

ETHNOSOCIOPHONOLOGY AND CONSONANT LENITION IN MAXAKALÍ¹

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ABSTRACT

This paper aims at describing and explaining the allophony of consonants in coda position in Maxakalí, which vary from a consonantal phonetic realization to a vocalic allophone. While prevocalization of consonants is a widespread phenomenon, in Maxakalí almost all consonants undergo lenition, with variation occurring within the productions of an individual speaker. To further understand the factors involved, data was collected in two sociolinguistically balanced experiments, and analyzed both statistically and phonologically. The main group of factors that condition the lenition of consonants in coda are the age of speaker, the place of articulation of the consonant, and the position of the segment inside the word and sentence.

KEYWORDS: ethnosociophonology; Maxakalí; phonology; prevocalization; sociolinguistics

RESUMO

Este artigo pretende descrever e explicar a alofonia de consoantes em posição de coda no Maxakalí, as quais variam desde uma realização fonética consonantal até um alofone vocálico. A pré-vocalização de consoantes é um fenômeno linguístico comum, mas o que acontece em Maxakalí é algo que merece uma atenção especial: praticamente todas as consoantes sofrem lenição, ocorrendo variação na fala de um mesmo falante. Os dados foram coletados por meio de dois experimentos e analisados tanto estatística quanto fonologicamente. Os principais grupos de fatores que condicionam a lenição de consoantes em coda são: faixa etária dos falantes, ponto de articulação das consoantes e posição do segmento na palavra e na sentença.

PALAVRAS-CHAVE: etnosociofonologia; fonologia; Maxakalí; pré-vocalização; sociolinguística

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1. INTRODUCTION

While most sociolinguistic research aims to describe the factors governing variation within the languages of complex industrial societies, one must imagine that languages of traditional societies also exhibit variation. Classic studies within the former group include Labov (1972) and Naro (1981). In the first of these works, the author deals with variation in the English of Martha's Vineyard, where the diphthongs /aj/ and /aw/ have variables that can be correlated with age, professional, and ethnic classes, and how the loss or retention of /r/ in New York English can vary according to gender, age and socioeconomic status. The second example, Naro (1981), analyzes variation in Brazilian Portuguese syntax as it relates to phonetic salience in verbs, having as conditioning forces the social strata to which the speakers belong. The present study aims at contributing to a new perspective of sociolinguistic studies: one in which indigenous languages are the main subject of analysis¹. Sociolinguistic variation in an indigenous context has some idiosyncrasies that are not usually explored by traditional studies of industrial societies. As we are dealing with a much smaller and more horizontal society, class stratification plays little to no role. The network density of this kind of society, though, is extremely high.

While the notion of a standard variety, especially the one enforced by orthography, is absent in this type of community, there are some notions of what is wrong and correct concerning language. Usually, individuals carry a strong sense that elders are the "authority" in speaking correctly and the youngsters must learn with them, as the young ones speak a language often described as "incorrect", "corrupt" and so on. Nonetheless, phonological differences are often below the limen of conscious perception and thereby present an interesting testbed for the comparison of linguistic and social factors.

In this present study, we also aim to present the consonant lenition in the Maxakalí language. Lenition can be defined as a weakening of consonant constriction in oral cavity, leading to a more vocalic pronunciation of a consonant (e.g. vocalization of laterals in Brazilian Portuguese, Serbo-Croatian (Browne, 1993) and Polish (Rothstein, 1993)). It often develops from prevocalization (Foley, 1977; Operstein, 2010), in which a consonant bears a vocalic element before it, which may be then later lost. In Brazilian Portuguese, *mil anos* (a thousand years) was once pronounced 'mi[wɫ] anos' as opposed to today's 'mi[w] anos'.

Consonant lenition in Maxakalí was first described by Gudschinsky, Popovich and Popovich (1970, henceforth abbreviated GPP)², although there is evidence that at least for palatals this phenomenon was present in the language for some time. The vocabularies collected by various explorers in the 19th century and present in the work of von Martius (1867) contain words transcribed with glides that are nowadays analyzed as having an underlying consonant, e.g. *tsooi* 'tooth', which is orthographically and phonologically analyzed in the present language as /coc/ → [ʧuwij].

1. Few examples of variationist sociolinguistic work have been conducted to date with Brazilian indigenous languages, though see Ribeiro (2012a) for a study on Karajá.

2. GPP (1970) provide description of the segmental phonology of Maxakalí, as well as the relation between phonological structures /CVC/ that alternate with a [CVGVC] output, where [G] represents a glide, e.g.: /poc/ → [puwij] 'arrow'. Maxakalí phonology is further studied in works such as Araújo (2000), Silva (2011), Wetzels (1993, 1995, 2009) and Wetzels and Sluyters (1995). Campos's (2009) doctoral thesis presents a thorough account of the morphosyntax of this language and some morphophonological processes involving nasality. The works of D. G. Pereira (1992) and S. S. Pereira (2012) analyze syntactic phenomena.

