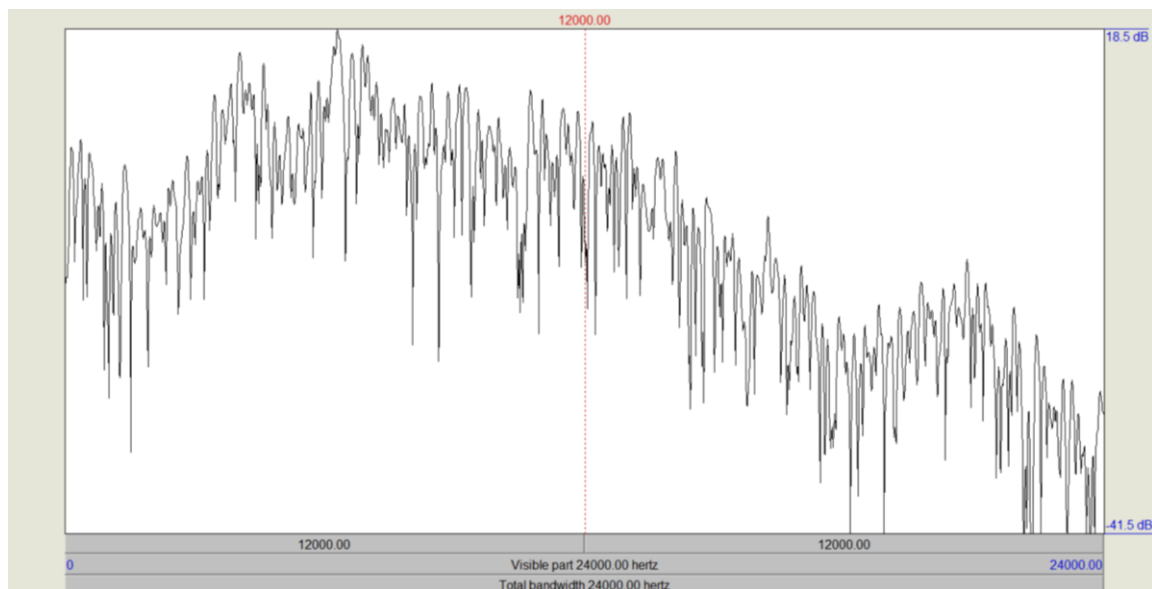


Figure 3: Spectrum of palatal fricative, female informant, centre of gravity 7128.8 Hz.

To ensure a high quality of speech sample, tokens with acoustic interference were deleted. Repetitions of the same token caused by speech errors during the test were also deleted. The final database consisted of 856 careful tokens (of which 437 were from male and 419 from female speakers) and 700 casual tokens (337 from male speakers, 363 from female speakers), creating a database of a total of 1556 tokens. To obtain paired data for each participant in the different conditions, means were created from each list of COG frequencies. Paired t-tests were used on variable means to determine statistical significance. Graphical output was generated in Python (Van Rossum & Drake, 2009) using the package Matplotlib (Hunter, 2007) and the Seaborn wrapper (Waskom, 2017).

4 Results

4.1 General Results

Table 1: Average centre of gravity frequencies (Hz) sorted by style and following vowel, male participants

	Careful, before /e/	Careful, before /i/	Casual, before /e/	Casual, before /i/
M2-STG	4079.4	4376.2	3301.1	3576.4
M3-STG	3246.7	3614.2	3160.5	3793.3
M4-STG	3442.7	4179.9	3411.5	4478.1
M5-STG	3331.6	3595.3	2369.6	3579.3
M6-STG	2758.5	3099.9	2655.8	3552
M7-STG	3758.9	3762.5	3168.8	3545.2
M8-STG	2061.4	2704.3	2057.4	2754.6
AVG	3239.9	3618.9	2874.9	3611.3

Table 2: Average centre of gravity frequencies (Hz) sorted by style and following vowel, female participants

	Careful, before /e/	Careful, before /i/	Careful, before /e/	Casual, before /i/
F1-STG	2755.5	2914.3	2521	2644.6
F2-STG	4561.7	5284.9	4411.1	5066.1
F4-STG	3609.2	4242.8	2633.4	4002.5
F5-STG	3733.8	4528.2	3537.9	5088.3
F6-STG	5784.5	6826.1	4037.6	5911.3
F7-STG	5602.1	5767.8	5672.2	5756.2
F8-STG	2541.1	2580.1	2943.4	2948.7
AVG	4084	4592	3679.5	4488.2

