

Linguistic Change in a Bilingual Context: Influence of Spanish in Catalan Sound Changes in Progress

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Abstract

This paper investigates the degree to which language contact may influence Catalan sound change in the absence of language shift by examining variables with potential contact-induced variants in the context of the highly bilingual Catalan-Spanish urban center of Barcelona that has undergone a recent reversal of language shift. The study identifies four variables, three which have been previously described in the literature as potential contact-induced linguistic changes, and one which is recognized as unaffiliated with language contact. These involve the potential merger of /k/ and /j/, the affrication of /f/, the devoicing of /z/ and /z/, as well as the deletion of pre-consonantal /r/, in an attempt to determine whether these former changes, if they are present, are due to language internal or external factors, and whether their social distribution differs significantly from the latter change unaffiliated with language contact. Additionally, the study analyzes the factors of language attitude and use among bilingual speakers and whether these correlate with particular linguistic variants to determine whether linguistic changes observed are due to language contact. The sociolinguistic patterns of the merger, affrication, and devoicing suggest these are, at least partially, language contact-induced changes from below, while that of /r/ deletion affirms its status as a stable sociolinguistic variable. Language attitude is found to have no correlation with the variables studied, while language use is found to be highly predictive only of /z/ devoicing.

1 Introduction

The effect of language contact on linguistic change has been well-attested (Heath 1984; Thomason 2006). Situations of language contact seem to provide a fairly straightforward answer to the “actuation problem” of linguistic change (Labov 1972), which asks why certain linguistic changes occur in a particular language at a particular time, as they provide the social context conducive to the development of linguistic variation through the introduction of a non-native variant that competes with a native one (Ravindranath 2008). However, many authors have stressed that the co-occurrence of language

contact and linguistic change, even when seemingly converging in structure, does not necessitate that such changes are contact induced (Poplack, Zentz, & Dion 2012).

Mooney and Hawkey (2019), in their study on Catalan and Occitan speakers in France, attempt to disambiguate between language-internal and language-external sources of change in the merger of the phonemes /ʎ/ and /j/. They observe that a shift from [ʎ] to [j] is a common sound change seen in many other Romance languages (e.g. French and standard varieties of Peninsular Spanish) due to the low functional load of the /ʎ-/j/ contrast. On the other hand, prolonged contact with the higher prestige French language, where these are no longer contrastive phonemes, may have triggered the merger in Occitan and Catalan, which are in an increasing state of obsolescence vis-à-vis French in the regions they are spoken in France. The study finds a change in apparent time of /ʎ/ from [ʎ] to [j], a merger that, for Catalan, is nearing completion for younger speakers. The authors argue that whereas in Occitan this change is solely due to language contact with French, in Catalan, both language external and internal factors drive the change.

Across the border in Catalonia, the sociolinguistic picture of Catalan is quite different. Whereas the authors describe Catalan as an "obsolescent" language of France with very few fluent native children or widespread presence in the education system, in the Spanish autonomous community of Catalonia, Castilian Spanish and Catalan are on much more equal footing. Barcelona, the main urban cosmopolitan center of Catalonia, is Spain's "biggest and most salient bilingual city" (Boix-Fuster 2015, 147). It is characterized by a highly fluid and unstable "seesawing bilingualism" in which it is unclear which of the two languages historically spoken in the city, Castilian Spanish, or Catalan, has greater prestige (Miller & Miller 1996). This is due, in part, to the fact that in Catalonia, economic and political power has long been separated, where Catalan is associated with the economic elite and Spanish with the politically dominant group. Due to the large influx of primarily lower-class Spanish-speaking immigrants to the city within the last half century, the social distribution of Catalan and Spanish in Barcelona can be characterized as "sandwich-shaped," in which Spanish is the dominant language in both the highest and lowest social class groups, while Catalan predominates in middle-class sectors (154).

