

Assumpció Rost Bagudanch*

Variation and phonological change: The case of *yeísmo* in Spanish

DOI 10.1515/flin-2017-0005

Submitted January 31, 2015; Revision invited April 22 2016;

Revision received May 21, 2016; Accepted May 31, 2016

Abstract: In several studies on sound change, it has been suggested that change is not possible without allophonic variation; indeed, it appears to be the triggering factor in phonetic evolution. This paper examines the process of *yeísmo* in Spanish, which is presented in recent research as a change in progress (see Moreno Fernández 2005). Since the beginning of the twentieth century, the lateral palatal /ʎ/ has been gradually merging with the non-lateral palatal approximant /j/, traditionally considered a fricative consonant in spite of its formantic structure. Nevertheless, in this process there is not a real dichotomy between a lateral and an approximant consonant. Instead, there is an array of coexisting allophones of /ʎ/ ([ʎ], [j], [ʝ] or [j̞]) are a few examples). The paper will thus focus on the wide variation in the phonetic representation of /ʎ/ and how it is affecting the Spanish sound system. This will be investigated through experimental means (analyzing speech acoustically) and through the collection of data for different dialects, which will give us information about (i) the existence of intra and inter-speaker variation and (ii) the way this variation functions. The results point to a restructuring of the palatal system of Spanish, at least in some parts of its linguistic territory, which seems to prove that the merger process is still progressing.

Keywords: sound change, phonetic variation, Spanish phonetics, Spanish diachronic linguistics, *yeísmo*.

1 Introduction

Yeísmo, the phenomenon consisting in the gradual replacement in Spanish of the palatal lateral phoneme /ʎ/ by the palatal approximant /j/,¹ has been a

¹ I have followed the criteria of the International Phonetic Alphabet (IPA) in the transcription of the palatal approximant /j/: since IPA offers a specific symbol for this sound, it is preferred to

*Corresponding author: Assumpció Rost Bagudanch, Facultat de Lletres (edifici Ramon Llull), Universitat de les Illes Balears, Ctra. de Valldemossa, km. 7.5, 07122 Palma de Mallorca (Balearic Islands), Spain, E-mail: assumpcio.rost@uib.es

favourite research topic in recent years (e. g., Clavería Nadal 1993; Chamorro Martínez 1996; Moreno Fernández 2005; Molina Martos 2006; García Mouton and Molina Martos 2012; Gómez and Molina Martos 2013; Rost Bagudanch 2014; Martínez Celdrán 2015). It is an interesting phenomenon because it is a sound change in progress in Spanish, which gives us the opportunity to observe how sound change operates and how it interacts with social, geographical and psychological factors. It also enables us to detect parallelisms between the shift from /ʎ/ to /j/ with diachronic changes in the evolution of Spanish, making it a very attractive topic not only for phoneticians interested in synchronic description but also for dialectologists or linguists concerned with historical grammar. My main purpose here is to give an account of the phonetic motivation for this ongoing change and to determine the context of variation from which the change might have stemmed. In addition, one of the core questions is whether there are clear acoustic and perceptual differences between [ʎ] and [j], which is a key aspect in understanding the confusion between them. With these objectives in mind, I decided to conduct a study that involves experimental phonetics and dialectal data collection, as will be described below.

The customary approach to *yeísmo* comprises two main aspects: on the one hand, its dialectal description, i. e., its spread in the Spanish linguistic territory; on the other, the phonetic characteristics of specific realizations in particular areas. Most of the literature mentions the articulatory, acoustic and perceptive proximity between [ʎ] and [j] (see, e. g., Quilis 1999: 314–315; Hualde 2005: 180; RAE 2011: 220), and leaves the explanation of the intrinsic causes of the phenomenon aside. Usually, the explanation of this proximity does not go beyond the idea of [j] being a less tense sound in the sense that it is produced with a lesser degree of constriction.

This paper adopts a novel approach to *yeísmo* by examining complementary views from different disciplines, as stated above. Thus, experimental phonetics will provide information about the acoustic features of the possible allophonic variants, which should account for the aforementioned “proximity”; dialectal information will supply evidence of the scope of the different phonetic solutions and can suggest the way in which the change may progress.

other possibilities. It is not necessary to label the palatal lateral /ʎ/ as an approximant (even though the IPA table does distinguish the category “lateral approximant”), because “approximant” is the default feature of /ʎ/ in opposition to /j/. It therefore seems redundant to emphasize the approximant value of /ʎ/: /ʎ/ and /j/ will therefore be characterized in terms of palatal lateral /ʎ/ and palatal approximant /j/, respectively. Moreover, Ladefoged and Maddieson (1996: 197) explain that the most common laterals in the world languages are “approximant” (in Spanish, at least, there is no other kind of laterals).

This paper thus has two main goals. The first is to briefly describe the degree of variability in the realization of the palatal lateral phoneme, using acoustic analysis and dialectal data. An acoustic analysis will allow us to establish whether there is variation at an intra-speaker level, while dialectal data may give us information about variation between speakers from different geographical areas. This dialectal survey will be relevant because it will show whether different allophonic solutions are regionally determined or are common realizations, irrespective of geographical area. In the latter case, we might be dealing with global tendencies, likely related to phonetic contexts while, in the former case, specific behaviours possibly associated with extralinguistic factors (i. e., language contact) might be at play. Secondly, I will try to determine whether the selection of the allophonic variants entails any alteration in the phonological system, which could throw light on the neutralization of the phonological contrast between /ɫ/ and /j/. Finally, in order to provide information on the current phonological situation and to trace a possible direction of the change, we will use diachronic descriptions (particularly corresponding to the evolution of the Lj Latin context),² which offer an interesting parallel with the synchronic situation.

This paper is structured as follows: Section 2 includes a brief account of the background to phenomenon of *yeísmo* (Section 2.1) and to phonetic variation and change (Section 2.2). The results for phonetic variation are presented in Section 3, with Section 3.1 focusing on the results of the acoustic experiment and Section 3.2 on the dialectal data. In Section 4, the possible causes of the sound change *yeísmo* will be discussed. Finally, the discussion of the results will be presented in Section 5, which is followed by the conclusions (Section 6).

2 Background

2.1 The phenomenon of *yeísmo*

Yeísmo has been described as a dephonologization process and in particular as a merger case in the sense described by Hay et al. (2006: 458): “Merger is a process [...] in which sound change leads to the collapse of a phonemic contrast, so that what were previously two distinct phonemes in a dialect

2 The phonetic evolution of Lj in Spanish, is known to be the following: [lj] (Latin) > [ɫ] (Vulgar Latin) > [j] > [ʒ]/[dʒ] (Middle Spanish) > [ʃ] (16th-century Spanish) > [x] (17th-century Spanish) (see Lapesa 1981: 167).

come to be realized as a single phoneme”. In the merger involved in *yeísmo*, the /ʎ/ category disappears and becomes /j/, a process which entails a reduction in the number of phonemes. Indeed, as will be explained, *yeísmo* affects almost the whole Spanish language sound system. According to Yu (2015), many sound changes such as this one can be explained by perceptual confusion, because they may arise from misperceptions – errors in perceptual parsing caused by perceptual similarity. Whatever the ultimate reason for the merger is, for some authors (e. g., Hualde 2005: 180) it is nearing completion, while for others it is still in its initial stages in some regions (see Moreno Fernández 2005: 987).

There has been much discussion about the nature of the segments implied in *yeísmo*, as well as about its geographical origin and its spread to other areas. From the beginning of the twentieth century, the Spanish palatal lateral /ʎ/ has gradually been replaced by another non-lateral palatal phoneme, traditionally considered a fricative consonant in spite of its formantic structure. Nowadays, more recent descriptions of the Spanish phonetic inventory refer to this sound as an approximant sound (see Martínez Celdrán 2015), at least in some Spanish-speaking regions. With regard to its geographical spread, the most popular view is that *yeísmo* has expanded from the Andalusian region (Lapesa 1964; Gómez and Molina Martos 2013), although other scholars (e. g., Corominas 1953) attribute its first occurrences to other peninsular areas, such as Aragon. In terms of its chronology, opinions also vary. Frago (1993) traces the phenomenon of *yeísmo* to the sixteenth century, and some authors maintain that it dates back to the Middle Ages. Chamorro Martínez (1996), for instance, supports the idea of its thirteenth century origin, relying on evidence from some documents from La Rioja.³

According to Moreno Fernández (2005: 984–985), four stages can be assumed in the evolution of *yeísmo* (see Figure 1). In the first phase, /ʎ/ and /j/ remain distinct.⁴ The second phase is characterized by the coalescence of lateral and approximant sound categories, with the latter being the more common choice. In the third phase, *yeísmo* would be the most widespread tendency but it would present different realizations depending on the degree of friction and the point of articulation. The fourth and final stage would be the stabilization of the process and the presence of

³ For further details about this subject, see Corominas (1953), Galmés de Fuentes (1957), Alonso (1967). Corominas (1953) defends the existence of non-Andalusian spots of *yeísmo* in the last centuries of the Middle Ages in the Aragonese area. However, Lapesa (1964) maintains the idea of an Andalusian origin and Alonso (1967) situates it in the eighteenth century for Peninsular Spanish and the seventeenth century for American Spanish.

⁴ In fact, the author mentions that in this initial stage, the confusion between both phonemes would have started but the distinction was still maintained in some lexical units: he points to a lexical spread of *yeísmo*.

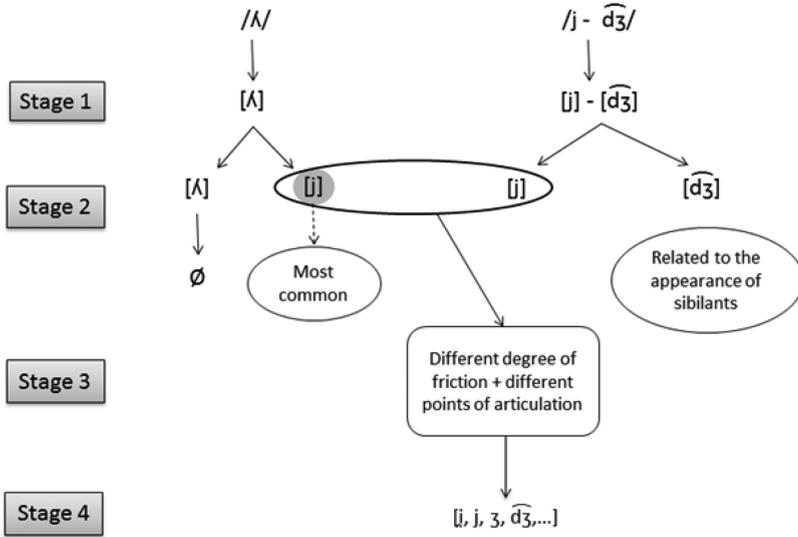


Figure 1: The four stages in *yeísmo* according to Moreno Fernández (2005: 984–985).

fricative variants (*rehilamiento*).⁵ According to some scholars, Peninsular Spanish seems to be in the third stage (see Hualde 2005 even RAE 2011).

What seems clear is that the situation is not a homogeneous one. The change is progressing at different speeds in the different regions and in all the areas variation is present. According to Moreno Fernández (2005: 987), while Central America seems to be in Stage 3, the Río de la Plata zone or Seville have reached Stage 4; by contrast, Castile-and-Leon seems to be continuing in Stage 1 and the most rural part of the Canary Islands is still in Stage 2.

It is worth noting that in the process of *yeísmo*, it is not clear whether there is an actual dichotomy between the palatal lateral and the palatal approximant consonant (as shown in traditional descriptions) or not. Moreover, according to the above explanation, there seem to be a large number of allophones competing as variants of the palatal phonemes: it appears, then, that a complex envelope of variants co-occur in the different stages of *yeísmo* (see Moreno Fernández 2005: 988; Gómez and Molina Martos 2013: 9).⁶

⁵ In the Hispanic tradition, *rehilamiento* is the term often used to refer to certain fricative sounds, as Navarro Tomás (1934: 274) described it: “vibración relativamente intensa y resonante con que se producen ciertas articulaciones” [intense, resonant vibration that occurs with certain articulations]. Quotations and examples which are not in English have been translated by the author.

⁶ See Navarro Tomás (1964) for a classical study of variation in *yeísmo*.