4.2 Results: Following Vowel

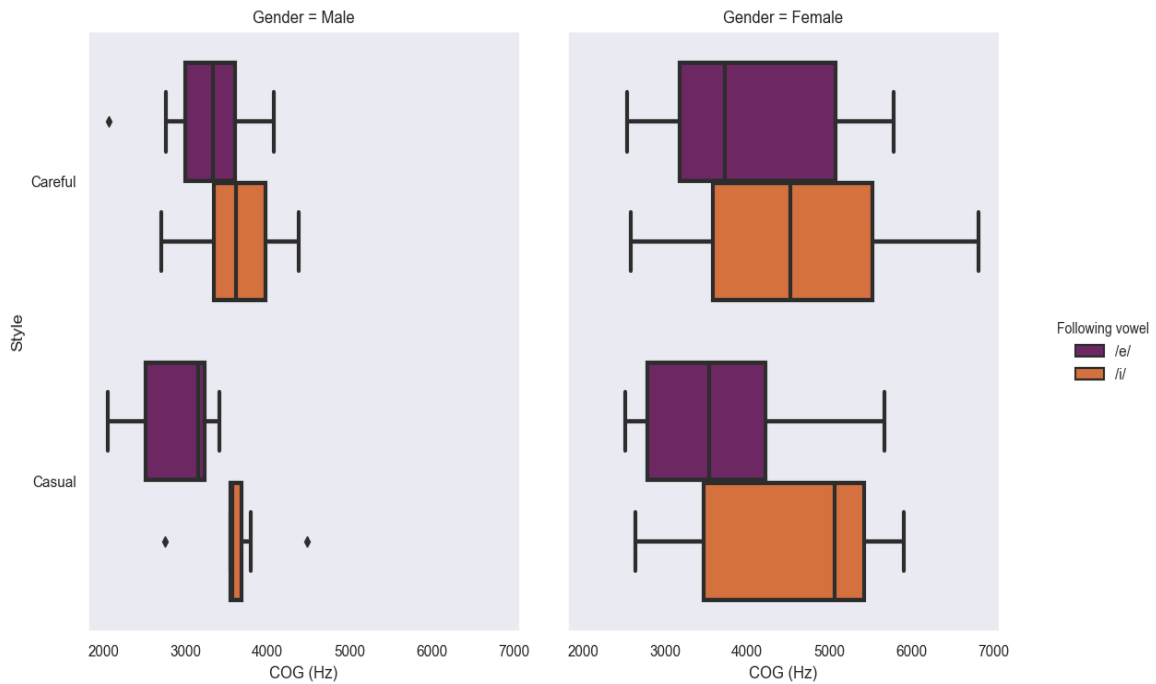


Figure 6: Average centre of gravity according to following vowel, in all 8 categories.

The results in Figure 6 demonstrate a pattern in the general extent of palatalisation exhibited by both genders. Centre of gravity tends to decrease before /e/ and to stay consistently higher before /i/. Significant differences were found in the centre of gravity frequencies before /e/ and /i/, for both genders in both speech styles: Male/careful: $t(6) = -4.0911$, $p = 0.006$; Male/casual: $t(6) = -5.651$, $p = 0.001$; Female/careful: $t(6) = -3.494$, $p=0.01$; Female/casual: $t(6) = -2.739$, $p = 0.03$.

It can be suggested that this pattern is the logical result of coarticulation before two vowels with different places of articulation, with /i/ being further forward than /e/: stronger coarticulatory behaviour emerges to facilitate production of the furthest forward vowel after a velar consonant.

4.3 Results: Style

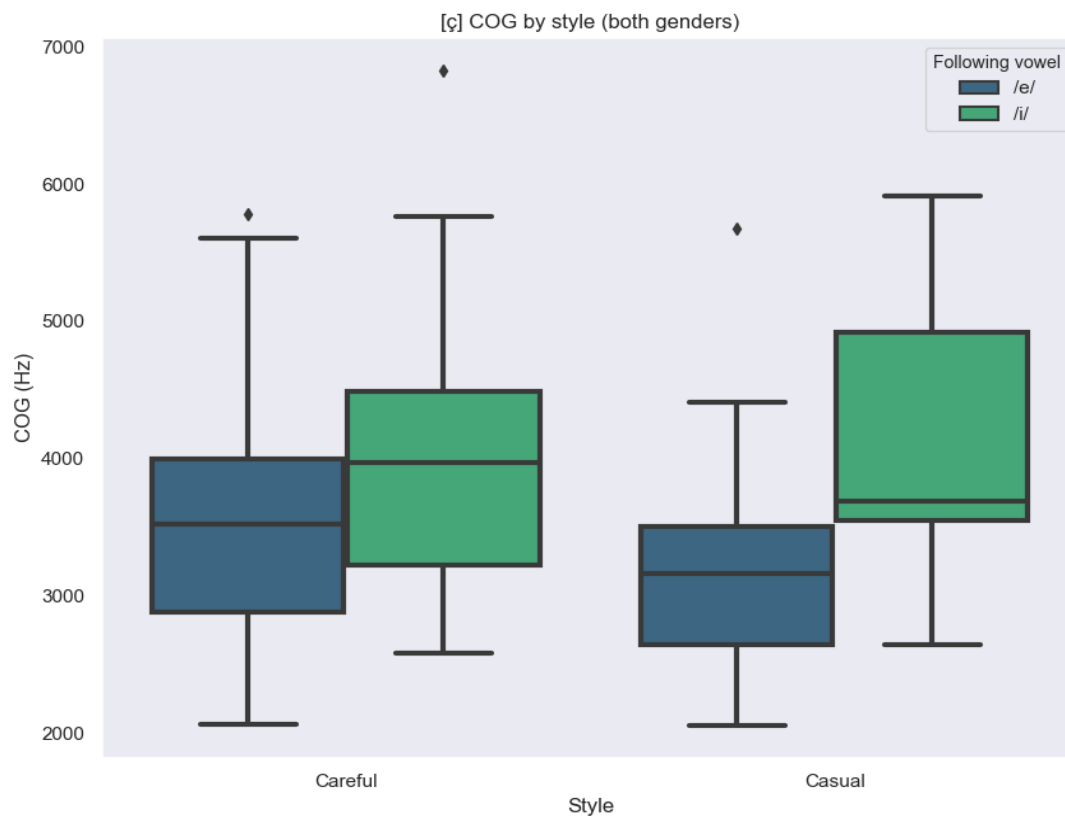


Figure 7: Average centre of gravity frequencies according to style, taken from results of both genders.