Similar to the sociolinguistic context in France, Spanish and Catalan present a case of extended language contact. However, whereas the centralizing language planning of the French state has led to the steady decline of Catalan in the country, the historical context in Spain is more complex, with the status of Catalan vis-à-vis Castilian Spanish undergoing multiple periods of suppression and subsequent revitalization. Once the language of the empire of the Crown of Aragón, Catalan slowly lost ground to Castilian Spanish as a literary and institutional language following the integration of Catalonia into the Castile-Aragon dynastic union (Miller & Miller 1996). In the mid-19th century, the language was revived

during a period known as the *Renaixença* (Renaissance) that saw Barcelona emerge as a modern industrial economic force, where the language was mobilized as the base for a broader Catalan national political movement (Etherington 2010). This increased proliferation of the Catalan language continued into the early 20th century where it was followed by a brief bout of repressive language policies following the centralist coup of 1923 and the successive restoration of the language's official status (equally as brief) in 1931 during Spain's Second Republic.

The mid-20th century bore another radical shift in language policy in Catalonia, marked by the end of the Spanish Civil War and the Spanish dictator, Francisco Franco's, ascendance to power. During his reign, from 1936 until his death in 1975, Catalan was heavily suppressed as a public language—along with traditional emblems of Catalan cultural identity, including Catalan customs, music, and dances—in the name of promoting Franco's nationalist ideal of a unified country under one culture, religion, and language (Seoane 2009). The situation of Catalan vis-à-vis Spanish during this time was characteristic of diglossia (Woolard & Gahng 1990), in which Spanish constituted the only permissible language of government, education, and mass media, whereas Catalan was relegated to the private sphere of the home.

Catalonia has undergone yet another rapid shift in language policy and language dynamics within the last half century following the restoration of democratic government in the country and the conferral of a measure of self-government in Catalonia, which granted Catalan official status for the first time in 40 years. Catalonia's current governing body, the Generalitat, explicitly announced the goal of language normalization as part of its language policies: a process in which Catalan “gradually recovers the formal functions it had lost” and “works its way into those social sectors, within its own territory, where it was not spoken before” (Miller & Miller 1996, 123). Catalan is now compulsory across all levels of public education in the region and is the language of government and mass media.

Thus, in many ways, Catalonia is an anomaly within the Catalan-speaking community. Despite “cultural and linguistic domination by the Castilian center,” it has emerged with a thriving industrial powerhouse of an urban center that has enabled the revival and standardization of the language (Boix-Fuster 2015, 148). As in French, many varieties of Spanish, including that spoken in Catalonia, have merged the /k/ and /j/ phonemes in favor of /j/, in the widely documented process known as yeísmo (Canales 2011). An investigation into the state of the /k/-/j/ merger in Catalonia, in which, similar to France, we find extended language contact with a Romance language that has lost the contrast, but a striking *lack* of language shift, could provide an insight into the social factors at play in this phonological phenomenon. Along with the familiar social variables of age, gender, and social class, probing into the factors of language attitude and use, as well as whether these correlate with particular linguistic variants,

could help determine whether the linguistic change observed is indeed due to language contact. Due to the diverging development of the /ʎ/ phoneme in Spanish and Catalan, the only cognates in which this phoneme was present historically, in both, is limited to intervocalic position, as in “cat” : ‘bellesa’ [bəʎeza] and Sp. ‘belleza’ [bejeθa] *beauty* (Zampaulo 2019). Thus, if the merger were contact induced, it would be favored in intervocalic position where the influence of the Spanish [j] variant strengthened the change.

Previous research on the state of these phonemes in the Catalan spoken in Spain indicates that this contrast remains stable in the language or has only just begun to merge. Rost (2016) compares the perceptual abilities of Spanish and Catalan speakers and finds that this contrast was much more robust for Catalan speakers, where the sounds remain distinct phonemes, though there are small urban centers where this merger is surfacing. Canales (2011) finds that in the related Valencian variety, the two phonemes remain distinct, while in Spanish, the merger is nearing completion among bilingual Valencian Spanish speakers in Gandía. Pons i Griera (1992), however, suggests that for the particular variant spoken in Barcelona, a merger of the two phonemes has been in progress for some time and has developed sociolinguistic variation along class lines, though she does not clarify the nature of this distribution.