From a sociolinguistic point of view, the literature points to the idea of *yeísmo* as a bottom-up change (Labov 2007), from the popular and middle classes to the upper classes, and that this change is led by women. Another characteristic of this ongoing change is its spread from urban centres to rural areas: the merger is seen as a marker of prestige by rural speakers, who will gradually shift to the merger. Rural areas are thus the most conservative and tend to hold on to the phonemic distinction to a greater extent than cities. With respect to social groups, we have already pointed out that women are more inclined to adopt prestige behaviours as a marker of social class. Other generalizations (i. e., regarding age or level of education) need to be made with caution, since the situation in the different parts of the Spanish domain is very complex; Gómez and Molina Martos (2013: 9) point out that the change is diverse and has its own specific features in every Hispanic community.

2.2 Variation and sound change

In Section 2.1, we have seen that *yeísmo* is a complex phenomenon involving variation in its different stages. Variation is indeed an important topic when referring to sound change. Recent studies on language change have shown that linguistic evolution appears to begin with the existence of variation. In this sense, Lindblom's Hyper & Hypo-articulation theory (henceforth H & H theory; see Lindblom 1990) assumes that there are two opposite forces in language that interact depending on communication needs: the tendency to minimize articulatory effort in speech production (hypoarticulation) and a force assuring perceptual discrimination⁷ (which leads to hyperarticulation). Success in communication requires an appropriate balance between the two. From this perspective, variation is one-dimensional: if output constraints dominate, hyperforms are expected, but if system constraints dominate, hypoarticulation is expected. In any case, the speaker will compensate his/her articulation gestures in order to obtain an acoustic equivalence with the target segments depending on the communicative situation. This is an adaptive behaviour which demonstrates the plasticity of sound production and perception.

Regarding variation, Caravedo (2014) distinguishes between non-functional variation, which has no consequences at the lexical distinctiveness level, and functional variation, which implies alterations in linguistic functions. In the former case, variation would not entail meaning modifications

⁷ When using the term “discrimination” in this paper, we are referring to perceptual distinctiveness.

(free variation at the phonetic level), while in the latter case, variation would mean reanalysis in the phonological parsing of phonetic units. In functional variation, the alteration could involve a reduction in linguistic units, as occurs in *yeísmo*. In fact, the author speaks of spaces of variability, a *continuum* which permits fluctuations in the phonetic realization of phonological units, always within certain limits that allow perceptual recognition.⁸ Actually, speakers themselves cannot tell if their production corresponds to one type of variation or to another, because they consider all the variants admissible: they are not aware of them. If a listener can perceive a variant as different from the rest of the phonetic categories, we can speak of functional variation, leading to a sound change. This means, with regard to *yeísmo*, that speakers cannot identify semantic differences in minimal pairs ([ˈpoʎo] ‘chicken’ vs. [ˈpojo] ‘stone bench’, for example) any more, or that they can identify differences with other speaking communities in which the sound change is not evolving at the same pace. Sound change has thus arisen through functional variation.

For his part, Harrington (2012) establishes five types of synchronic variation which he relates to change and to diachronic variation. These are variation caused by physiological constraints, by plasticity, by the non-linear relation between the articulatory production of speech and the acoustics of sound, by the communicative conditions (new vs. old information) and by the level of variability naturally tolerated in speech. All of these may coexist in the *yeísmo* process. In line with the view that variation is a requirement for sound change, Harrington (2012) points out that this synchronic variation may have a parallel in historical tendencies, so that the study and explanation of current variation may provide an opportunity to understand sound changes which are phonetically induced. Indeed, Harrington’s variation typology can be recognized in the explanations of sound change by other researchers, like Blevins (2004) or Caravedo (2014), who openly acknowledge that there are different reasons why variation (and subsequently, sound change) may arise.

What seems clear from all these proposals is that the first step leading to sound change is variation (Ohala 1993; Bybee 1998, 2001; García Santos 2001 are some relevant references that should be added to the ones mentioned above), but the main question here is how sound change operates. It is clear from the preceding discussion that variability in speech is generally accepted in the literature, not only at inter-speaker but also at intra-speaker level. Communication, and particularly language acquisition, takes place in an extraordinary context of phonetic variation in which individuals must sample their

⁸ See also Flemming (2004) for a similar idea from the perspective of perceptual phonetics.

production options from a pool of possible variants (see Coseriu 1978; Blevins 2004). This situation may give rise to a number of misunderstandings and ambiguities. Some of these mismatches (according to Ohala 1993, most of them) do not lead to modifications in the system because listeners tend to normalize the input by means of their own experience as speakers. However, sometimes this ability is not sufficient or it does not operate, so that the misperception leads to a sound change (Ohala 1981, 2013). Lindblom et al. (1995) take Ohala's proposal into account in their own theory: change arises from the *continuum* of hypo- and hyperarticulation, when subjects, instead of being interested in *what* is being said, focus on *how* it is said, a situation in which they can sample new forms. Thus, both perception and production are seen as closely related and even interacting in sound change.

Hence, variation accounts for the paths evolution may follow. Blevins (2004: 32) proposes three sources of phonetic change: sound misperception, problems with the segmentation of the phonetic chain (misparsing), and problems with selection of the stimulus to which the listener is exposed when acquiring L1 (typical situation of variation). The first source, which she calls *change*, means that the listener replaces the sound uttered by the one understood;⁹ this leads to a change in pronunciation but not to reanalysis. In the second one – *chance* – the stimulus is phonologically ambiguous, so the listener will associate it with a phonological form which does not coincide with the speaker's.¹⁰ Chance does imply reanalysis and reinterpretation of the sequence and, thus, it can bring about phonological recategorization. The third source – *choice* – supposes variation at intraspeaker level: the listener selects an option as a phonological form from all the variants uttered by the speaker.¹¹ This means that the element preferred by the listener will not necessarily be the same phonological form selected by the speaker. These three sources can provide an explanation of how sound change occurs and how it may produce important alterations in phonological systems.

The behaviour of the possible variants in the *yeísmo* merger case may be explained in terms of the variation described by Harrington (2012) and Caravedo (2014) and by Blevins' (2004) theory. In fact, only by understanding how variation operates in this particular case will it be possible to appreciate the whole change process.

⁹ The author illustrates this with a speaker saying [anpa] and the listener hearing [ampa]: The phonetic signal is simply misheard due to similarities between the utterances.

¹⁰ It would be the case of a speaker producing [ʔaʔ] for /aʔ/ and the listener interpreting /ʔa/.

¹¹ Blevins (2004: 33) offers the example of a speaker uttering [kakáta], [kăkâta] and [kkáta] for /kakata/ and a listener assuming /kkata/.

3 Phonetic variation in /ʎ/

In order to give an account of phonetic variation for the lateral phoneme /ʎ/, I will make use of two complementary resources. My starting point is an acoustic experiment carried out by Rost Bagudanch (2011). The goal of this experiment was to determine which allophones were attested in the speech of individual speakers (Section 3.1). To complement these results, I collected dialectal data from linguistic atlases to establish the realizations in different areas of the Spanish-speaking regions (Section 3.2).

3.1 Intraspeaker variation

3.1.1 Methodology

In the aforementioned experiment, three male speakers aged between 40 and 50 years old were recorded while reading a series of paragraphs including words containing /ʎ/.¹² All subjects were non-distinguishers: they could not distinguish /ʎ/ from /j/, neither in production nor in perception.¹³ Indeed, it is very difficult to find native Spanish speakers who can discriminate between the lateral and the approximant. The subjects were born and raised in three different areas of the Iberian Peninsula¹⁴ (Leon, Alicante and Aragon), but had spent many years in Catalonia. All of them had university degrees and came from medium to high socio-cultural backgrounds. None of them reported any kind of speech production problems.

The recordings were carried out in a completely quiet and echo-free room in the Phonetics Laboratory of the Universitat de Girona (Girona, Spain). A Shure

12 The whole experiment was intended to compare the lateral consonants /l/ and /ʎ/ in three different contexts – /lV/, /l_ɪV/ and /ʎV/ – in order to establish a *continuum* from the least palatal realizations to the most palatal ones. It was hoped that our study would also throw light on the evolution of the Lj sequence in Latin to /x/ in current Spanish. This diachronic change shows great parallelism with the *yeísmo* phenomenon, so we exploited the experimental approach to explain the historical change.

13 Although these particular speakers were not able to differentiate [ʎ] from [j] at any level (production and perception), this does not necessarily mean that the sound change has been completed everywhere. In fact, a perception experiment carried out with subjects from the northern areas of Spain demonstrated that, even when they were non-distinguishers in production, they were still able to discriminate between [ʎ] and [j] in perception (Rost Bagudanch 2016).

14 For the purpose of this study, it was important to demonstrate whether the dialectal origin of the speakers made a difference in their behaviour. This justifies the selection of participants from different geolectal areas.

Unydyne 5155D directional microphone and a Marantz PMD 670 professional recorder were employed. The subjects were asked to read a series of paragraphs in a spontaneous way and at a natural pace, as if they were talking to someone else (the content of the sentences was designed to favour an informal register). They were allowed to read the paragraphs once before the recordings started.

Three factors were taken into account: (i) point of articulation of the syllabic vowel, (ii) stress and (iii) adjacent phonological context. These independent variables were expected to affect the behaviour of the consonant. On the one hand, the presence of /*ʎ*/ in a stressed position may result in the appearance of tenser variants.¹⁵ A stressed syllable can be considered a prominent context while unstressed syllables are expected to favour more relaxed variants, since this position involves an easing in articulation gestures (Recasens 1999). Even the phonological context can affect the type of phonetic realizations: tenser variants (affricates and stops) are expected after a pause or non-continuant consonants, while intervocalic position should favour lenited options. On the other hand, palatal vowels are thought to pave the way for the elision of /*ʎ*/, at least from a dialectal standpoint,¹⁶ but central and velar vowels do not seem to do so. Prosodic variation was not taken into account as a variable, since a pilot study showed no significant influence on the production of the consonant.¹⁷ Some examples of paragraphs in the corpus are shown in (1), with the words containing /*ʎ*/ in italics. There were 30 instances for each of the levels of these variables, which means that every speaker produced 180 instances of the lateral phoneme and that the total number of utterances analyzed is 540 (see Table 1).

Table 1: Number of instances analyzed for each variable taken into account.

		Informant 1	Informant 2	Informant 3
palatal vowel	stressed syll.	30 cases	30 cases	30 cases
	unstressed syll.	30 cases	30 cases	30 cases
central vowel	stressed syll.	30 cases	30 cases	30 cases
	unstressed syll.	30 cases	30 cases	30 cases
velar vowel	stressed syll.	30 cases	30 cases	30 cases
	unstressed syll.	30 cases	30 cases	30 cases
TOTAL INSTANCES PER INFORMANT:		180 instances	180 instances	180 instances
TOTAL INSTANCES:		540 instances		

¹⁵ We consider tense variants the ones produced with a clear articulatory constriction (a complete or almost complete obstruction of the airflow), especially fricatives, affricates and stops.

¹⁶ See explanations of elision in Quilis (1999), Quesada Pacheco (2010b), RAE (2011).

¹⁷ This is consistent with Bauer (2008: 619), who states that position is not a factor that necessarily conditions lenition processes.

- (1) a. A pesar de ser el *empollón* del grupo, se relacionaba muy bien con todos; de hecho, un fin de semana se fue a la feria del *mejillón* con varios compañeros del instituto, *gallegos* como él, con los que había montado algún que otro *folión* en el *pabellón* de su pueblo. [Although he was the swot of the group, he had a great relationship with all of them; in fact, one weekend he went to the mussel fair with some high school classmates, all of them Galician like him, with whom he had started some trouble in his town's sports hall.]
- b. El jamón de Jabugo se obtiene de los cerdos de pata negra alimentados con *bellotas*, normalmente en las famosas dehesas de la zona, unos lugares llenos de *belleza* que hay que haber visto al menos una vez en la vida. [Jabugo ham is obtained from black-legged pigs fed with acorns in the famous meadows of the Jabugo area, beautiful spots one should visit at least once in a lifetime.]

The acoustic analysis was performed with Praat (v. 5.1.15) (Boersma and Weenink 2009), using waveforms and spectrograms. The segments obtained were classified according to their spectral properties and the duration and the frequency of the first three formants were also measured. According to Ladefoged and Maddieson (1996: 98) or Quilis (1999: 116), the most relaxed allophones can be expected to display a shorter duration than the tenser ones, and even the formant frequency may help to distinguish different acoustic realizations.

As one can infer from the preceding explanation, the dependent variables in the analyses were duration, formant frequency and kind of allophone, while stress, point of articulation of the following vowel and adjacent phonological context were considered factors that could modify the acoustic features of the sounds and, as a consequence, alter the category of the allophones.

Data were processed using SPSS software (v. 15). Anovas, t-tests and Mann-Whitney U tests (the latter in case of non-normal distribution) were employed to determine whether the different allophones obtained presented analogous acoustic features or not and whether their acoustic characteristics fluctuated depending on stress and point of articulation of the syllabic vowel. The significance level (*p*) was set at 0.05.