As shown in Figure 7, careful speech is associated with an increase in palatalisation for both men and women, especially before /e/. The combined frequencies indicate that this increase is significant ($t(13) = 2.559013$; $p = 0.02$). On the other hand, casual speech appears to cause a drop in frequencies, implying that palatalisation takes place on a lesser scale when speakers pay less attention to their speech. In comparison to /e/, the frequencies before /i/ remained relatively constant for all participants regardless of speech style ($t(13) = 0.481457$; $p = 0.6$).

Therefore, it can be concluded that participants have a greater tendency to palatalise realisations of /x/ in environments where they pay more attention to their speech, and that this trend is more frequent before /e/. However, it is apparent that before /i/, place of articulation remains relatively fixed despite the change in style. In the next Section, the results according to gender will be analysed, in order to illuminate any potential intersection between gender and style.

4.4 Results: Gender

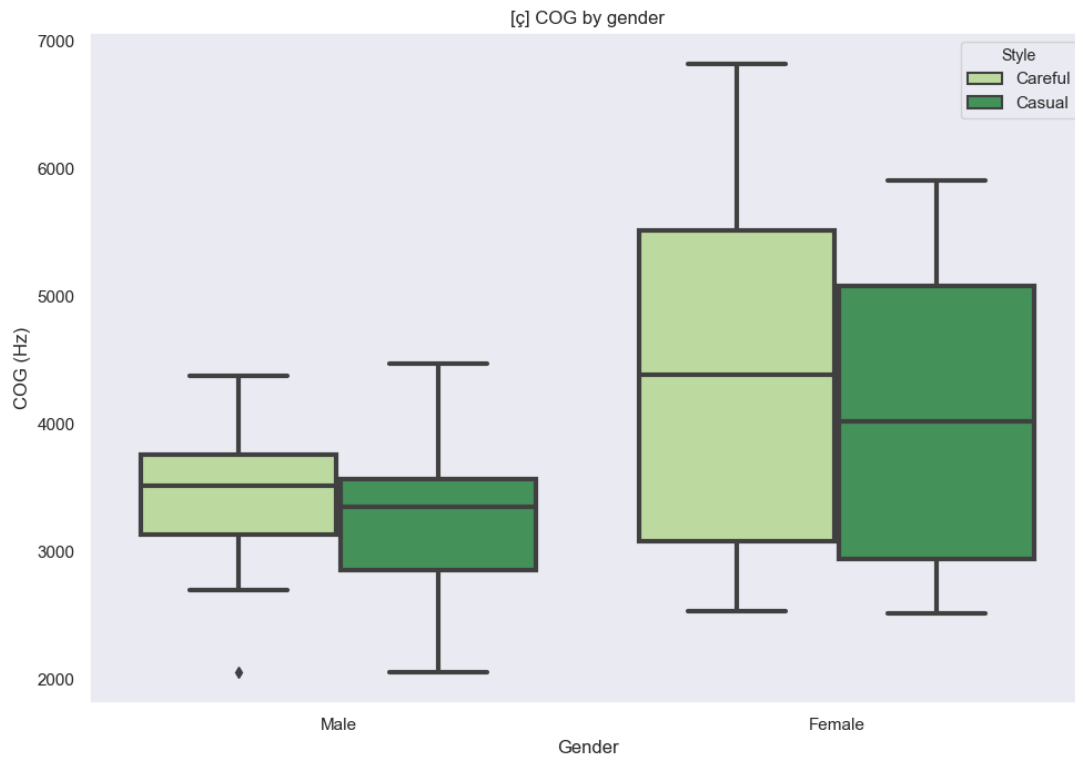


Figure 8: Average centre of gravity frequencies from both genders. It is expected that the women will have higher voices and thus typically higher COG values due to the different physical characteristics of their vocal tracts.