She identifies several other phenomena of sociolinguistic interest: word-initial affrication of the voiceless fricative /f/ and devoicing of the voiced fricatives /z/ and /ʒ/, particularly as these are changes that converge with the phonemic inventory of Castilian Spanish, which lacks phonemic /f/ and /z/. Analyzing the social correlations of the devoicing of /z/ and whether they pattern with the other changes in progress could help determine whether these changes are being driven by language-internal or external factors. The devoicing of /z/ could be an indirect consequence of contact-induced change through speakers’ attempts to level imbalance in their phonemic feature inventory, if /z/ devoicing was the initial change, or an indication that this change is due to unrelated language-internal factors. By contrast, Mas i Miralles and Montoya i Abad (2004), in their general overview of the current sociolinguistic variation in Catalan, identify the deletion of pre-consonantal /r/ as another sociolinguistic variable of interest, though crucially variation identified in previous research as unaffiliated with the influence of language. Evaluation of whether there are differences in the social factors that govern the variation in /r/ deletion compared to those of the other variables identified could help determine whether the latter are truly due to language contact.



Figure 1: Area of Study

This paper investigates the degree to which language contact may influence sound change in the absence of language shift by examining variables with potential contact-induced variants in the context of the highly bilingual Catalan-Spanish urban center of Barcelona that has undergone a recent reversal of language shift. It analyzes the potential merger of /k/ and /j/, the affrication of /j/, and the devoicing of /z/ and /z/, as well as the deletion of pre-consonantal /r/, in an attempt to determine whether these former changes, if they are present, are due to language internal or external factors, and whether their social distribution differs significantly from the latter change unaffiliated with language contact.

I predict that if the sound changes in progress are driven by language-contact with Spanish, this will be reflected in socioeconomic status and region, with higher class urban speakers with more connections to the Spanish-speaking world further advanced in these changes than lower class rural speakers, as well as language use and attitude, with greater Spanish usage and feelings of Spanish language solidarity correlated with further advancement in these changes. Similarly, if these sound changes are contact induced, they should be favored in words with Spanish cognates, where phonemic correspondence with the Spanish variant strengthens the change.

2 Methods

Participants for this research project were recruited using snowball sampling, in which additional participants are recruited through referral from initial participants, thus leading to a sampling bias that overrepresents the social networks of relatively few individuals. The resulting demographic distribution of participants skews strongly older and female. In particular, younger male speakers were underrepresented, with only two participants in this category, as compared to the relatively more even distribution across other categories, as observed in Figure 2.

Participants	Male	Female	Total
Older: 40-82	12	17	29
Younger: 18-30	2	11	13
Total	14	28	42

Figure 2: Sample Size of Catalan speakers by Age and Gender

To gauge the potential effects of style shifting on each variable, while still maintaining a uniform set of data to draw from, I designed a word list, representing a more formal style. The list contained 3-4 instances of each variable of interest, along with a reading passage, representing a more casual style, that contained 4-7 instances of each variable, in a range of relevant linguistic environments. Participants were asked to record themselves reading the passage and word list and given the option to send these recordings through WhatsApp or email, though the majority of recordings were received through WhatsApp.

The (z), (j), (3), and (r) variables were all recorded impressionistically, using the presence of the voicing bar and slope of F3 on Praat, correlated with voicing and rhoticity, respectively, as guidelines in case of any transcriptional ambiguity. The /k/ and /j/ variables, which are much more challenging to discriminate auditorily, were instead analyzed acoustically on Praat. The minimal and maximal F2 value of each variable were measured, as well as the duration of the entire gesture, following the method developed by Crowley and Palaiologou (2024), as the lateral variant tends to be longer in duration and have a flatter F2 slope. In order to avoid directly comparing the formant values across genders, which would lead to spurious differences due to physical differences in vocal tract size, I subtracted the mean F2 slope for /k/ from that of /j/ and compared this difference in F2 slope across speakers. Group means of /k/ and /j/ were statistically analyzed using two tailed t-tests while the distribution of all other variables among groups were statistically analyzed through chi-squared tests.

The word list and reading passage were accompanied by a questionnaire, delivered in Catalan, that asked for participants' demographic information: year of birth, gender, education level, parents' jobs, as well as what region they grew up in and whether they still lived there. There was minimal variation in education level, with 34 of the 42 participants having a college education or above. Thus, socioeconomic status was primarily based on participants' responses about their parents' job, in which there was greater variation. This led to a classification of 10 upper middle class, 17 lower middle class, 13 upper working

class and 1 lower working-class participants (one participant did not respond to this question). Additionally, while most speakers came from the Barcelona province, which essentially covers the area where the Central Catalan dialect is spoken—with 26 directly from the Barcelona metropolitan area—7 participants came from other major cities in Catalonia, where dialect differences may have played a role in the variation observed.