A contingency table was also used when it was necessary to relate qualitative variables (i. e., type of allophone and context of appearance). In this categorical analysis, a Pearson's X^2 test was conducted in order to determine whether the variables were statistically related: if the probability value was under 0.05, the relationship between the variables was considered significant. In this case, we also looked at the adjusted standardized residuals (AR) to know which variants

displayed relevant behaviour: if this value is higher than 1.96 or lower than -1.96 , there is a significant relationship between the variants (there are more cases than the statistical model predicts or there are fewer cases than expected).

3.1.2 Results

The acoustic analysis allows us to recognize five allophones of the palatal lateral phoneme (see Figure 2(a)) according to their spectral proprieties (i. e., presence of formantic structure, noise, or a closure phase followed by a release burst). Interestingly, there is only one periodic variant: the palatal approximant [j], which is also the most frequent choice (78.05%). In addition, there are three non-formantic solutions, all of them voiced: a prepalatal fricative [ʒ] (8.47%), a palatal affricate [dʒ] (5.84%) and a double articulated palatal stop [tʃ] (4.08%). There are also instances of elision, but this variant is even rarer (3.56%) than the cases of palatal stops. These phonetic realizations are common to all the speakers recorded, though in different percentages, as can be seen in Figure 2(b). The most recurrent allophone is the approximant (78% on average), although it is

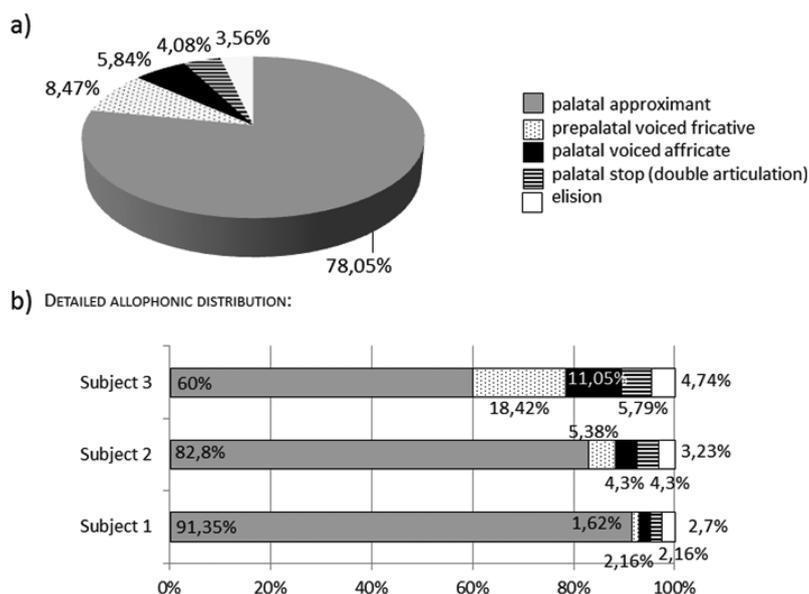


Figure 2: Graphs showing the general allophonic distribution (a) and the distribution for each one of the three informants (b).

worth pointing out that in Subject 3 the non-periodic solutions seem to be more frequent when compared with the other informants: 40% vs. 9% in Subject 1 and 17% in Subject 2. The most remarkable result is that there is no phonetic palatal lateral realization (perception shows clearly that there is no lateral quality in these kind of utterances).

It is important to offer a brief description of the acoustic features of these variants in order to distinguish them. The first one, [j], is the only one that presents a formantic structure. As can be observed in the spectrogram in Figure 3, the transitions to the adjacent sounds are smooth and long (26.35ms on average). The first formant of [j] is usually located at about 345Hz, while the second one is typically near or above 2000Hz, as is characteristic of a palatal sound. Its intensity is less than that of the neighbouring segments and it frequently seems to vanish in F2. The total duration of the consonant is around 73ms, though it can be longer.

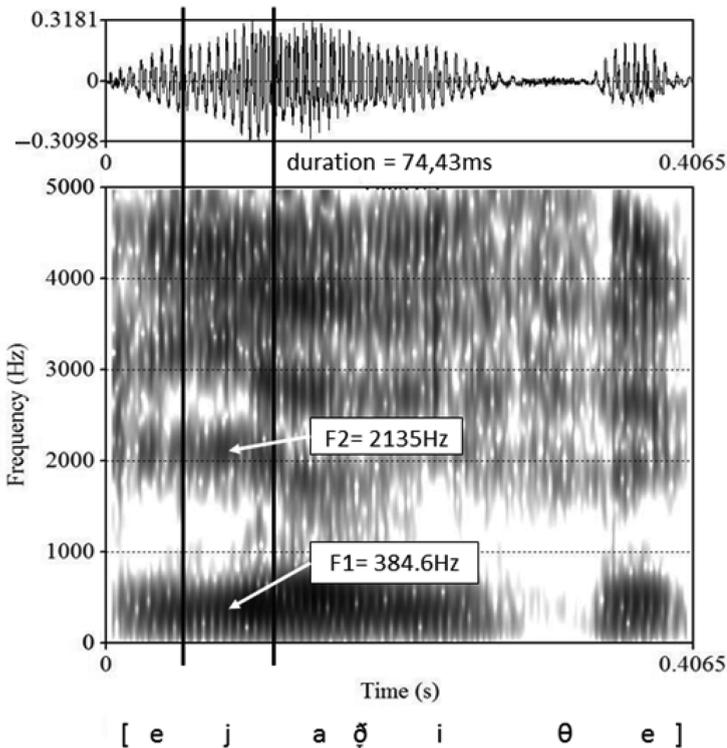


Figure 3: Oscillogram and spectrogram of *ella dice* ‘she says’, in which the lateral palatal phoneme /*ɲ*/ is produced as a palatal approximant consonant.

The fricative variant [ʒ] is also a long sound (approximately 78ms) and also displays long transitions to the following segment (23.68ms on average), but it has no formantic structure: as this kind of sound is produced by a turbulent airflow caused by the narrowing of the air path at some point in the vocal tract, acoustically, we can observe chaotic energy (noise) concentrated in high-medium frequencies. Figure 4 illustrates this clearly.

The third possibility is a voiced palatal affricate [dʒ]. Affricates can be considered a combination of a plosive and a fricative sound. As can be observed in Figure 5, there is a closure phase, which is, acoustically, a silence in the spectrogram, followed by a friction phase. These allophones are longer than fricatives or approximants (over 92ms long on average) and their transitions to the following sound are a little longer too (around 26ms on average).

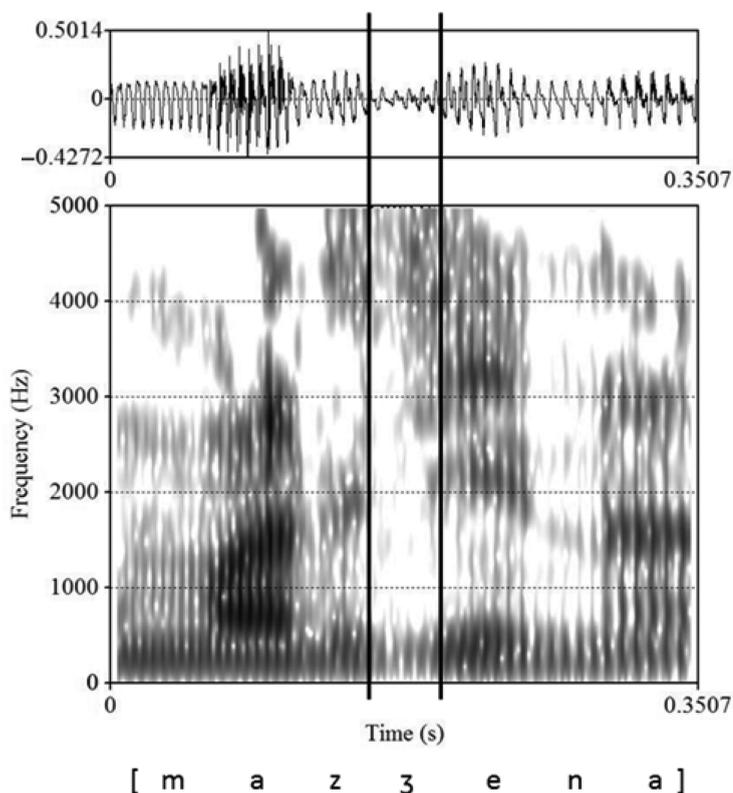


Figure 4: Oscillogram and spectrogram of *más lleno* 'fuller', in which /ʎ/ is produced as a voiced prepalatal fricative.

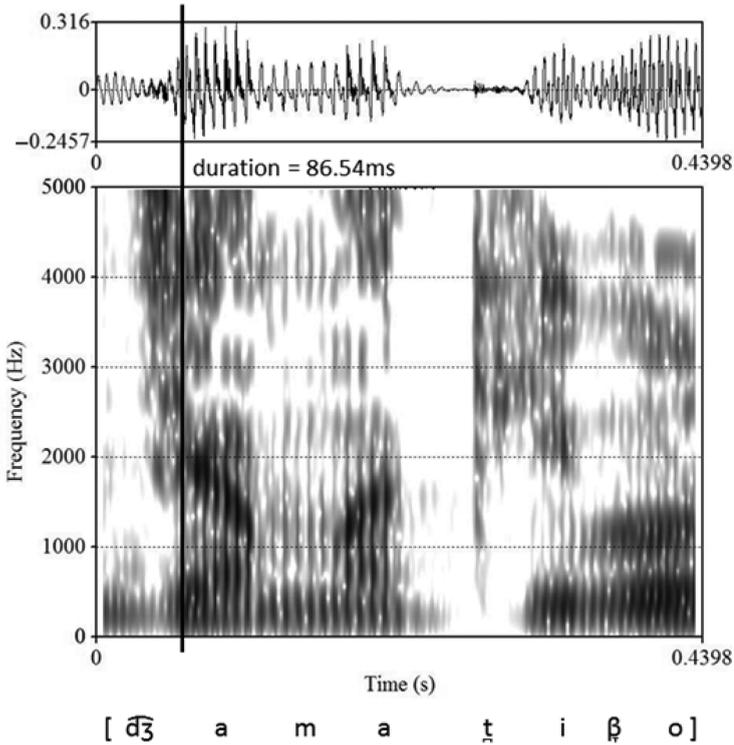


Figure 5: Oscillogram and spectrogram of the adjective (*más*) *llamativo(s)* ‘striking’, in which /ʎ/ is produced as a voiced palatal affricate.

In some cases, the variant is a plosive sound but it does not show the features of a typical stop as it lacks the burst after the closure phase. Instead of this characteristic release, we find a brief formantic period that shows the features of a short approximant sound (see Figure 6). This is the reason why some scholars have called this allophone a double articulated stop (see Martínez Celdrán and Fernández Planas 2007: 58). Its duration is the longest of all variants (approximately 97ms on average).

In addition, there are a few instances in which the consonant has been elided, as in the example in Figure 7.

Another notable aspect gathered from the results is that, broadly speaking, the various realizations seem to be organized along a *continuum* from tense to relaxed allophones: the most tense variants (fricatives, affricates and stops) commonly occur in prominent position (post-consonantal and post-pausal),

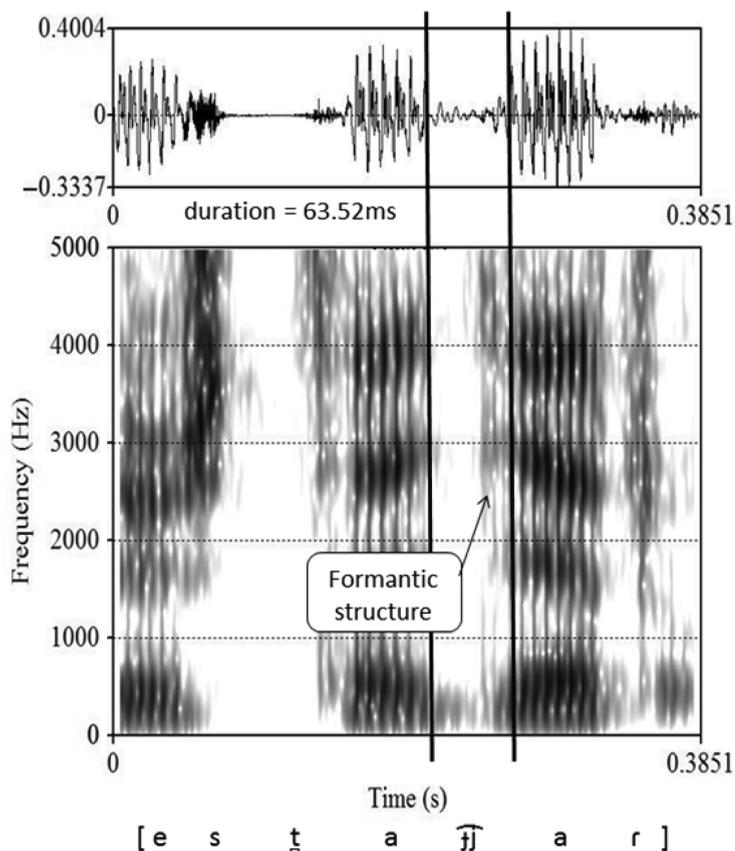


Figure 6: Oscillogram and spectrogram of the verb *estallar* ‘to explode’, where /ʎ/ is produced as a double articulated palatal stop.

whereas the most relaxed options (approximants and elision),¹⁸ in particular elision, are more regularly found in intervocalic position – though this is not a systematic distribution. A more accurate analysis will provide further information (see the data in Table 2 and Figure 8).