4.4.1 Results: Male Gender

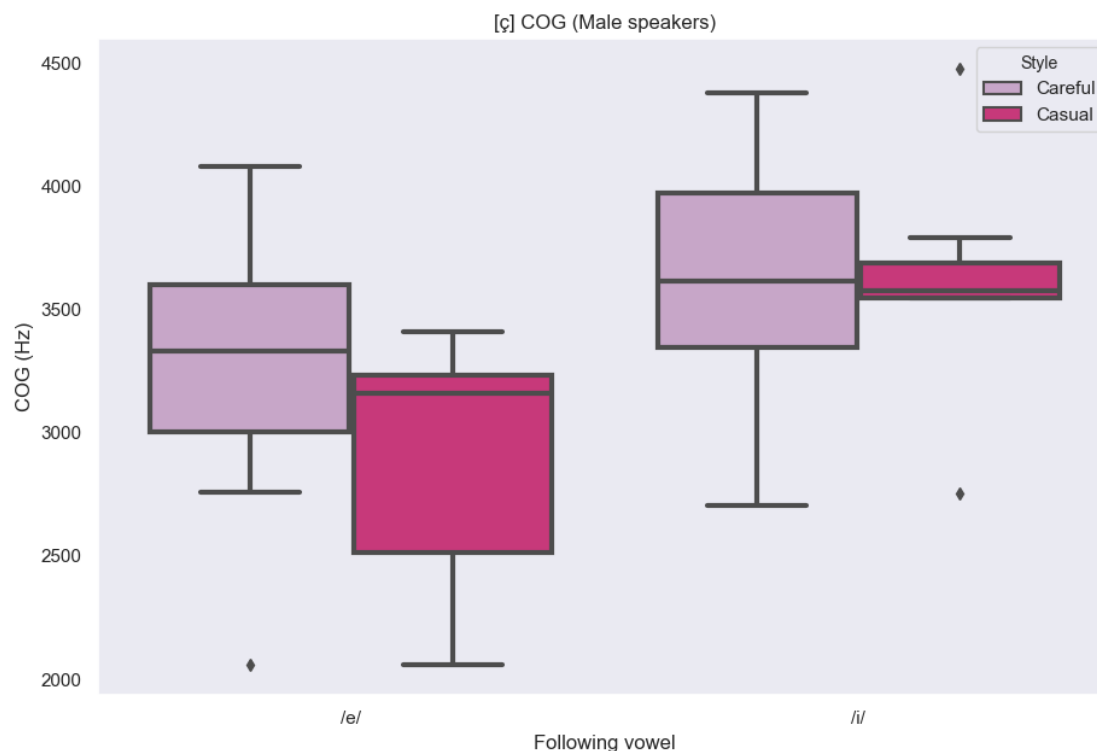


Figure 9: Average centre of gravity, careful and casual speech, male participants.

Bearing in mind the centre of gravity frequencies registered in careful speech from male speakers (see Figures 8–9) these frequencies dropped significantly in casual speech before /e/ ($t(6) = 2.406$; $p = 0.05$). The difference in frequencies before /e/ suggests that the realisation of /x/ in this phonological environment tends to be significantly further back in casual masculine speech in comparison to their careful speech. As the difference in frequencies before different vowels is greater in casual speech, it appears that the male participants follow the pattern of consonant-vowel coarticulation more closely in this style. It could even be proposed that they are more susceptible to the influence of the further-back vowel /e/ when they pay less attention to their speech.

Contrary to their results before /e/, the male participants did not present any significant difference in centre of gravity frequencies before /i/ ($t(6) = 0.049$, $p = 0.96$). This result suggests that place of articulation remains constant and that there is no sociolinguistic factor that influences their speech in this phonological environment: in other words, centre of gravity is only influenced by the following vowel.

4.4.2 Results: Female Gender

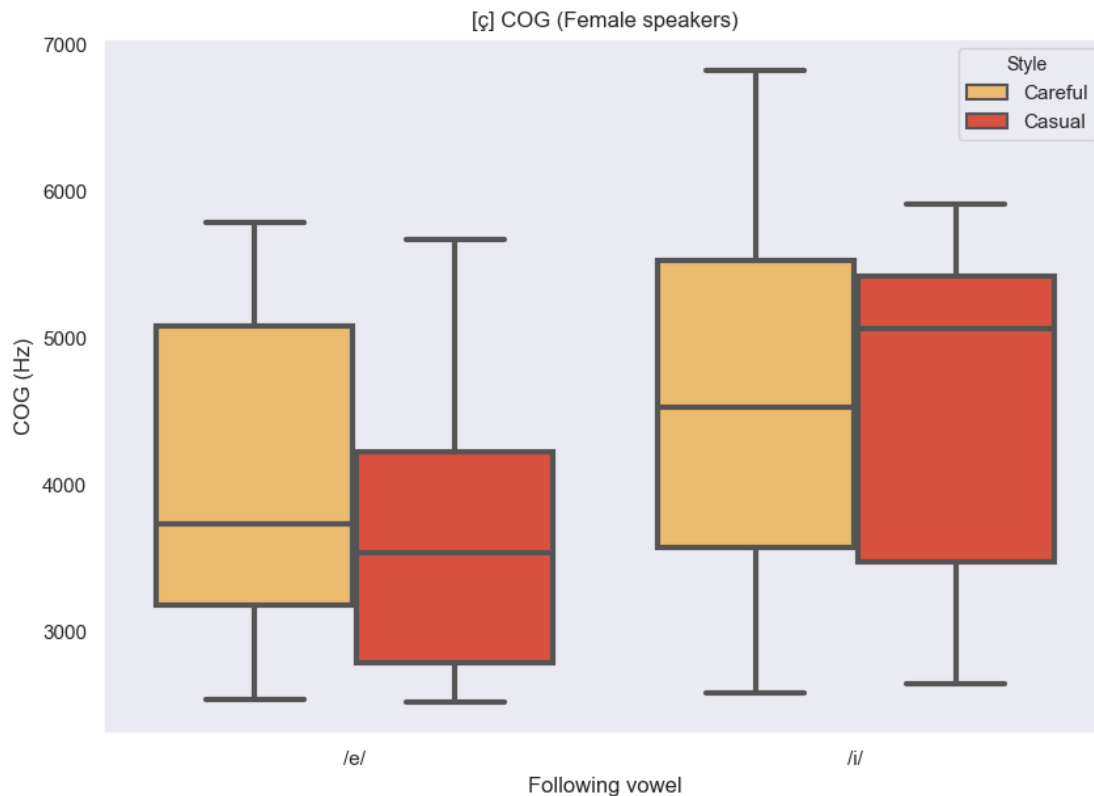


Figure 10: Average centre of gravity, careful and casual speech, female participants.