Along with this demographic information, a number of questions were aimed to assess participants' bilingual experience in Catalan and Spanish. Participants were asked for their native language—for which “Catalan,” “Spanish,” or “both” were presented as options—as well as their second language (L2) and at what age they began speaking their L2. These variables were coded with whatever response put forth for native language pertaining to their L1, and their L2 split into early L2, if learned before the end of primary school, and late L2, if learned later than primary school.

Additionally, language use and attitude in both Catalan and Spanish were assessed, in line with recent research that asserts that language *use* provides a more accurate measure of L2 proficiency than subjective self-evaluations (Hernández-Rivera et al. 2024). To assess language use, participants were asked how often they spoke each language daily on a 5-point scale: ranging from *almost never* to *almost always*, as well as who they spoke each language to: family, friends, work colleagues, neighbors, and strangers, with each group contributing one point to the participant's total language use score. Participants' responses for each question were combined, yielding a language use score out of 10 for each language. To assess language attitudes, participants were asked to answer *yes* or *no* to a series of statements on whether they felt comfortable speaking each language, whether they enjoyed speaking it, as well as whether they would linguistically accommodate to an interlocutor that felt more comfortable in one or the other language. A *yes* response to every question indicated a perfectly neutral or balanced language attitude to both languages, while any *no* responses indicated a preference for the other language. Thus, *no* responses for the Spanish statements counted towards stronger Catalan solidarity and vice-versa along one 6-point scale from strong Catalan solidarity (score of 3) to strong Spanish solidarity (score of -3).

3 Results & Analysis

Figure 3 displays and compares the social variables with statistically significant differences across group means by style to identify the degree of style-shifting (L: list and P: passage) for each variable. Since a broader comparison of gender across all speakers would have too great a confound of age, analysis of gender differences was restricted to older speakers, who had a more even gender distribution. Thus, all references to gender differences in the data tables and graphs refer to comparisons

across speakers aged 40 and over. In the table for certain variables, *Sp* use refers to total Spanish use which was found to be marginally significant ($p < 0.01$), while *Cat-Sp* use refers to the use of Spanish relative to Catalan.

Variables	List	Passage	Style-Shifting
/ʃ/ affrication	Age: $p = .344$ O: 14% Y: 23%	Age: $p = .007$ O: 32% Y: 54%	$p < .001$ L: 18% P: 39%
	Gender: $p = .555$ F: 18% M: 13%	Gender: $p = .723$ F: 34% M: 29%	
	Sp Use: $p = .091$ H: 25% L: 13%	Sp Use: $p = .087$ H: 47% L: 34%	
/ʒ/ affrication	Age: $p = .792$ O: 7% Y: 6%	Age: $p = .741$ O: 41% Y: 40%	$p < .001$ L: 7% P: 41%
	Gender: $p = .793$ F: 7% M: 6%	Gender: $p = 0.201$ F: 45% M: 36%	
/ʒ/ devoicing	Age: $p = .041$ O: 13% Y: 4%	Age: $p = .046$ O: 5% Y: 0%	$p = 0.002$ L: 10% P: 3%
	Gender: $p = .212$ F: 12% M: 15%	Gender: $p = .015$ F: 8% M: 0%	
/z/ devoicing	Cat-Sp Use: $p = .212$ H: 21% L: 13%	Cat-Sp Use: $p = .005$ H: 6% L: 18%	$p = .018$ L: 17% P: 11%
/j/ - /ʎ/ F2 Slope	Age: $p = .031$ O: 2.8 Y: 1.7	Age: $p = .021$ O: 2.6 Y: 1.1	$p = .276$ L: 2.5 P: 2.1
	Gender: $p = .007$ F: 3.4 M: 2.0	Gender: $p = .231$ F: 2.9 M: 2.2	

/r/ deletion	Age: p = .877 O: 22% Y: 23%	Age: p = .100 O: 25% Y: 37%	p = .147 L: 22% P: 29%
	Cat-Sp Use: p = .866 H: 22% L: 23%	Cat-Sp Use: p = .008 H: 23% L: 45%	

*Significance at $p < 0.05$

Figure 3: Group Means and Statistical Significance of Social Factors on Linguistic Variables