Firstly, regarding elision, the figures in Table 2 show that it only occurs in intervocalic contexts (100% of the utterances), and that it is more likely if one of the vocalic segments is a palatal one: 40% of the intervocalic instances of elision occur when both vowels are palatal (and 45% if there is only one palatal vowel). The

¹⁸ Actually, elision and approximant realizations involve less articulatory effort whereas fricatives, affricates and stops are more tense sounds (see Ladefoged and Maddieson 1996: 90, 95–99 for plosives, 137 for fricatives, and 322–323 for approximants; see also Dogil 2007: 90).

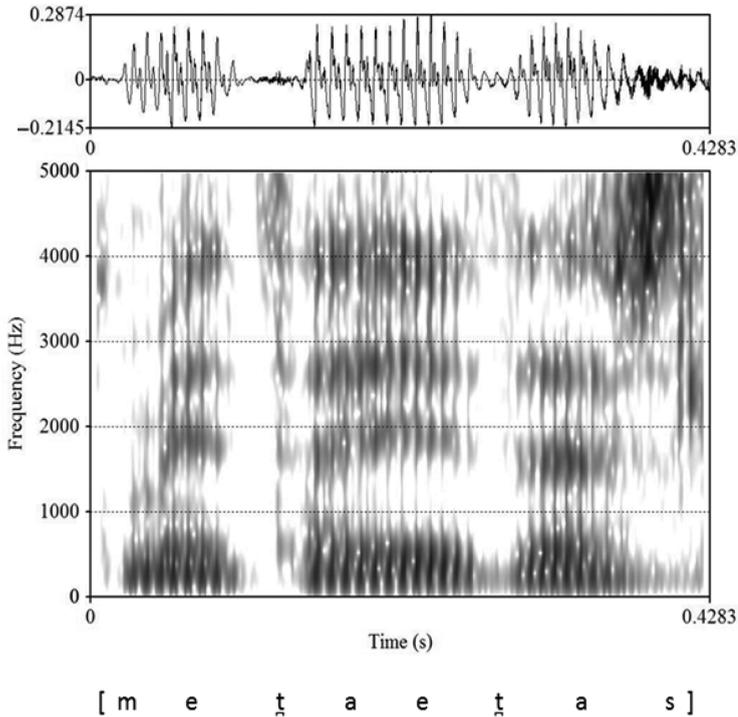


Figure 7: Oscillogram and spectrogram of the noun *met(r)alleta* ‘submachine gun’, where there is an elision of the palatal consonant.

adjusted standardized residuals show that this behaviour is significant.¹⁹ There is one intervocalic context where elision does not happen, namely, in the context of a velar vowel. We can tentatively suggest that a velar context has an inhibiting effect on the palatal feature of the consonant, which could not be omitted to compensate for this effect.²⁰ Elision never occurs either after a pause or a consonant, which means that it does not appear in a prominent position.

Secondly, there are statistically relevant differences between [j] and the other allophones, since [j] dominates in intervocalic contexts (96.1% of the total number of cases)²¹ (see Figure 8). Moreover, 73.09% of the intervocalic utterances of [j]

19 AR=2 for elision with a preceding palatal vowel and AR=2.4 for elision with a following palatal vowel.

20 It is difficult for velar and palatal places of articulation to overlap since the gestures involved require larger movements from the front part of the oral tract to the back: it is complicated to achieve a reduction process in which the palatal feature can be easily maintained if the velar one predominates.

21 Adjusted standardized residuals show that the approximant is significantly less frequent after a pause (AR = -2.2) and after a consonant ([+continuant], AR = -3.6; [-continuant], AR = -3.1).

Table 2: Distributional results (number of utterances) of the different allophones in the three possible contexts studied: intervocalic, post-consonantal or post-pausal.

		[j]	[ʒ]	[dʒ]	[ʃ]	elision
v_v	[pal_pal]	56	8	3	1	8
	[cen_pal]	42	3	3	3	2
	[vel_pal]	24	1	2	1	–
	[pal_cen]	73	5	2	–	4
	[cen_cen]	44	2	1	3	1
	[vel_cen]	13	2	–	–	–
	[pal_vel]	112	8	7	1	5
	[cen_vel]	17	–	2	2	–
	[vel_vel]	39	3	3	2	–
	total v_v utterances	420	32	23	13	20
c_v	[+cont]_pal	2	3	1	–	–
	[+cont]_cen	4	7	1	–	–
	[+cont]_vel	–	1	1	1	–
	[-cont]_pal	6	3	2	–	–
	[-cont]_cen	2	2	2	6	–
	[-cont]_vel	–	–	–	–	–
	total c_v utterances	14	16	7	7	–
#_v	[#_pal]	2	–	2	2	–
	[#_cen]	1	–	1	1	–
	[#_vel]	–	–	–	–	–
	total #_v utterances	3	–	3	3	–
TOTAL UTTERANCES		437	48	33	23	20

occur in contact with a palatal vowel, which represents 70.25% of the global average of [j] instances, while the utterances after a pause or a consonant are much less frequent (0.68% and 3.20% respectively). Therefore, there is a clear parallelism between this allophone and elision.

After a consonant or a pause, the share of approximant [j] decreases and fricative, affricate and stop realizations become more common. The range of occurrence of [ʒ] is much higher after a [+continuant] consonant (namely [s]) than the other realizations are in the same context; in fact, it is the most common phonetic category in this context (68.75%).²² Cases of [dʒ] and [ʃ] after a consonant account for 21.21% and 30.43%, respectively, in this context; these numbers are statistically significant, since the adjusted standardized residuals show that [dʒ]

²² Adjusted standardized residuals for this context are 6.1, thus indicating that [ʒ] is significantly more frequent after a [+continuant] consonant than expected.

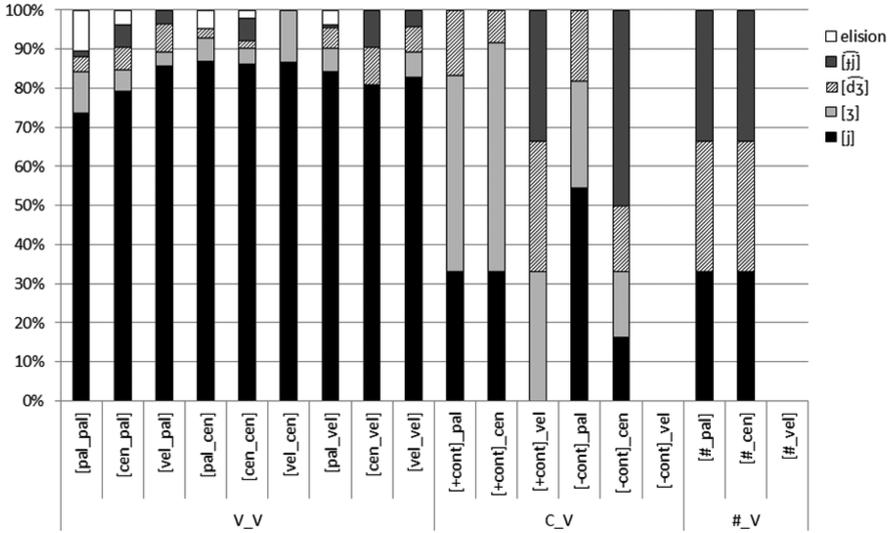


Figure 8: Graphs showing the distribution of the different allophones depending on the context.

and [j] tend to appear after [-continuant] consonants.²³ In post-pausal position, approximants account for a third of the occurrences, with two-thirds of the total corresponding to the reinforced variants, [dʒ]²⁴ and [j].

To sum up, there is a statistically significant relationship between the selection of the allophone and the preceding and following segments, as the results of Pearson’s X^2 indicate: ($X^2 = 16.322, p < 0.038$) and ($X^2 = 92.358, p < 0.0001$), respectively.

From the above explanation, one may be led to think that there is a *continuum* from hyper- to hypoarticulated realizations, depending on the adjacent context. Although this may seem plausible, when taking the absolute frequencies in Table 2 into consideration, it appears that all the allophones obtained tend to be concentrated in the intervocalic context. It therefore seems interesting to check whether there was any influence of position within the word. Table 3 shows the results in absolute and relative frequencies. Plosive sounds appear more frequently in initial position, whereas elision, approximants and fricatives are found in medial position. Conversely, affricates tend to be evenly distributed.

As for the two remaining factors taken into account, neither stress nor the type of syllabic vowel have an effect on the nature of the consonant. The appearance of one variant or another is more likely to be subject to speech style.

23 AR = 2.2 value for the affricate and AR = 3.9 for the plosive.

24 According to the adjusted standardized residuals, it is significantly frequent in post-pausal position (AR = 4.3).

Table 3: Distribution of the allophones of /ʎ/ over positions within the word, in absolute and relative frequencies. Predominant results have been shaded.

	[j]	[ɟ]	[dʒ]	[ʝ]	elision
initial position	88 20.13%	19 39.58%	15 45.45%	15 65.21%	3 15%
medial position	349 79.86%	29 60.41%	18 54.54%	8 34.78%	17 85%

Table 4: Mean values and standard deviation of the duration of the different allophones (in milliseconds).

	[j]	[ɟ]	[dʒ]	[ʝ]
\bar{X}	74.44ms	76.54ms	88.66ms	88.21ms
sd	22.81	21.30	24.90	31.23

Concerning the dependent variables, formant frequency could not be compared within the variants since there was only one which presented this kind of acoustic structure. As for duration, affricates and stops tend to be longer (see Table 4 and Figure 9), which is consistent with their appearance in onset position where sounds tend to be tenser, since a longer duration could be considered a reinforcement cue. However, statistics reveal that, while there are no significant differences

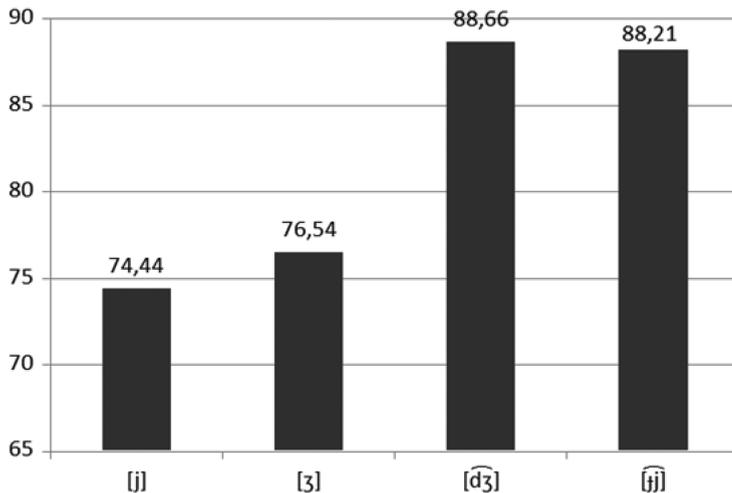


Figure 9: Graph showing the differences in duration of the different allophones analyzed. The Y-axis indicates duration in milliseconds.

between the duration of [j] and [ʒ], in fact there are between the approximant and the affricate ($U = 3717.5$, $Z = -3.331$, $p < 0.001$) and between the approximant and the plosive ($U = 3433.0$, $Z = -2.151$, $p < 0.031$). In the same way, there are also significant differences in duration between the fricative and the affricate ($t = -2.258$, $p < 0.027$). The affricate thus shows a significantly longer duration than the approximant and fricative variants, while it cannot be distinguished from the plosive by means of duration, as can be seen in Figure 9. This marks a difference between reinforced sounds and more relaxed ones.