Firstly, as opposed to the male participants, female speakers did not present any significant frequency differences in careful and casual speech before /e/ ($t(6) = 1.479$; $p = 0.19$). Although Figures 8 and 10 show a decrease in centre of gravity, this change was not found to be significant: while there were indeed some female participants whose average frequencies dropped during the casual interview, there were also some participants whose frequencies increased during the informal conversation. Therefore, although their place of articulation of /x/ oscillates, this fluctuation does not equal a significant change in the degree of palatalisation, implying that place of articulation in female speech remains more constant in the two speech styles than it does in male speech.

Secondly, in a similar fashion to the male participants, the female cohort did not demonstrate significant changes in centre of gravity before /i/ in both speech styles ($t(6) = 0.571$; $p = 0.59$), although the averages dropped slightly in casual speech. Consequently, it can be concluded again that neither gender nor style influence productions of /x/ before a very front vowel.

5 Discussion

5.1 Discussion of Results by Style

Reiterating the second hypothesis previously mentioned in Section 2, it was proposed that there would be a difference in the degree of palatalisation in careful and casual speech styles. Normally coarticulation and the resulting assimilation is assumed to be a sign of a more casual speech style, which implies that it should be more prevalent during the interview. However, both masculine and feminine

centre of gravity averages (especially before /e/) dropped during the interview, implying that there was a lesser degree of palatalisation during this activity. Therefore, the decrease in frequencies appears to be linked to a decrease in articulatory caution: correspondingly, an increase in frequency (indicative of a more palatal realisation) appears to be correlated with an increase in speech control.

According to previous literature, an allophone caused by assimilation is unlikely to be more frequent in careful speech. However, this unexpected result could have arisen because the voiceless palatal fricative is articulated with the greatest intensity of all voiceless fricatives, implying that air pressure is high during articulation (Stevens, 1960). As a result, it is possible that the production of such a sound requires a special articulatory effort and therefore that its presence is indicative of a more careful articulation. Similarly, velarisation of pre-palatal fricatives (the most similar to [ç]) in old Spanish is cited as an example of lenition (Ariza, 2004, p. 13), implying that a palatal place of articulation requires articulatory effort to sustain. This effort to produce a more fronted palatal variant could become more evident before /e/, whose location further back in the oral acoustic space reduces the degree of inevitable coarticulation that helps to generate a palatal fricative.

At times, speakers used alternative allophones. In several instances they produced cases of the voiceless glottal fricative [h], which has a markedly lower centre of gravity than [x] or [ç], as shown in Figure 11.

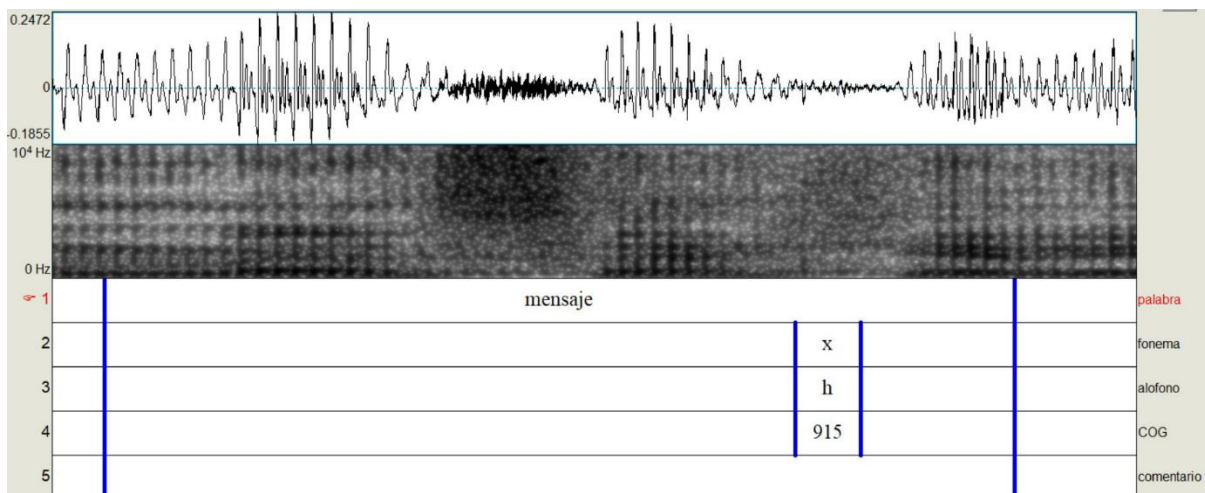


Figure 11: Example of [h] as an allophone of /x/ (COG 915Hz), male participant.

O'Brien (2012) proposes that this process happens due to debuccalisation, where the consonant loses its place of articulation and becomes a laryngeal allophone (it is assumed that the appearance of [h] is due to lenition and not to other processes such as exonorms or dialect contact, given the perseverance of [x] and [ç] before other vowels in the recordings). The frequency of lenition seems to be positively correlated with the informality of the situation. It appears that the generation of a palatal fricative (especially before /e/) demands more articulatory effort and a careful articulation from the speaker. In return, to let /x/ be realised as [h] permits a fast articulation (the instances of [h] were shorter than those of [ç]) without great constriction, which is useful in casual speech where speakers are less focused on the modulation of words. It could even be proposed that [h] seems to be the result of a corresponding lack of articulatory effort when compared to [ç].