The social factors of age, gender, and style proved to have the strongest correlation with the variables, with at least one of these factors statistically significant in some capacity for each variable. All other factors, including socioeconomic status, region, native language, and language attitude, were found to not be substantial. For /f/ affrication, there were significant differences across age groups in the more casual reading passage style (p-value of 0.007), with younger speakers affricating more than older speakers. This was a trend observed in the word list style, though not statistically significant. This pattern is indicative of a change in progress towards affrication. This variable also exhibited the most dramatic style-shifting, with speakers affricating significantly more in the casual reading passage than the more formal word list (p-value of less than 0.001). While gender did not have a statistically significant effect on this variable, female speakers tended to have higher rates of affrication than male speakers.

Intriguingly, the only other variable that exhibited such a high degree of style-shifting was one I hadn't originally planned to examine but was produced organically by my speakers: /z/ affrication. Speakers affricated /z/ significantly more in the casual reading passage than the formal word list, with a p-value of less than 0.001. This variable is clearly value-laden for speakers, who seem to correct their speech towards the non-affricated variant in more formal settings, yet strikingly, it is the only variable that doesn't correlate significantly with any of the social factors. Rate of production of the affricated variant is nearly identical across age and gender in the word list style, while female speakers have only a slight non-significant lead in the reading passage style. This is not in line with the prediction by Bell (1984) that stylistic variation presupposes social variation, in which markers exhibit both social and stylistic distinctions while indicators exhibit only a social difference.

The devoicing of /z/, by contrast, correlated significantly with the most number of social factors. In both speaking styles, younger speakers devoiced this variable significantly less than older speakers. In the reading passage style, female speakers devoiced this variable significantly more than male speakers (p-value of 0.015). These results are driven by the fact that the only instances of devoicing in the reading passage style are by older female speakers. The distribution across age and gender for this variable indicates, somewhat unexpectedly, that female speakers and younger speakers do not align in their variant

preference, while in terms of style-shifting, all speakers devoiced significantly less in the reading passage than the word list (p-value of 0.002). This suggests that the devoicing of /z/ was once a change from above, in which the devoiced variant carried social prestige, hence the further advancement of female speakers and greater frequency in the more formal register, which has since lost its social valuation and is receding among younger speakers.

The devoicing of /z/ shows a similar style-shifting trend to /z/ in which speakers devoice significantly less in the more casual reading passage than the formal word list (p-value of 0.018). Yet unlike the devoicing of /z/, and similar to the affrication of /z/, this variable shows no other significant correlation with the social factors of age and gender. It does, however, display a meaningful correlation with Catalan vs. Spanish language use, which will be explored further below.

The /k/-/j/ merger, in contrast to some of the other variables examined, displays several significant correlations with social factors yet does not display a significant degree of style shifting. This pattern suggests that this variation is still below conscious awareness at the level of an indicator. In both speaking styles, the difference in the F2 slope of /k/ and /j/ is significantly different across age groups, with a much smaller difference among younger speakers than older speakers. The convergence of the F2 /k/-/j/ slopes for younger speakers is indicative of a change in progress towards a phonemic merger. Figure 4 shows a breakdown of this merger by age, with the older group further split into 40-60-year-old middle-aged speakers and those 60 years old and older. The graph measures the percentage of speakers with an unequivocally complete merger. Speakers with a difference in /j/-/k/ slope of less than 1.0 were counted as having a categorical merger of the phonemes.