These results suggest that there is significant variation at intraspeaker level, and that it is not limited to a particular speaker: all speakers showed the same type of allophones in spite of displaying different rates of occurrence ($t = 92.547$, $p < 0.0001$). Moreover, this variation occurs in a complementary distribution: plosives tend to dominate in initial position, fricatives are more likely to occur after a [+continuant] consonant, and approximants and elision are extremely frequent in intervocalic contexts, particularly when in contact with a palatal vowel. Nevertheless, there is a certain degree of instability in the case of affricate allophones. What seems clear is that, despite the fact that some scholars consider /ʎ/ a monolithic category,²⁵ the results from Figures 2 and 8 and Table 2 point to the existence of variation. According to Blevins (2004), a system can be modified only if different options exist; in other words, the existence of allophonic variation can be seen as the precondition for sound change to take place.

3.2 Dialectal variation

Having examined variation at the speaker level, we are still left with one question: what happens at community level or at regional level? The answer is found in linguistic atlases. The sources that I have employed are the Spanish regional atlases (see Table 5 for the complete inventory), since they are the most detailed sources of phonetic information, providing a more accurate phonetic transcription than most dialectology manuals. Even though their use may involve some methodological complications,²⁶ these are offset by richer information when compared with most dialectology manuals.

²⁵ Allophonic variation in the case of /ʎ/ is usually considered from a dialectal perspective when explaining *yeísmo* (see Quilis 1999: 314–324 or Hualde 2005: 179–180).

²⁶ The use of data from linguistic atlases in Spanish poses some problems. First of all, they were not compiled in the same period: The first one was started in 1952 (Alvar 1961–1973), whereas the most recent ones were published in the last 20 years (Alvar 2001a, 2001b; Quesada Pacheco 2010a); see González González (1992) or García Mouton (2006) for a detailed explanation of the Spanish linguistic atlases and the consequences of the lapse of time between their

Table 5: Linguistic atlases used in the collection of the phonetic variants for /ʎ/ in geographical order from Spain to America, from North to South.

ATLAS	REFERENCE	REGION
<i>Atlas Lingüístico y Etnográfico de Cantabria (ALECant)</i>	Alvar (1995)	Cantabria (Spain)
<i>Atlas Lingüístico de Castilla y León</i>	Alvar (1999)	Castile-and-Leon (Spain)
<i>Atlas Lingüístico y Etnográfico de Aragón, Navarra y La Rioja (ALEANR)</i>	Alvar (1979–1983)	Aragon, Navarre and La Rioja (Spain)
<i>Cartografía lingüística de Extremadura</i>	González Salgado (2005–2010)	Extremadura (Spain)
<i>Atlas Lingüístico (y Etnográfico) de Castilla-La Mancha (ALECMan)</i>	García Mouton and Moreno Fernández (2003)	Castile-La Mancha (Spain)
<i>Atlas Lingüístico y Etnográfico de Andalucía (ALEA)</i>	Alvar (1961–1973)	Andalusia (Spain)
<i>Atlas Lingüístico y Etnográfico de las Islas Canarias (ALEICan)</i>	Alvar (1975–1978)	Canary Islands (Spain)
<i>El español en el Sur de Estados Unidos ...</i>	Alvar (2000b)	Southern part of the United States
<i>Atlas Lingüístico de México</i>	Lope Blanch (1990)	Mexico
<i>Atlas Lingüístico de Puerto Rico</i>	Navarro Tomás (1948)	Puerto Rico
<i>El español en la República Dominicana ...</i>	Alvar (2000a)	Dominican Republic
<i>Atlas Lingüístico de América Central (ALAC)</i>	Giraldo Gallego et al. (2012)	Central America: Belize, El Salvador, Honduras, Panama
<i>Fonética del español en Guatemala ...</i>	Utgård (2006)	Guatemala
<i>Atlas Lingüístico de Nicaragua</i>	Rosales Solís (2008)	Nicaragua
<i>Atlas Lingüístico-Etnográfico de Costa Rica (ALECORI)</i>	Quesada Pacheco (2010a)	Costa Rica
<i>El español en Venezuela ...</i>	Alvar (2001b)	Venezuela
<i>Atlas Lingüístico-Etnográfico de Colombia (ALEC)</i>	Flórez (1981–1983)	Colombia
<i>El español en Paraguay ...</i>	Alvar (2001a)	Paraguay
<i>Atlas lingüístico Diatópico y Diastrático del Uruguay (ADDU)</i>	Thun and Elizaincín (2000)	Uruguay
<i>Atlas Lingüístico-Etnográfico del Sur de Chile (ALESuCh)</i>	Araya (1973)	Southern part of Chile

starting date and their publication. In addition, the methodology is not the same in all of them. Nevertheless, their data are important as evidence of possible phonetic solutions in /ʎ/ contexts. The other major difficulty is the lack of a linguistic atlas for important areas of South America, such as Perú, Argentina or Bolivia, and the Caribbean islands (an atlas for Cuba was presented in November 2013 but it has not been published yet).

The range of variants listed for the palatal phoneme /ʎ/ in these sources reveals an extremely complex situation: around 50 different allophones are documented, most of them with few acoustic or articulatory differences.²⁷ As it is difficult to show all of them in a chart, I have conflated them according to their manner of articulation: in all the atlases, there were instances of elision, glide realizations, approximants, fricatives and affricates. Stops were infrequent, although it is difficult to state whether some affricate examples should be classified as plosives according to their articulatory description. The result is summarized in Figure 10.

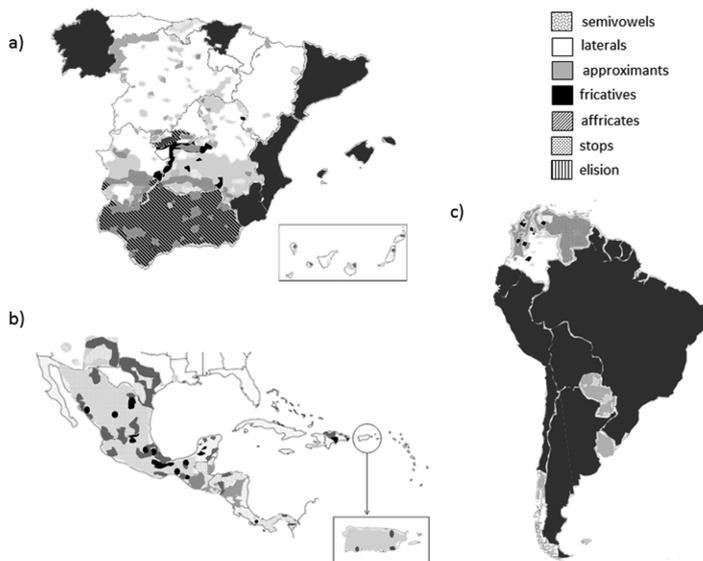


Figure 10: Allophonic variation in Peninsular and Insular Spanish (a), in Central American Spanish (b) and in South American Spanish (c). There is a particular pattern in Andalusia and northern Mexico which involves the coexistence of both approximant and fricative allophones. We have marked in dark grey the areas where there are no available linguistic atlases or where Spanish is not spoken as L1. Data collected from regional linguistic atlases and simplified by the author (see Rost Bagudanch 2014).

²⁷ It is interesting to consider some examples of the allophones found in the atlases and the degree of detail in their description; consider, for instance, a “prepalatal central muy rehilada” [strongly vibrated central prepalatal] (González Salgado 2005–2010), a “palatal central fricativa con realización adelantada” [advanced central palatal fricative] (García Mouton and Moreno Fernández 2003), or an “alveolo-prepalatal central muy rehilada y sin labialización” [strongly vibrated central alveopalatal with no labialization] (Alvar 1975–1978, 1961–1973). According to

First of all, we find here the same type of allophones detected at speaker level. As a consequence, it appears that these variants are not constrained to a particular area but may be found across the Spanish-speaking territory, and thus inherent to the Spanish phonetic system. Elision, for instance, seems to be frequent in intervocalic contexts but, since it tends to appear after a palatal vowel, it will not entail a loss of the palatal information because the listener will be able to make up for it. This behaviour is observed in Central America, where elision is extremely common,²⁸ but it is not unusual in many other areas. Conversely, elision does not appear anywhere in initial position: the segment is more likely to be realized as an approximant in Central America or as an affricate in other parts. The capacity of the sound system to adapt itself in order to provide all the necessary phonological information is common to all speakers, irrespective of their origin: in a position where the palatal feature cannot be supplied by other segments, the consonant will be present, but if this information can be recovered from other adjacent segments (especially similar vocalic sounds), it would be possible to omit the palatal consonant.

On the other hand, there are some apparent differences in the phonetic regional distribution of the allophones: approximant realizations (with all the intermediate degrees between glide and approximant, and fricative and approximant) are the most common in Mexico, Central America and most of the Caribbean territories; fricatives are the usual option in South American regions as well as in the southern dialects of Peninsular Spain. Interestingly, according to the atlases, the palatal lateral (which is represented in white in Figure 10) is the most frequent solution in Castile-and-Leon, Aragon, Navarre, La Rioja and the southern area of Cantabria, a state of affairs which differs significantly from other authors' descriptions (even that of the RAE). Nevertheless, the most interesting fact is the possibility of locating almost every kind of allophone in almost every area examined. As we postulated before, this seems to point to inherent tendencies within the Spanish sound system; still, due to sociolinguistic factors, some allophones have spread more in certain regions than in others (see Gómez and Molina Martos 2013).

Lope Blanch (1990), there are three different allophones of the palatal approximant: An open solution, a very open one and an extremely open one. Although drawing inferences regarding the acoustic and articulatory properties of these variants from their transcriptions in the atlases can be speculative, it must be appreciated that the authors made every effort to be accurate in their judgements (indeed, they claimed to be trained to distinguish the different phonetic realizations) and, since this is the only "experimental" data we have, we must place some trust in these materials. It should also be pointed out that the most recent studies have included spectrograms and phonetic characterizations (e. g., Alvar 2001a, 2001b).

28 In Figure 10(b), elision has not been marked as it should, because one more overlapping pattern would impede proper interpretation of the other possible solutions in this area.

4 The origin of the sound change

We have now attested the existence of variation in the context where change has started and is still in progress.²⁹ Such variation appears to be the condition *sine qua non* for the change to occur but there is still one question that remains unanswered: what is the ultimate reason for that change? Why is the palatal lateral [ʎ] replaced by an approximant consonant [j]?

Traditionally, it is stated that an approximant solution involves less articulatory effort. In fact, the change of the lateral into an approximant should respond to a hypospeech tendency that would have started when distinctiveness was not endangered.³⁰ However, in other Romance languages, both solutions remain as two distinct phonemes, e. g., in Catalan or Italian, but this is not the case in Spanish. Alarcos (1971) argued in favour of a useless phonemic opposition in the Spanish system but there are works (see Ohala 1974 or Blevins 2004) that postulate that sound change is not teleological: speakers do not modify their “norms” in order to keep the functionality of the system; they just interact, their only purpose making sure that the listener will perceive their message correctly.

The idea of articulatory effort, which has been mentioned above, must be considered before moving forward because it is a somewhat controversial topic. In Lindblom (1990) and Lindblom et al. (1995), articulatory effort is associated with the idea of “economy”, in the sense of “the minimal expenditure of energy compatible with the task” (Lindblom et al. 1995: 8): if a speaker believes that the listener will be able to understand the information without making it totally explicit, he/she will produce hypofoms. Variation, as we have already commented, arises in this kind of situation. Such hypofoms are usually seen as instances of lenition processes, which can be considered as “a failure to reach a phonetically specified target: articulatory undershoot or underachievement”

²⁹ Though the variation observed in *yeísmo* seems stable (in the sense of Labov 1994 or Caravedo 2014), the extent of *yeísmo* is increasing even in areas where the variation seemed to be stable: Utgård, in Quesada Pacheco (2010b: 76), explains how the youngest generations in Guatemala prefer the approximant realization to elision, which is in decline due to the influence of Mexican Spanish; and Montero Bernal (in Gómez and Molina Martos 2013: 138) shows that the approximant is gradually spreading in the urban areas of Cuba, especially in the centre and the eastern parts of the country. These examples seem to point to progress in the change. What is more, variation, even stable variation, is needed to trigger a sound change, which can arise from stable variation which becomes unstable – see Caravedo (2014).

³⁰ Wedel et al. (2013) demonstrate the “functional load hypothesis”, whereby elements with lower functional load are more likely to undergo merger processes. Included in the languages and the phonological contrasts these authors analyze is the merger between /ʎ/ and /j/ in Spanish.