It cannot be proclaimed with certainty that the palatal fricative is chosen on purpose by speakers, given that the frequency values before /i/ only varied slightly in both styles. As palatalisation seems to be linked with controlled speech, the use of less palatalised variants seems to be linked with speed and

lack of caution in speech. It could be suggested that these variants are not articulated on purpose, but that they are merely an effect of casual, fast, and colloquial speech. These results together would imply that the degree of palatalisation is not chosen deliberately, but by default depending on the speech style. This change according to style could demonstrate that the process is also tied to the sociocultural factors that surround the speech of both genders, discussed in greater depth in the following chapter.

5.2 Discussion of Results by Gender

Bearing in mind the third hypothesis that gender will affect the degree of palatalisation, it was noted, above all, that both men and women tended to front their realisations of /x/ in controlled speech. However, an intersection between gender and style is also apparent. Female speakers maintained a reasonably constant degree of palatalisation in both speech styles, whereas the male speakers exhibited a significantly lesser degree of palatalisation in casual speech. Therefore, if palatalisation is linked to articulatory effort, it can be inferred that the women maintain a constant level of effort, while the men take advantage of the informal situation to relax their effort levels. To an extent, these results coincide with sociolinguistic patterns discovered by variationists.

Silva Corvalán (1987 [2001]) suggests that women try to stand out in their environment by employing more ‘correct’ forms of speech, lacking opportunities to stand out in other environments such as business, politics, etc. (although women now enjoy more opportunities in employment, it is possible that this careful linguistic behaviour has been maintained). Extrapolating this information to this context, as production of highly palatal fricatives is most common when the speaker is most conscious of their speech, it is therefore logical that palatalisation increases when a speaker is culturally and socially inclined to pay attention to their speech, and even more so during a situation which requires a high level of consciousness of speech and articulation.

Women tend to dictate the trajectory and results of linguistic variation. There exist points in favour and against the notion that the presence of [ç] is the result of change ‘from below.’ Supposedly, the allophone is derived in part from assimilation (an idea that the differences in frequencies before different vowels would support), an internal linguistic factor. Women tend to be more innovating in terms of this type of variation, being the first to adopt new variants which result from systematic linguistic change (Labov, 2006). However, ‘from below’ change is carried out with a low level of consciousness of the process and the variant tends not to demonstrate stylistic change (Labov, 1972; Hawkey, 2016). This appears to contradict the greater degree of palatalisation in the reading test, where speakers paid more attention to their speech. It could be the case that a lesser degree of palatalisation appeared first, paving the way for the generation of [ç], which subsequently became a signal of articulatory effort. In that case, the more conscious ‘from above’ change also tends to be spearheaded by women, who calculatedly choose the most prestigious new variants (Labov, 2001). Although a high degree of palatalisation may not be chosen on purpose, it seems reasonable to say that a high level of articulatory effort (which could have some prestige) could indeed be chosen consciously. Similarly, women tend to be the first to reject new variants which they do not consider acceptable for social situations (Labov, 1990). Independently of their origin, if it were the case that palatal variants of /x/ were not considered acceptable, it is probable that they would have been somewhat less frequent or even eradicated in female speech.

Contrary to the tendencies of the women, male speakers registered a lower degree of palatalisation before /e/, especially during the casual interview. This trend indicates that when a careful speech style was not necessary, the men were less predisposed to palatalise their realisations of /x/ when the following vowel did not (inevitably) physically trigger a greater degree of palatalisation. As a result, there exists a need to search for reasons as to why [ç] lacks popularity among men.

It is a popular view that language (consequently, use of certain allophones) plays a key role in the expression of gender identity (Cheshire, 2004; Lawson, 2014). At the same time, men tend to employ more non-normative colloquial variants in speech (see Labov, 2001). Kiesling (1998) suggests that men, focusing on the acquisition of physical strength as a source of power, do not have to concern themselves with the search for status through language use in the same way as women and do not have to modify their speech, or expend as much effort in articulation, in order to increase their social prestige. It is possible that masculine idiolects are dictated by the desire to project a relaxed image in terms of speech, implying that the desired power already comes from other sources. As a result, this masculine identity and self-image could be demonstrated by apathy towards articulatory effort. This preference would be exacerbated in informal situations, where the result of the conversation does not have significant implications for an important sphere such as the working world, or in politics, for example, and a high level of attention to speech is simply not necessary in their eyes.

Coates (2016) affirms that linguistic variation is most probably started and dictated by differences in linguistic behaviour between genders, while Tagliamonte (2011) concludes, as a result of several studies, that men can consciously differentiate their speech from the speech of women. Extending these notions to this context, it is possible that a highly palatalised allophone is a marker of formality and articulatory effort, causing men to avoid it consciously in order to differentiate themselves from women in their speech. However, according to the sets of results specifically before /i/, it seems probable that the apathy is not towards the palatalised allophone specifically, but towards the articulatory effort that generates it. As such, patterns of effort and caution in speech between genders reflect sociolinguistic patterns observed by variationists in the past, but it is doubtful that there is a conscious choice of exact allophones in this specific case.

5.3 Comparison with Other Studies

Huskey (2010) found no significant difference between centre of gravity values before /e/ and /i/, while the results of this experiment show a clear disparity between differing prevocalic centre of gravity values. Considering that frequencies before /i/ were similar in both genders, the convergence in Huskey (2010) could indicate a greater prevalence of high centre of gravity frequencies before /e/. This result may be explained by the elicitation method: Huskey used a series of short phrases with the template 'I say *x*... because I do' which would have generated an extremely controlled speech style due to the minimal quantity of words in each phrase. The positive correlation between speech control and more extreme palatalisation appears to support the results of this study.