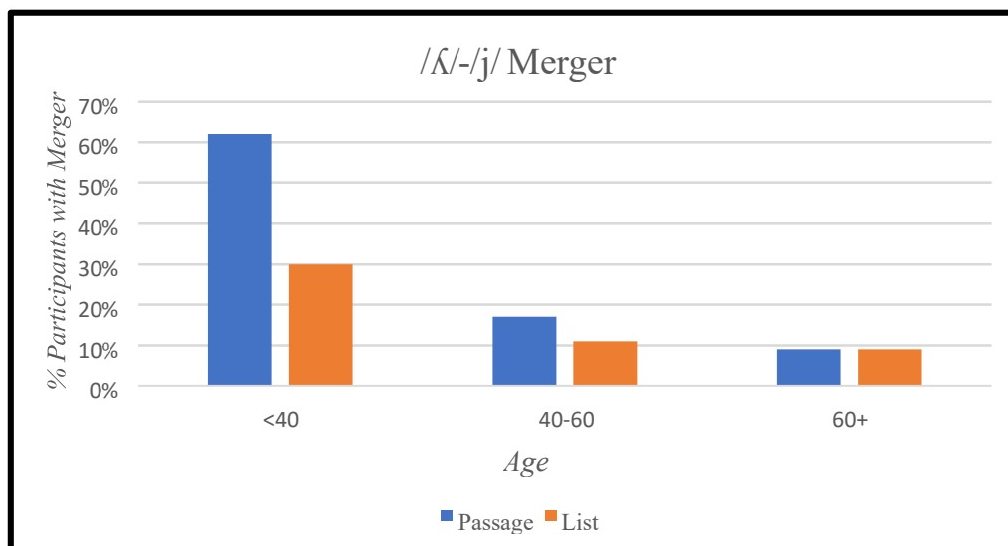


Figure 4: /k/-/j/ Merger by Age Across Styles

The graph demonstrates a correlation not only between age and phonemic merger, as previously observed, but also between age and degree of style-shifting. Indeed, as age decreases, the degree of style-shifting increases. In the oldest speakers, the percentage of participants with a full merger is identical in both speaking styles; style-shifting begins to play an incipient role for middle-aged speakers, while for the youngest speakers, this shoots up to a 32% difference in styles. This more detailed examination of the interaction of social and stylistic factors for this variable shows the clear progression of this variable towards the status of a marker for younger speakers, in which it reaches conscious awareness and begins to respond to changes in formality. As the previous graph confirms, this merger has all the characteristics of a change in progress. Yet, strikingly, whereas women tended to lead changes in progress in Labov (1990), the women in my sample tended to preserve a greater contrast between the two phonemes than the men, with this difference statistically significant at a p-value of 0.07 in the word list. Figure 5 further examines the distribution of the merger by gender.

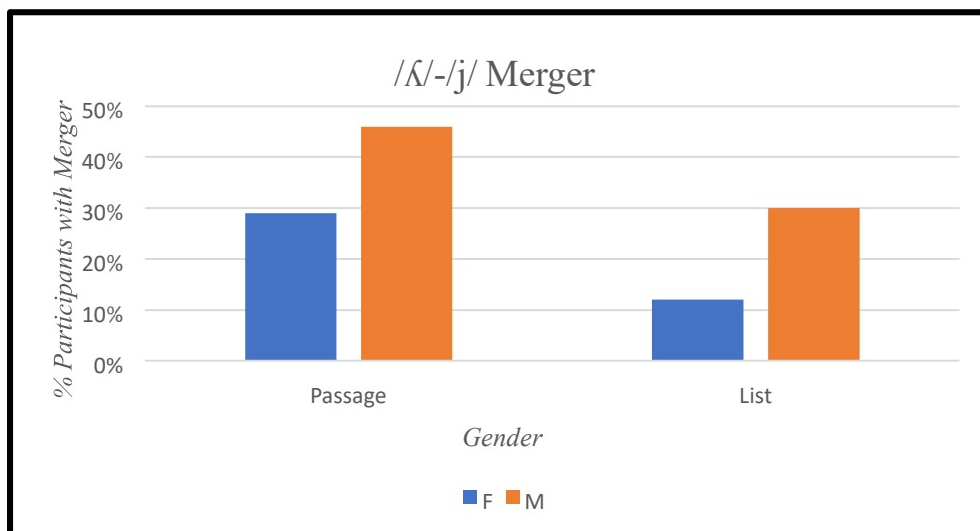


Figure 5: /k/-/j/ Merger by Gender Across Styles

This graph shows that men are further advanced in this merger than women in both speaking styles, with a 17% difference across genders in the reading passage and an 18% difference in the word list. Both men and women appear to style shift to relatively the same degree, with the percentage of both female and male participants with a complete merger increasing in the reading passage style. Thus, all speakers, regardless of gender, recognize a negative value attached to the merged [j] variant of /k/ and shift away from the innovative variant in formal contexts, but female speakers respond more strongly to this social stigmatization and produce less of the merged variant in either context than male speakers. The fact that this gender difference is only statistically significant in the formal word list style indicates that female speakers are more responsive to this change in formality than male speakers. Put together, these

facts suggest that, contrary to what Figure 3 and 4 might indicate, this variable has reached the status of a marker even for older speakers, where this gender difference is exhibited, and is now confronting the effects of change from above towards a more prestigious non-merged form.