(Bauer 2008: 611).³¹ In any case, the replacement of / λ / by / j / can be seen as an instance of undershoot since the degree of constriction decreases (see footnote 15).

In this context, then, the gradual disappearance of the lateral realization can be explained by the acoustic properties of both the palatal lateral [λ] and the approximant [j]. According to Quilis (1999: 261), the differences between these two sounds lie in the lower intensity of F2 in the case of [j], which also exhibits a clear positive F2 transition; in addition, all transitions appear to be smoother and longer (see Rost Bagudanch 2015). Figure 11 shows the waveform and the spectrogram of the words *callado* [ka λ a δ o] ‘quiet’ (11a) and *cayado* [kaja δ o] (11b) ‘walking stick’ produced by a Catalan speaker, in whose phonetic system the lateral and the approximant are two unambiguous phonemes. At first glance, the differences in intensity are not obvious: in fact, the second formant of the lateral is only 2 dB stronger, which is not a significant difference (71.71 dB in the approximant and 73.26 dB in the lateral). The duration of transition is similar in both of them: 45ms for the approximant and 51ms for the lateral, and their direction is similar. The clearest difference one can detect in this picture may be the frequencies of F2 and F3. If this is the case, the frequencies of F2 and F3 could be the necessary cues to

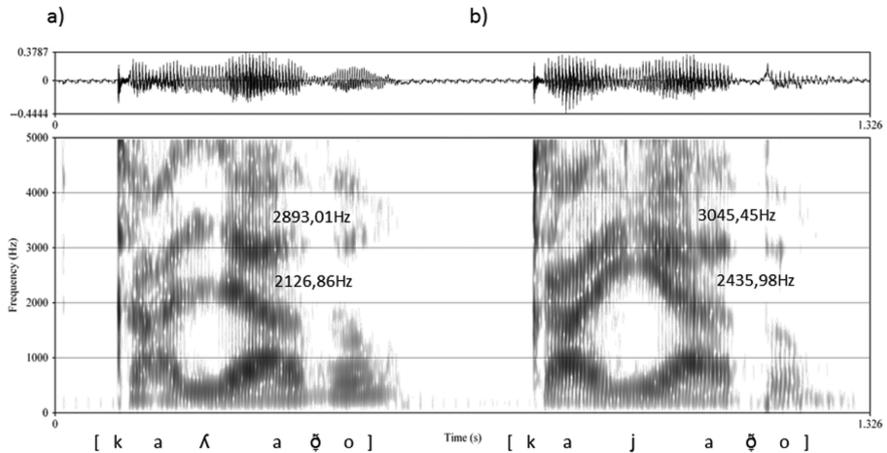


Figure 11: Waveform and spectrogram of the Spanish words *callado* ‘quiet’ (a) and *cayado* ‘walking stick’ (b).

³¹ Kingston (2008) agrees in part with this statement but includes another interesting element: the acoustics of speech. He indicates that speakers manipulate articulatory gestures (reducing the interruption of the airflow, thus increasing openness) to achieve an acoustic goal (increasing consonant intensity), which allows important phonological information to be communicated to the listener, namely that the prosodic constituent is continuing.

distinguish the approximant from the lateral. In fact, Recasens (1996: 317) affirms that the frequencies of F2 and F3 help to differentiate between [ʎ] and [j], since these formants are lower in [ʎ] than in [j].³²

Statistical analyses were performed with data from the aforementioned experiment (Section 3.1) but there was no relevant difference which could point to sounds with lower F2 and F3 being considered as laterals.³³ This result is not totally surprising if we bear in mind that F2 is the acoustic cue for the point of articulation and that both the lateral and the approximant are palatal sounds.³⁴

Hence, the general conclusion that stems from these data is that there are no relevant acoustic differences between the lateral and the approximant and that they can easily be confused perceptually. As a result, it is not difficult to misperceive the stimulus, which can certainly lead to a reinterpretation of the signal. The origin of *yeísmo* probably lies with the listener more than with the speaker (see Ohala 1996). In the terms used by Blevins (2004), it would correspond to the *change* source of her sound change typology, whereby the listener replaces the sound uttered by the one understood. However, this source should interact with *selection*, since the confusion between [ʎ] and [j] would take place in a variation context: certainly, variation would entail misperceptions which would give rise to long-term phonological recategorization.

5 Discussion: Phonological consequences

At the beginning of this study, we were interested in finding out whether there was variation in the context of *yeísmo* and if there were clear acoustic differences between the possible phonetic variants. Our research revealed that there is a great deal of variation at two levels: the intra- and inter-speaker level. The experiment in Section 3.1 showed that there are different acoustic realizations at intra-speaker level and that they have clearly distinctive acoustic features. However, a comparison of the palatal lateral [ʎ] with the palatal approximant [j] shows that they have

³² “L'espectre acústic i les transicions vocàliques de /ʎ/ són similars als corresponents a [j]. Una constricció dorsopalatal menys pronunciada durant la producció de [ʎ] vs [j] fa que F1 esdevingui lleugerament superior, i que F2 i F3 edevinguin lleugerament inferiors” [The acoustic spectrum and vocalic transitions of /ʎ/ are similar to those of [j]. F1 is slightly higher and F2 and F3 slightly lower due to a less pronounced dorsopalatal constriction during the articulation of [ʎ] vs [j]].

³³ Information about data, statistical tests and variables is available in Section 3.1.1.

³⁴ In other acoustic analyses, the main differences were related to F1 and the duration of transitions, but not to the frequency of F2 or F3 (Rost Bagudanch 2015).

similar acoustic properties, as seen in Section 4. This acoustic similarity may account for the confusion and gradual replacement of the former by the latter. In terms of Kingston's efficiency principle (Kingston 2008), the approximant [j] implies not reaching the articulatory target for [ʎ], but entails producing an equivalent acoustic output, with no cost at the informational level because of the low functional load of the opposition between /ʎ/ and /j/. In addition, we have observed that variation also exists at the inter-speaker level (see Section 3.2), which reinforces the idea of inherent phonetic tendencies in the system.

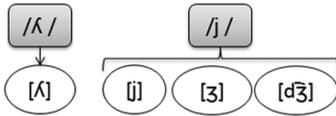
Closely related to this, we wanted to clarify whether these variation and misperception contexts really involve phonological reorganization; in other words, whether they lead to a change in phonological rules. Several scholars have pointed out the importance of the listener in sound change (e. g., Ohala 1996; Flemming 2004). From this point of view, Colantoni (2008) states that microvariation and macrovariation³⁵ may serve to initiate the change: in the case of [ʎ] and [j], there is little perceptual difference between them, so they can be easily confused (microvariation). As a consequence, speakers may choose a hypoarticulated option as a canonical form, an option that maintains the requirements of communication along with the efficiency principle. For these speakers, [ʎ] and [j] are one and the same. In categorical perception terms, both sounds correspond to the same phoneme and listeners cannot tell one allophone from the other, as they are interpreted as belonging to the same category. On the other hand, fricative, affricate and plosive realizations should be considered as macrovariation, since the differences between them are important and they should be distinguished without difficulty. In practice, however, it seems that these realizations may no longer be discriminated and they are confused with the existing category /ʎ/.³⁶ This seems to be the path *yeísmo* has followed in its merger process.

Data from Spanish dialect atlases illustrate the phenomenon in a clearer way (see the diagrams in Figure 12). Traditionally, it was stated that there were two lateral phonemes in Spanish (the alveolar /l/ and the palatal /ʎ/) and a

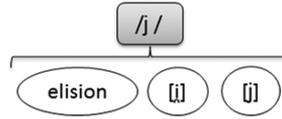
³⁵ According to Colantoni (2008: 70), *microvariation* is non-prominent variation from a perceptual perspective (“aquella variación que no es prominente desde un punto de vista perceptual”) while *macrovariation* refers to perceptually prominent variation (“aquella prominente desde un punto de vista perceptual”). She understands perceptual prominence in the same sense as Ohala and Kawasaki (1984: 116), that is, as the “scalar property that determines a given event's detectability”.

³⁶ The speakers recorded in the aforementioned experiment (Section 3.1) are not aware of having produced [ʒ], [dʒ] or [jʝ] as realizations of the category /ʎ/ or /j/ (in the case of *caballo* [kaβaʎo] ‘horse’ or *mayo* [majo] ‘may’). When asked, all of them believed they had pronounced [j] or even [ʎ].

a) RAE (1973):



b) Central America:



c) Argentina:

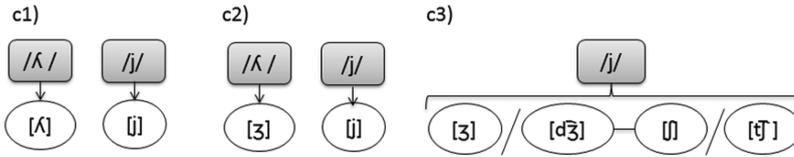


Figure 12: Diagram showing the phonological organization of the palatal phonemes in three different dialectal areas.

palatal approximant (/j/, which was traditionally labelled as fricative instead of approximant) (see RAE 1973: 34, or; Quilis 1999: 308–329). This approximant phoneme had several allophones: an approximant consonant [j] and fricative and affricate realizations, which were considered dialectal. From this point of view, standard Spanish had two palatal phonemes with two main allophones: the palatal lateral /ʎ/ and the palatal approximant /j/ (see Figure 12(a)). It was admitted, though, that in some regions, the approximant realization had also become a usual variant of the lateral phoneme. Nowadays, the data collected by some researchers suggest that the phonemic system does not exactly match this description (see Hualde 2005; García Mouton and Molina Martos 2012; Gómez and Molina Martos 2013). This is illustrated by an institutional advertising campaign in the summer of 2013, which insisted on the importance of keeping beaches clean. The slogan was as follows:

- (2) *Antes de recoger la toalla, limpia tu metro de playa.*
 Before of picking the towel, clean your metre of beach.
 ‘Before you pick up your towel when leaving the beach, clean up after yourself.’

Here *toalla* and *playa* are supposed to rhyme, which suggests that [ʎ] and [j] no longer contrast in Peninsular Spanish.

The observations from other regions within the Spanish-speaking territory can shed light on what is happening in Peninsular Spanish. Let us first consider

the Central American countries. According to Quesada Pacheco (2010b), the phonological system in these countries does not contain a palatal lateral phoneme, as the only phoneme attested was the palatal approximant one (see Figure 12(b)). A lenition process is taking place in this area: by increasing intensity in sound production, it is possible for speakers to reach an [j] (or even zero) stage. Here speakers have chosen, from the pool of variants, the most relaxed ones, which is an efficiency option in the sense of Kingston (2008) or even Bauer (2008). In this microvariation situation, hypofoms have been adopted as canonical.

A second example is Argentina, a huge territory which presents an interesting situation regarding *yeísmo*. In the northern area, in Misiones and Corrientes, the distinction between the lateral /ʎ/ and the approximant /j/ is still maintained, as in the conventional descriptions of standard Spanish (see Figure 12(c1)). In contrast, in Santiago del Estero the distinction is still alive but in a different sense; here, the palatal lateral has come to be realized as a voiced prepalatal fricative [ʒ], which contrasts with the palatal approximant realization [j] (see Figure 12(c2)). The rest of the country, though, lost this distinction in the eighteenth century. In those areas, the lateral /ʎ/ and the approximant /j/ have merged, as they have in the Central American countries. The main difference between this merger and the one in Central America is that, in Argentina, the palatal phoneme is realized as a prepalatal fricative (or affricate) consonant, which tends to be voiceless in younger speakers (see Figure 12(c3)). To sum up, there are three possible coexisting systems, located in several areas within Argentinian Spanish: the “classical distinction”, the distinction between prepalatal fricative and palatal approximant realizations, and *yeísmo* realized as fricative consonants. In the third one, some scholars defend the phonemic nature of the prepalatal fricative consonant in place of /j/ (see Fontanella de Weinberg 2005). *Yeísmo*, in this case, appears to involve fortition rather than only lenition: once the [j] stage has been reached in the merger process, strengthening occurs, that is, an increase in articulatory constriction and a decrease in acoustic intensity. The path followed is that of the hyperforms, as described by Lindblom et al. (1995), probably favoured by linguistic contact with prestigious systems which included fricatives and affricates in their inventories, such as French or Italian.