However, the results of this investigation do not completely match results from previous literature. Tapia Ladino and Valdivieso (1997) found that the palatal fricative was not significantly more prevalent in one style or speaker gender. Although this investigation and that of Flores (2016) coincide in that palatal fricatives were more favoured in more formal conversational styles (in Flores, the formal discussion programmes broadcast on radio channels), it would be a leap of the imagination to compare a radio programme to a linguistic reading task. Flores did not find that the speaker gender influenced palatalisation. However, it is worth mentioning that in the Flores study, female speakers tended to palatalise more when speaking with an interlocutor, which may indicate a greater desire to speak in a more prestigious fashion, or more carefully, in the presence of others.

The difference between the previous two sets of results and this paper may be explained by the change in elicitation methods. The results from previous literature were taken from speakers likely to have undergone some form of training concerning speech styles in mass media communication. Contrarily, in this experiment, data was taken from linguistic interviews. Even when accounting for some possible lingering effects of the observer's paradox, it can be imagined that these participants

were more likely to employ a more naturalistic speech style outside of a publicly-broadcast environment.

6 Conclusions and Projections

Firstly, the null hypothesis that the following vowel does not influence the degree of /x/ palatalisation can be rejected. Centre of gravity values were notably higher before /i/ than before /e/. This result is not surprising: as /i/ is a fronter vowel than /e/, it stands to reason that /i/ impules a greater degree of palatalisation to better facilitate the articulation of juxtaposed front and back phonemes.

Secondly, it can be provisionally concluded that speech style influences the degree of palatalisation, especially before /e/. However, this experiment generated the unexpected result of an increase in palatalisation in careful speech. This result appears to contradict the conclusions of Browman and Goldstein (1987) who proposed that coarticulation and resulting assimilation were more frequent in more casual speech styles. An explanation of this apparently discordant set of results could stem from the notion that velar palatalisation is not entirely due to coarticulation. Instead, velar palatalisation can be considered a separate and not entirely inevitable process, which can be influenced to a certain degree by anticipatory coarticulation stemming from the place of articulation of the following vowel.

Thirdly, the results here suggest a possible interaction of style and gender. In this case, the centre of gravity figures indicate that the degree of palatalisation by male speakers dropped significantly when the formality of the speech style dropped, while this change was less pronounced in female speakers. However, this phenomenon only took place before /e/, suggesting that assimilation has a larger role in governing palatalisation before /i/. It can be proposed that male speakers, in casual speech, have a lower propensity to engage in articulatory effort. Therefore, they tend to follow patterns of coarticulation, submitting to the physical and coarticulatory effects of the less front vowel and producing less palatalised fricatives. On the other hand, productions of female speakers showed less significant differences in frequencies between careful and casual speech, implying that they exhibited a more constant articulatory effort.

With regards to the possibility of predicting the propensity of certain speakers to palatalise the velar fricative, we can see a potential interaction between linguistic variation dictated by social factors and linguistic variation dictated by articulatory factors. It can be concluded that, to a certain point, social factors have an influence over the degree of /x/ palatalisation, given its positive correlation with a careful style of speech and its more frequent employ by female speakers. However, it would be a bold statement to propose that highly-palatalised variants enjoy overt prestige in Chilean Spanish, given that the degree of palatalisation was effectively equal in both genders and both styles before /i/. In this case, it appears that the effects of coarticulation are inevitable and that palatalisation is not totally controlled by social and stylistic motivations: assimilation plays a role in the centre of gravity of /x/. The presence of what appears to be variation dictated by multiple sources (as proposed by López Morales (2004)) generates questions surrounding the level of speaker consciousness of the variation. The most logical proposition, in this case, would be that the degree of /x/ palatalisation is not controlled by conscious choice, but rather, that its presence is controlled by articulatory effort and caution in speech: as a result, it is inevitably tied to sociocultural factors surrounding linguistic variation and imitates patterns previously seen in the variationist paradigm.

It is worth mentioning, briefly, that variation in /e/ and /i/ in Chilean Spanish also tends to carry connotations of prestige or stigmatisation (Soto Barba, 2007). Therefore, if palatalisation is physically linked to vowel place of articulation, it stands to reason that a speaker who exhibits prestigious variants

of these vowels would also exhibit more prestigious centre of gravity values, by default, and without consciousness of the process.

Although measures were taken to ensure the quality of the investigation and naturalistic qualities of the speech samples, there were some obstacles to research which should be mentioned here. Firstly, tokens of /x/ before /i/ appeared only infrequently during the conversational interview. This problem could have been solved by extending the duration of the interview, but this measure was not taken due to the uncomfortable nature of the microphone after too long a time. Secondly, it would have been beneficial to interview more speakers, but it was necessary to balance the size of the participant pool with the time available. Ideally, a further study with more participants and more powerful statistical testing would be compared to the conclusions here.