Finally, and perhaps most surprisingly, for pre-consonantal /r/ deletion, this study found neither statistical significance of the effect of the social factors of age and gender on the variation exhibited, nor significant stylistic variation. However, the variable was significantly correlated with Catalan vs. Spanish language use (p-value of 0.008), with lower dominance of Catalan language use over Spanish (more balanced language use) associated with higher rates of /r/ deletion. This phenomenon cannot be due to convergence with Castilian Spanish as this variety of Spanish does not delete /r/ pre-consonantly. Thus, it is likely that its correlation with lower dominance of Catalan language use over Spanish is signaling something else altogether. Though not statistically significant, speakers tended to decrease their rate of /r/ deletion in the more formal register, indicating that /r/ articulation is the standard form. Thus, balanced Catalan-Spanish language use could indicate lower attachment to the language standard, compared to Catalan-dominant language use, reflected in greater deviation from this norm. Though gender was not statistically significant, age was on the cusp of being marginally significant for the reading passage style (p-value of 0.100), with younger speakers deleting /r/ at a greater rate than older speakers. This indicates that pre-consonantal /r/ deletion is an incipient change that hasn't yet acquired all its social connotations.

Pre-consonantal /r/ deletion is not the only variable that exhibited significant correlations with language use. As previously mentioned, /z/ devoicing does not show significant correlation with the social factors of age and gender. However, lower dominance of Catalan language use over Spanish correlated with greater devoicing in the reading passage style. While it may appear from the similar correlation of these two variables, in regard to language use, that this correlation has a similar underlying motivation, their style-shifting behavior reveals a divergence. In contrast to /r/ deletion, /z/ devoicing had a significant effect of style on the variation observed. Furthermore, for this variable, speakers tended to devoice more in the formal register, indicating that the devoiced variant is the more prestigious form, whereas for the /r/ variable, the variant associated with balanced Catalan-Spanish language use demonstrated the opposite connection with prestige, where the tendency was to reduce deletion in the more formal style. When further analyzing the linguistic environments of /z/ devoicing, we find that the word “casa” (En: *house*), which was the only form in the study with a direct Spanish cognate, had the highest rate of devoicing in the reading passage style, making it likely that this devoicing is a result of convergence with Spanish.

Similarly, /f/ affrication had marginally significant effects of Spanish language use on the variation observed in both speaking styles, with greater total use associated with greater rates of

affrication. When examining the linguistic environments of this variable, we find that the affricated variant appears overwhelmingly more when in word-initial position compared to word-medially, and it never appears word-finally. Word-initially, the affricated variant is slightly more frequent in forms with a direct cognate to Spanish, such as in the word “xocolate” (En: chocolate), itself a Nahuatl borrowing that was adapted differently in the corresponding languages, than in Catalan only words such as “xarranca” (En: hopscotch).

Though not statistically significant, the /ʎ/-/j/ merger was more advanced in intervocalic position in both styles compared to word-initial and final position. This is exactly the position in which the correspondent phoneme to Catalan /ʎ/ is Spanish /j/. Thus, the fact that the /ʎ/-/j/ merger is favored in this position suggests this change is, if not contact-induced, contact-accelerated.

4 Discussion

The variables examined in this paper show a wide array of sociolinguistic patterns that position them as either stable variation or variables at different stages of sound change and with varying influences of language contact. Pre-consonantal /r/ deletion is an incipient change from below, as suggested by its age distribution and lack of style shifting, whose correlation with language use is likely unaffiliated with language contact but rather may signal lack of pressure to conform to language standards. The affrication of /ʒ/ is another variable unaffiliated with language contact that emerged unexpectedly from this study as a stable sociolinguistic variable, as suggested by its strong degree of style shifting yet comparative lack of variation by age.

The remaining variables all exhibited signs of at least partial influence from language contact, in line with the assumptions put forth by previous research. The affrication of /ʒ/ represents a change from below, as suggested by its age distribution, that is further advanced than /r/ deletion and now exhibits stylistic variation. The marginally significant correlation of Spanish language use with greater rate of affrication along with this variant being favored by greater correspondence to a Spanish cognate suggests the change is contact induced.