The data from linguistic atlases analyzed in this paper, along with our experiments, seem to indicate that the most common system in Spanish is one that has lost a palatal lateral phoneme. The palatal phoneme resulting from this process may be realized in multiple ways depending on internal factors and external influences. The results of Section 3.1 suggest that lenited forms are more frequent in word-internal position (intervocalic position) while the most

strengthened ones are more likely to appear in initial position or following a [–continuant] consonant, thus balancing intensity features, as referred to by Kingston (2008). The literature also points to sociolinguistic factors, but they could not be demonstrated in this study: for instance, Argentinian Spanish, as mentioned before, has been in close contact with French and Italian, which could partly explain the prominence of [ʃ]/[ʒ] (see Fontanella de Weinberg 1987 for further information on this issue). The distinction between /ʎ/ and /j/, however, has almost disappeared and it is only retained in some areas of Argentina, Bolivia and, rarely, in Paraguay. What seems to be widespread in the regions where *yeísmo* is the rule, according to our limited data, is that the palatal lateral is no longer regarded as a phoneme by speakers, who do not recognize it either in production or in perception.

From the foregoing, it would appear then that the state of affairs in the whole Spanish-speaking territory is characterized by coexisting grammars (in other words: different phonological systems), and therefore that a situation of variation has arisen that could lead to sound change. Indeed, according to Moreno Fernández (2005), some of the regions surveyed are concluding the last stage of the phenomenon (see Fontanella de Weinberg 2005).

As I have pointed out, diatopic data do not allow us to conclude that [ʎ] exists as an allophone but experimental data actually could. Hence, the experiment referred to in Section 3.1 not only studied the behaviour of /ʎ/ but also compared it with the sequences /l̞j/ and /l̞V/. The purpose was to check whether the lateral consonant [l] had the same acoustic properties before a vowel and before a palatal glide, in order to determine the existence of a *continuum* from [l] to [ʎ]. The variables and acoustic parameters taken into account were the same as in Section 3.1. The results regarding /l̞j/ revealed that, in fact, [ʎ] is a possible realization of the lateral phoneme /l/ when it occurs in a palatalizing context. As can be observed in Figure 13, [ʎ] was one of the allophones co-occurring in such a context along with the alveolar lateral and a palatalized lateral.

In this paper, we have been referring to the process of *yeísmo* as a merger. An important issue about this notion, however, is symmetry or asymmetry in terms of production and perception. Labov et al. (1991) argue that, when there is asymmetry, we should talk about a near-merger rather than a merger. The main characteristics of a near-merger also include the existence of “considerable individual variation within the community. Some individuals show a near-merger, others show a complete merger, and others a distinction” (Labov et al. 1991: 45). The speakers in our experiment fit the idea of a completed merger perfectly, but other experiments show that there are listeners who can make a distinction between /ʎ/ and /j/ in perception though not in production (see Rost Bagudanch 2016).

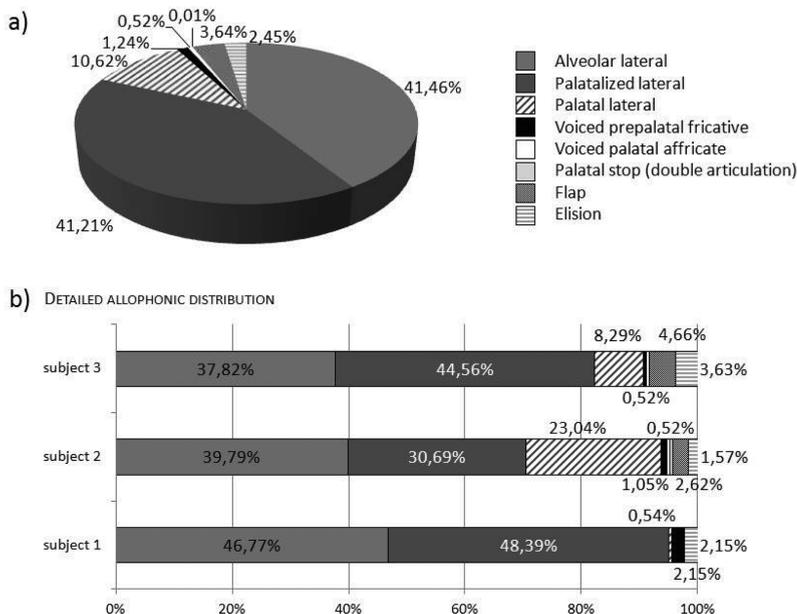


Figure 13: Graphs showing the general allophonic distribution for /li/ sequences (a), and the distribution for each one of the three informants (b).

Dialectal data also point to the absence of homogeneity in the allophonic variants: as seen in the literature, the progress of *yeísmo* is not uniform across regions and this heterogeneity seems to affect individuals within the same speech community. Moreover, according to apparent-time studies such as Rohena-Madrado (2013), Molina Martos (2006) or García Mouton and Molina Martos (2012), the sound change is actually progressing, even though other studies in dialectology point to considerable consistency within dialectal areas (e. g., Rosales Solís in Gómez and Molina Martos 2013). Another typical feature of near-merger is that opposing phonemes must show a small phonetic distance; results from the perception study in Rost Bagudanch (2016) show that this is the case in *yeísmo*. It thus seems plausible that, at least in some areas, we should talk about a near-merger rather than a merger. However, it is important to bear in mind that we have not conducted minimal pair or commutation tests to evaluate the /ʎ/ and /j/ contrast, a type of experiments which could help us to determine in a more detailed fashion to what extent *yeísmo* is a near-merger case.

Finally, as mentioned at the beginning of this paper, both dialectal and experimental data allow us to draw a clear parallel to the diachronic evolution of Latin *l*. This sequence (phonologically, /li/), palatalized in Late Latin and, later

on, in early Romance, became the approximant consonant (see footnote 2 for the whole chronology). In medieval Spanish, voiced fricative and affricate solutions ([ʒ], [dʒ]) are attested and, in the sixteenth century, these were transformed into their voiceless counterparts ([ʃ], [tʃ]) as a result of general devoicing. The emergence of the velar fricative /x/ may have taken place in the second half of the sixteenth century (see Canellada 1972; Quilis 2005: 171; Ariza 2012: 227–229).

Taking this chronology into account, it seems plausible to put forward some equivalence with the change currently in progress. Argentinian Spanish, for instance, has attained a stage comparable with sixteenth century Peninsular Spanish, whereas contemporary Peninsular Spanish is moving towards the solutions of medieval Castilian, which have been supported by data in the linguistic atlases in almost all the regions examined. It is important to note that this evolution seems to be progressing more quickly in the southern dialects than in the northern ones. In any case, it appears that the old phonemic distinction has been kept in rural and isolated spots, in contrast to its disappearance in the rest of the Spanish linguistic domain (note that sociolinguistic factors are an important condition, since the spread of *yeísmo* is considered a sound change in progress from below (see Moreno Fernández 2005)). It would thus appear that /ʎ/ is likely to disappear completely. Following the analogy with the diachronic change, the genesis of velar solutions in this context would not be strange, even more so if we consider that there are cases already documented in *ALeCMan* (García Mouton and Moreno Fernández 2003), e. g., [arθixa] for *arcilla* ‘clay’ and [taxo] for *tallo* ‘blade’ are found in Molina de Aragón (Guadalajara) and Villahermosa (Ciudad Real).³⁷

6 Conclusions

In this paper, we have shown that variation in the production of Spanish /ʎ/ can be found not only at a dialectal level but also in the allophonic realizations of a single speaker. In particular, the same kind of phonetic variation is attested in inter- as well as intra-speaker domains. This variation displays a *continuum* from the least tense realizations to the tensest ones, and tends to be organized in complementary distribution, with the hyperarticulated allophones tending to appear in initial position and the hypoarticulated ones generally found in intervocalic position.

³⁷ In González Salgado (2005–2010), we find a case of aspiration in the word *gavillón* [gaβiʎon] in Fuente del Maestre (Badajoz), a phonetic realization which can be accounted for easily if we consider it a variant of the velar fricative [x].

This range of variation could favour situations of confusion and misperception, which could then lead to sound change. Our data indicates that there is no clear distinction between [ʎ] and [j], which is an ideal condition for the reinterpretation of the acoustic signal in a hypoarticulation situation. In this situation, a speaker may produce realizations other than the expected canonical form and thus offer the listener different phonetic options for a concrete phonological category. The listener, then, has the possibility to reinterpret the phonetic chain, resulting in a phonological analysis that may be quite different from that of the speaker. In fact, the diachronic evolution of Lj in Spanish illustrates a parallel change, when Lj became [j], [ʒ] in Medieval Spanish and, finally, [x]. In some regions, the current stage of *yeísmo* in Spanish seems to correspond to medieval [ʒ] or the 16th-century [j] (Stage 4 in Moreno Fernández 2005), whereas in others, it seems to remain in the [j] period (Stage 2).

As a result, the phonological description of Spanish needs to be revised. Specifically, I would argue in favour of a reorganization of the palatal system, at least in Peninsular Spanish, whereby there would be only one (non-lateral) palatal phoneme /j/, which merged with the ancient palatal lateral consonant /ʎ/ during the last century. After a period of co-existing grammars (i. e., phonological systems), phonological recategorization took place. Consequently, the palatal lateral may no longer be considered distinctive but an allophone of the alveolar lateral phoneme in palatalization contexts. Indeed, it is interesting to note that [ʎ] still exists, although speakers are not aware of producing it. As they are no longer able to distinguish it, they identify it as a variant of an alveolar lateral when followed by a palatal glide or consonant.

Acknowledgement: This research has been funded by grant no. FFI2011-24183 awarded by the Spanish Ministry of Education and Science. I would also like to thank Dr. Cristina Suárez, three anonymous reviewers and the editor for their helpful comments.

References

- Aларcos, Emilio. 1971. *Fonología española*, 4th edn. Madrid: Gredos.
- Alonso, Amado. 1967. *Estudios lingüísticos: Temas hispanoamericanos*, 3rd edn. Madrid: Gredos.
- Alvar, Manuel. 1961–1973. *Atlas Lingüístico y Etnográfico de Andalucía*. Madrid: Arco Libros.
- Alvar, Manuel. 1975–1978. *Atlas Lingüístico y Etnográfico de las Islas Canarias*. Las Palmas de Gran Canaria: Cabildo Insular.
- Alvar, Manuel. 1979–1983. *Atlas Lingüístico y Etnográfico de Aragón, Navarra y La Rioja*. Madrid: La Muralla.
- Alvar, Manuel. 1995. *Atlas Lingüístico y Etnográfico de Cantabria*. Madrid: Arco Libros.

- Alvar, Manuel. 1999. *Atlas Lingüístico de Castilla y León*. Salamanca: Junta de Castilla y León.
- Alvar, Manuel. 2000a. *El español en la República Dominicana: Estudios, encuestas y textos*. Madrid: Universidad de Alcalá, La Goleta.
- Alvar, Manuel. 2000b. *El español en el Sur de Estados Unidos: Estudios, encuestas y textos*. Madrid: Universidad de Alcalá, La Goleta.
- Alvar, Manuel. 2001a. *El español en Paraguay: Estudios, encuestas y textos*. Madrid: Universidad de Alcalá, Agencia Española de Cooperación, La Goleta.
- Alvar, Manuel. 2001b. *El español en Venezuela: Estudios, encuestas y textos*. Madrid: Universidad de Alcalá, La Goleta.
- Araya, Guillermo (dir.). 1973. *Atlas Lingüístico-Etnográfico del Sur de Chile*. Valdivia: Instituto de Filología de la Universidad Austral de Chile/Editorial Andrés Bello.
- Ariza, Manuel. 2012. *Fonología y fonética históricas del español*. Madrid: Arco Libros.
- Bauer, Laurie. 2008. Lenition revisited. *Journal of Linguistics* 44(3). 605–624.
- Blevins, Juliette. 2004. *Evolutionary phonology: The emergence of sound patterns*. Cambridge: Cambridge University Press.
- Boersma, Paul & David Weenink. 2009. *Praat: Doing phonetics by computer* [Computer program]. Version 5.1.15. <http://www.praat.org/> (accessed 12 September 2009).
- Bybee, Joan. 1998. Usage-based phonology. In Michael Darnell, Edith Moravcsik, Frederick Newmeyer, Michael Noonan & Kathleen Wheatley (eds.), *Functionalism and formalism in linguistics, Vol. 1: General papers*, 211–242. Amsterdam: John Benjamins.
- Bybee, Joan. 2001. *Phonology and language use*. Cambridge: Cambridge University Press.
- Canellada, M. Josefa. 1972. *Una nota para la historia de la fonética. Studia Hispanica in Honorem Rafael Lapesa*, Vol. I, 181–182. Madrid: Gredos.
- Caravedo, Rocío. 2014. *Percepción y variación lingüística: Enfoque sociocognitivo*. Madrid & Frankfurt: Iberoamericana Vervuert.
- Chamorro Martínez, José M^a. 1996. Breves notas para la historia del yeísmo. In Alegría Alonso González (coord.), *Actas del III Congreso Internacional de Historia de la Lengua Española, Salamanca, 22–27 de noviembre de 1993*, vol. I, 103–112. Madrid: Arco Libros.
- Clavería Nadal, Gloria. 1993. Observaciones acerca de la historia del “yeísmo. In Ramón Lorenzo Vázquez (coord.), *Actas do XIX Congreso Internacional de Lingüística e Filoloxía Románicas*, vol. V, 229–242. Santiago de Compostela: Fundación Pedro Barrié de la Maza.
- Colantoni, Laura. 2008. Variación micro y macro fonética en español. *Estudios de Fonética Experimental* 17. 65–104.
- Corominas, Joan. 1953. Para la fecha del yeísmo y del lleísmo. *Nueva Revista de Filología Hispánica* VII. 81–87.
- Coseriu, Emilio. 1978. *Sincronía, diacronía e historia: El problema del cambio lingüístico*. Madrid: Gredos.
- Dogil, Grzegorz. 2007. Phonetic dimensions of segmental strength. In Jürgen Trouvain & William J. Barry (eds.), *Proceedings of the 16th International Congress in Phonetic Sciences, August 2007*, 89–92. Saarbrücken: University of Saarbrücken.
- Flemming, Edward. 2004. Contrast and perceptual distinctiveness. In Bruce Hayes, Robert Kirchner & Donca Steriade (eds.), *Phonetically based phonology*, 232–276. Cambridge: Cambridge University Press.
- Flórez, Luis (dir.). 1981–1983. *Atlas Lingüístico-Etnográfico de Colombia*. Bogotá: Instituto Caro y Cuervo.
- Fontanella de Weinberg, M. Beatriz. 1987. *El español Bonaerense: Cuatro siglos de Evolución Lingüística (1580–1980)*. Buenos Aires: Hachette.