The cause of extreme palatalisation in Chile is still not known with certainty. One explanation could be the geographical isolation of Chile: surrounded by ocean and the Andes mountains, it is more likely that linguistic variation will take hold more intensely if there is less possibility of dialect contact in border areas. However, dialect contact is surely established by contemporary immigration of speakers of different varieties of Spanish, who settle in Chile. Alternatively, it is possible that palatalisation is caused by contact with a substrate language (in this case, Mapudungun) where speakers palatalise velar consonants strongly before front vowels (Pérez & Salamanca, 2016). Further investigation of the contact between these two languages would surely illuminate more aspects of this phenomenon. Equally, an expansion of the experiment to involve different geographical regions and socioeconomic strata would give rise to further useful insights surrounding palatalisation.

7 References

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8 Appendix: Reading Test Slides

En la playa se ven todo tipo de palmeras; en el mar, cardúmenes de peces multicolores y algunos delfines muy graciosos.

Me vendieron un embudo sin boleta en Chimbarongo.
Después de registrar una visa, hay que ir al Registro Civil y esperar.
Ella era gorda, pecosa y de cabello de color amarillento muy crespo.
Mi hermana estudió ingeniería en la universidad, pero ahora es profesora de biología, lo que no afecta su fascinación con todo lo tecnológico.
Podrán vivir sin guerra en Angola.
Te mandé un mensaje diciendo que trajeras dinero en efectivo para pagar el viaje, pero trajiste tu tarjeta de crédito.
Los furgones de carga dan mayor rentabilidad, porque presentan mayor capacidad.
Hace unas horas, yo, el líder de la comunidad británica en Chile, elegí personalmente al encargado de traer ginebra a los carretes de la organización.
En Lota, las actividades comunitarias de invierno contribuyeron a paliar la pobreza de la gente.
“Ya te dije que vayas a la página 394, Sr. Potter, y quiero que vayas a esa página antes de que me enoje,” dijo Snape.
Vi con angustia como un gato angora se comía una anguila.
Los abogados tuvieron que corregir los errores de tipeo en los documentos legislativos, sin hacer grandes cambios al contenido original.
Se dice que el tordo, por su brillante color negro, atrae la atención de los turcos.
La gente se mantiene en forma mediante ejercicio físico: por eso, es útil tener un gimnasio cerca de la casa.
Existen muchas mentiras que parecen verdaderas y agradan más cuando tienen un origen dudoso, pero posible.
La gira del grupo de metal fue un gran éxito; los artistas recibieron muchos halagos acerca de la calidad y la complejidad de su música, siendo las habilidades del bajista las más comentadas.
Ángel Fernández señaló que será la empresa privada la que hará los proyectos económicos.
Escogiste la mejor temporada para pasar tiempo en las playas francesas, porque en verano se cosechan los mejillones.
La esbelta joven era tan terca que nunca estudiaba para los certámenes.
La inteligencia de esta nueva generación de estudiantes se nota en sus capacidades de buscar soluciones logísticas que nos mejoran la vida.
Me invitaron a pasear en un bote sin combustible.
Me imagino que a la gente le enganchan las series porque acaban sintiendo cariño por los personajes.
Antofagasta lanza su apuesta para enfrentar a Calama.
Aguirre sonó su nariz y la balsa en la que viajaba empezó a hundirse rápidamente.
El ají chileno no pica tan fuerte como el mexicano, que se usa en las fajitas y toda esa comida.
Seguro que va a haber intercambio de bombas: molotovs para allá, lacrimógenas para acá.
Ya es hora de exigir que nos dejen acceder a la plataforma digital, porque tenemos una cantidad de lecturas pendientes.
Claro que me gusta comer caldo de congrio, con hartos ajos y un pichintún de ají.
Un exceso de lluvia puede arruinar el día, aquí y en la quebrada del ají.
Más vale un largo etcétera que una lista latera.
Allí resonó por última vez el fusil del guerrillero abatido por la mujer del general Javier Grandón Jiménez.
La respiración es un proceso involuntario que permite la obtención de oxígeno y la eliminación de desechos en estado gaseoso.
Los glóbulos rojos, apoyados por la hemoglobina, expulsan las moléculas de dióxido de carbono y reciben las de oxígeno, que luego llevarán hasta cada una de las células del cuerpo.

En el diccionario de la Real Academia Española, se define tribu como un grupo social primitivo de un mismo origen, real o supuesto, cuyos miembros suelen tener en común usos y costumbres, y también como grupo grande de personas con alguna característica común.

Ya está dicho: nos invaden los extranjerismos. Ir de camping, divertirse con stickers, pertenecer a un club, ir a un casting, dedicarse al marketing, probarse las panties, tener un partner, comprar los tickets... Se comenta que los habitantes de esta ciudad, así como los de todo el orbe, apetece más el vino tinto que el blanco, debido a la presencia de sustancias que retardan el envejecimiento, favorecen la digestión e inhiben la formación de trombos, disminuyendo de este modo el riesgo de accidentes cardiovasculares. Mientras cada uno se esforzaba por presentar argumentos más ingeniosos que el otro, escucharon pasar a un extraño viajero envuelto en unas ropas muy abrigadas, hechas de un fino tejido ovejuno. Urgido como nunca antes en su vida, Carlos trató de apagar el notebook, pero el botón de encendido no hizo nada.

About the Author

Madeleine Rees is a PhD candidate at the Department of Theoretical & Applied Linguistics of the University of Cambridge. She graduated from the University of Southampton with a BA in Spanish & Linguistics in 2019 and from the University of Cambridge in 2020 with an MPhil in Linguistics. Her research interests include speech production, both from a cognitive and sociolinguistic standpoint, speech perception, and language variation and change.

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