This pattern can be contrasted to that observed in the devoicing of /ʒ/ and /z/, which show an opposing direction of style shifting in which the variant associated with language contact is used more in the formal register. This indicates its status as the prestigious variant. The devoicing of /z/ represents a contact-induced change, as suggested by its correlation with language use and the favorable conditions for devoicing presented by Spanish cognates, that has stagnated or is becoming stable sociolinguistic variation, as noted by its lack of correlation with other social factors. Meanwhile, the devoicing of /ʒ/ represents an old change in progress from above that is receding, as suggested by age and gender

distribution. Since the devoicing of /z/ and /z/ show the same social evaluation of their variants, it's plausible that /z/ devoicing developed as an extension of contact-induced devoicing of /z/. The patterns of these two variables are likely the effect of a recent reversal of language shift that has led Spanish to lose any of the prestige it may have carried when these sound changes were in progress.

The merger of /k/ and /j/ represents a change from below that is most advanced, as it has now reached the level of social awareness that yields correction from above. While Mooney and Hawkey (2019) did not find a significant effect of gender on the merger of /k/ and /j/, my study finds that women are less advanced in this change than men in formal registers, indicating that women, which tend to respond more to changes in formality than men, are responding to the social stigmatization of this merged variant through a greater correction of their speech in formal styles. Additionally, my study found that only 62% of the youngest speakers in my sample had this categorical merger while for Mooney and Hawkey (2019), this was over 90% for younger speakers. The degree of advancement of this merger in Barcelona thus more closely corresponds to the 60% merger for older speakers of Mooney and Hawkey's study, indicating that this change is still a generation behind for speakers of Barcelonan Catalan.

Contrary to my hypothesis, language attitude had no statistical correlation with any variable in any style and thus was not predictive of any differences in production. Language use, on the other hand, was found to correlate with several variables, including one that is unlikely to be the result of language contact. This indicates that correlation with language use does not imply contact-induced change but instead signals the need for further probing into the language-internal facts about the distribution of each variant to determine whether the change is truly influenced by language contact. Thus, one social factor was underpredictive, and the other overpredictive, suggesting that these may not be the best markers of the influence of language contact.

Language use is a useful social factor to consider for sociolinguistic variation in a bilingual context. In fact, for one of the variables under study, /z/ devoicing, it was found to be the only social factor significantly correlated with variation. However, this social factor requires careful consideration of its interaction with other aspects of the variation observed to understand exactly what is being conveyed, as it could signal external influence or simply a lack of adherence to linguistic standards depending on the variable.

5 Conclusion

This study set out to find whether changes in progress identified by previous research on the Catalan spoken in Barcelona were due to language contact with Spanish or are advancing purely through

language-internal processes of change to examine to what degree language contact can influence sound change in the absence of language shift. The variables of /r/ deletion, /ʒ/ and /ʃ/ affrication, /z/ and /z/ devoicing, and the merger of /k/ and /j/ were analyzed and found to have varying sociolinguistic patterns that generally affirmed the influence of language contact on these changes as well as the stable variation of /r/ deletion and /ʒ/ affrication unassociated with language contact. Intriguingly, the active sound changes with the contact-induced variant in advancement were all changes from below, with any instances of a contact-induced change from above receding from the community. This demonstrates the powerful effect of language shift reversal in changing the social valorization attached to linguistic variables.

Due to the limitations of the sample size of the current study, results showed several marginally significant correlations between social factors and linguistic variables suggesting a more strongly significant difference in a larger sample. A natural extension of this study would thus be to analyze the same variables with a larger sample size, in particular, a sample with a more even distribution of gender across age groups, for more robust findings. As the study found no correlation with social class, which was unexpected given previous research, it would benefit from the more direct sampling of Barcelona neighborhoods as a correlate for socioeconomic status as these are still socially, and somewhat linguistically, segregated. Additionally, the study found several variables that displayed style shifting but seemingly no other stylistic variation. A more Eckertian approach to these variables that anchors social factors to local categories and communities of practice (Eckert 2007) may reveal social variation that has gone undetected here.

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Figure 1: Barcelona *provincia*, Spain. *Encyclopædia Britannica*.
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