- Fontanella de Weinberg, M. Beatriz. 2005. *El español de la Argentina y sus variedades regionales*. Buenos Aires: Edicial.
- Frago, Juan Antonio. 1993. *Historia de las hablas andaluzas*. Madrid: Arco Libros.
- Galmés de Fuentes, Álvaro. 1957. Lle-yeísmo y otras cuestiones lingüísticas en un relato morisco del siglo XVII. *Estudios dedicados a Menéndez Pidal* II. 273–307. Madrid: Consejo Superior de Investigaciones Científicas.
- García Mouton, Pilar. 2006. Los atlas lingüísticos y las variedades del español de América. *Boletín Hispánico Helvético* 8. 111–122.
- García Mouton, Pilar & Isabel Molina Martos. 2012. The /k/–/j/ merger (yeísmo) in Central Spain: Advances since the ALPI. *Dialectología*. Special Issue, III. 23–42.
- García Mouton, Pilar & Francisco Moreno Fernández. 2003. *Atlas Lingüístico (y Etnográfico) de Castilla-La Mancha*. Universidad de Alcalá. <http://www2.uah.es/alecman> (accessed 11 December 2014).
- García Santos, Juan Felipe. 2001. Ni velarización, ni interdentalización: Lenición. In José Antonio Bartol Hernández (coord.), *Nuevas aportaciones al estudio de la lengua española: Investigaciones filológicas*, 93–102. Salamanca: Luso-Española Ediciones.
- Giraldo Gallego, Diana Andrea, Lidun Hareide & Miguel Ángel Quesada Pacheco (eds.). 2012. *Atlas Lingüístico de América Central (ALAC): Nivel fonético – Belice (ALEB), El Salvador (ALPES), Honduras (ALPH), Panamá (ALEP)*. Bergen: University of Bergen.
- Gómez, Rosario & Isabel Molina Martos (eds.). 2013. *Variación yeísta en el mundo hispánico*. Frankfurt & Madrid: Iberoamericana Vervuert.
- González González, Manuel. 1992. Metodología de los atlas lingüísticos en España. In *Actas del Congreso Internacional de Dialectología* (IKER 7), 151–177. Bilbo: Real Academia de la Lengua Vasca.
- González Salgado, José Antonio. 2005–2010. *Cartografía lingüística de Extremadura*. <http://www.geolectos.com/index.htm> (accessed 10 December 2014)
- Harrington, Jonathan. 2012. The relationship between synchronic variation and diachronic change. In Abigail C. Cohn, Cécile Fougeron & Marie K. Huffman (eds.), *The Oxford handbook of laboratory phonology*, 321–332. Oxford: Oxford University Press.
- Hay, Jennifer, Paul Warren & Katie Drager. 2006. Factors influencing speech perception in the context of a merger-in-progress. *Journal of Phonetics* 34. 458–484.
- Hualde, José Ignacio. 2005. *The sounds of Spanish*. Cambridge: Cambridge University Press.
- Kingston, John. 2008. Lenition. In Laura Colantoni & Jeffrey Steele (eds.), *Selected proceedings of the 3rd Conference on Laboratory Approaches to Spanish Phonology*, 1–31. Somerville, MA.: Cascadilla Press.
- Labov, William. 1994. *Principles of linguistic change Vol. 1: Internal factors*. Oxford: Blackwell Publishing.
- Labov, William. 2007. Transmission and diffusion. *Language* 83(2). 344–387.
- Labov, William, Mark Karen & Corey Miller. 1991. Near-mergers and the suspension of phonemic contrast. *Language Variation and Change* 3. 33–74.
- Ladefoged, Peter & Ian Maddieson. 1996. *The sounds of the world's languages*. Oxford: Blackwell Publishing.
- Lapesa, Rafael. 1964. El andaluz y el español de América. In *Presente y futuro de la lengua española (Actas de la Asamblea de Filología del I Congreso de Instituciones Hispánicas)*, vol. II, 173–182. Madrid: Ediciones de Cultura Hispánica.

- Lapesa, Rafael. 1981. *Historia de la lengua española*, 9th edn. Madrid: Gredos.
- Lindblom, Björn. 1990. Explaining phonetic variation: A sketch of the H&H Theory. In William J. Hardcastle & Alain Marchal (eds.), *Speech production and speech modelling*, 403–439. Dordrecht: Kluwer Academic Publishers.
- Lindblom, Björn, Susan Guion, Susan Hura, Seung-Jae Moon & Raquel Willerman. 1995. Is sound change adaptive?. *Rivista di Lingüística* 7(1). 5–37.
- Lope Blanch, Juan M. (dir.). 1990. *Atlas Lingüístico de México*. México DF: El Colegio de México, Fondo de Cultura Económica.
- Martínez Celdrán, Eugenio. 2015. Naturaleza fonética de la consonante 'ye' en español. *Normas* 5. 117–131.
- Martínez Celdrán, Eugenio & Ana M^a Fernández Planas. 2007. *Manual de fonética española: Articulaciones y sonidos del español*. Barcelona: Ariel.
- Molina Martos, Isabel. 2006. Innovación y difusión del cambio lingüístico en Madrid. *Revista de Filología Española* 86(1). 127–149.
- Moreno Fernández, Francisco. 2005. Cambios vivos en el plano fónico del español: Variación dialectal y sociolingüística. In Rafael Cano Aguilar (coord.), *Historia de la lengua española*, 2nd edn., 973–1010. Barcelona: Ariel.
- Navarro Tomás, Tomás. 1934. Rehilamiento. *Revista de Filología Española* 21. 274–279.
- Navarro Tomás, Tomás. 1948. *Atlas Lingüístico de Puerto Rico*. <http://www.alpr.info> (accessed 16 May 2013).
- Navarro Tomás, Tomás. 1964. Nuevos datos sobre el yeísmo en España. *Thesaurus: Boletín del Instituto Caro y Cuervo* 19(1). 1–17.
- Ohala, John. 1974. Experimental historical phonology. In John M. Anderson & Charles Jones (eds.), *Historical linguistics II: Theory and description in phonology*, 353–389. Amsterdam: North Holland.
- Ohala, John. 1981. The listener as a source of sound change. In Carrie S. Masek, Roberta A. Hendrick & Mary F. Miller (eds.), *Papers from the parasession on language and behavior*, 178–203. Chicago: Chicago Linguistic Society.
- Ohala, John. 1993. The phonetics of sound change. In Charles Jones (ed.), *Historical linguistics: Problems and perspectives*, 237–278. London: Longman.
- Ohala, John. 1996. Speech perception is hearing sounds, not tongues. *Journal of the Acoustic Society of America* 99. 1718–1725.
- Ohala, John. 2013. The listener as a source of sound change: An update. In Daniel Recasens & Maria-Josep Solé (eds.), *The initiation of sound change: Perception, production and social factors*, 21–35. Amsterdam: John Benjamins.
- Ohala, John & Haruko Kawasaki. 1984. Prosodic phonology and phonetics. *Phonology Yearbook* 1. 113–117.
- Quesada Pacheco, Miguel Ángel (coord.). 2010a. *Atlas Lingüístico-Etnográfico de Costa Rica (ALECORI)*. Costa Rica: Universidad de Costa Rica.
- Quesada Pacheco, Miguel Ángel (ed.). 2010b. *El español hablado en América Central: Nivel fonético*. Frankfurt: Iberoamericana Vervuert.
- Quilis, Antonio. 1999. *Tratado de fonología y fonética españolas*, 2nd edn. Madrid: Gredos.
- Quilis, Antonio. 2005. *Fonética histórica y fonología diacrónica*, 2nd edn. Madrid: Universidad Nacional de Educación a Distancia.
- RAE. 1973. *Esbozo de una nueva gramática de la lengua española*. Madrid: Espasa.
- RAE. 2011. *Nueva gramática de la lengua española: Fonética y fonología*. Madrid: Espasa.

- Recasens, Daniel. 1996. *Fonètica descriptiva del català (Assaig de caracterització de la pronúncia del vocalisme i consonantisme del català al segle XX) (Biblioteca Filològica XXI)*, 2nd edn. Barcelona: Institut d'Estudis Catalans.
- Recasens, Daniel. 1999. Lingual coarticulation. In William J. Hardcastle & Nigel Hewett (eds.), *Coarticulation: Theory, data and techniques*, 80–104. Cambridge: Cambridge University Press.
- Rohena-Madrado, Marcos. 2013. Variación y cambio de sonoridad de la fricativa postalveolar del español de Buenos Aires. In Laura Colantoni & Celeste Rodríguez Louro (eds.), *Perspectivas teóricas y experimentales sobre el español de la Argentina*, 37–57. Madrid & Frankfurt: Iberoamericana Vervuert.
- Rosales Solís, María Auxiliadora. 2008. *Altas Lingüístico de Nicaragua*. Managua & Bergen: Academia Nicaragüense de la Lengua & Universidad de Bergen.
- Rost Bagudanch, Assumpció. 2011. *Variación en los procesos de palatalización de yod segunda (o cómo la sincronía permite la explicación de la diacronía)*. Girona: Universitat de Girona PhD Dissertation. <http://hdl.handle.net/10803/31860>.
- Rost Bagudanch, Assumpció. 2014. Una panoràmica del yeísmo: ¿un proceso acabado o en construcción?. *Revista Internacional de Lingüística Iberoamericana* XII (23). 141–163.
- Rost Bagudanch, Assumpció. 2015. La confusión yeísta, entre la producción y la percepción. Paper presented at the XV Congrès International de Linguistique Ibéro-romane, Université de Rouen (France), 3–5 June.
- Rost Bagudanch, Assumpció. 2016. La percepción de /ʎ/ y de /j/ en catalán y en español: Implicaciones en la explicación del yeísmo. *Estudios de Fonética Experimental* 25. 39–80.
- Thun, Harald & Adolfo Elizaincín (dir.). 2000. Consonantismo y vocalismo del español. Fasc. A.1: Lateral palatal y fricativa mediopalatal: Lleísmo, yeísmo, zeísmo y jeísmo en el español uruguayo. *Atlas lingüístico Diatópico y Diastrático del Uruguay (ADDU)*, Vol. I. Kiel: Westensee Verlag.
- Utgård, Katrine. 2006. *Fonètica del español en Guatemala: Análisis geolingüístico pluridimensional*. Bergen: University of Bergen MA Thesis.
- Wedel, Andrew, Abby Kaplan & Scott Jackson. 2013. High functional load inhibits phonological contrast loss: A corpus study. *Cognition* 128. 179–186.
- Yu, Alan C. 2015. The role of experimental investigation in understanding sound change. In Patrick Honeybone & Joseph C. Salmons (eds.), *The Oxford handbook of historical phonology*, 410–428. Oxford: Oxford University Press.