Every consonant in the Maxakalí phonological inventory undergoes lenition in coda position. The speakers vary between a “pure” consonantal pronunciation up to a “pure” vocalic allophone, with variation of these allophones being encountered even in the same context with the same speaker. Which variables condition one or another realization? Is a sociolinguistic point of view providing insights into what is happening in the present stage of this language? As we will see, it is possible to understand this phenomenon (and possibly others) in a variationist perspective, bearing in mind that the group of factors that may be relevant for an industrial society will not necessarily be so in a traditional one and vice-versa.

2. AN OVERVIEW OF THE PEOPLE AND THE LANGUAGE

The Maxakalí people (*Tikmũ'ũn*, in Maxakalí) speak the Maxakalí language in the Mucuri Valley region, located in the northeastern part of Minas Gerais state, Brazil. The language is spoken by about 2,000 people, and belongs to the Macro-Je stock (Rodrigues, 1999; Ribeiro, 2006). The Maxakalí have been in contact with Europeans and their descendants since at least the 18th century (Paraíso, 1994) and nowadays are divided in four villages. Most of them still maintain their original cosmology and rituals, having resisted frequent attempts at conversion to Christianity. Before colonization and resettlement into indigenous reservations, they were hunter-gatherers and to this day, despite having small plantations and livestock, there are relatively few socioeconomic differences between them.

As mentioned above, Maxakalí belongs to the Macro-Je stock, specifically to the Maxakalí family. It is the only extant language of this family, and the mother tongue of virtually every *tikmũ'ũn*, although some of them speak Portuguese as a second language. It has a dominant SOV word order, but allows post-verbal material for information-structural reasons (Popovich, 1985), and has an ergative-absolutive alignment: the verb agrees with the intransitive subject and with the object of a transitive sentence, and there is an ergative postposition attached to the subject of a transitive verb (Popovich, 1985).

According to GPP (1970), there are 10 vowels (5 oral and 5 nasal), 2 laryngeals and 8 consonants. In this inventory, there are no liquids, no phonological glides and just one fricative, the glottal [h]. Stress is described as being word-final. Every supralaryngeal consonant has the potential to undergo lenition in coda position³. As for the laryngeals, /h/ just occurs in onset position (although it can be found in coda position in some loanwords from Portuguese, such as /kah'nẽn/ → [kah'nẽ̃] from Portuguese [kah'nejɾo], ‘goat, sheep’) and /ʔ/ has in most cases a predictable occurrence. Neither of the laryngeals show lenition of the prevocalization type that all other consonants in the language do. Table 2 shows the consonantal inventory, with the respective prevowels resulting from lenition presented in brackets:

3. Historically, it seems that there may have been a series of consonant insertions in codas in Maxakalí along its development from Proto-Macro-Jê, as shown by Ribeiro (2012b). Nevertheless, as Silva (in preparation) demonstrates, word lists from the 19th century already contain signs of prevocalization in the language.

Table 1: Vowels in Maxakalí

	Front	Non-front	
High	i ĩ	i	ĩ
	Front	Central	Back
Low	e ě	a ã	o õ

Based on GPP (1970)

Table 2: Consonants and their prevowels in Maxakalí

	Bilabial	Dental	Palatal	Velar
Nasal	m (ɱ)	n (ɳ)	ɲ (j̃)	ŋ (w̃)
Stop	p (ɸ)	t (ɬ)	c (ç)	k (q)

Based on GPP (1970)

3. THE PROBLEM UNDER STUDY

In the speech of a single individual, one can find roughly three kinds of phonetic realization of stop (or nasal) phonemes in coda position: just the consonant, the prevowel plus consonant, and just the prevowel. In the appendix, we include a complete list of words that show this lenition, across a full range of places of articulation and word-internal context; we provide a representative example in (1):

- (1) a. /tepta/ → [tɛp'ta] ~ [tɛɣp'ta] 'banana'
 b. /coʔop/ → [ʧu'ʔup] ~ [ʧu'ʔuɣp] ~ [ʧu'ʔuɣ] 'to drink'

It is noteworthy that stop consonant lenition is typologically rare; if one looks at the second appendix in Operstein's (2010) typologically comprehensive work on prevocalization (2010), there are almost no other cases of this phenomenon occurring with plain stops.

At first blush, this variation seemed to be random, so we were interested in verifying if sociolinguistic methodology could be applied in an indigenous context. We conducted two experiments for data collection, employing a methodology somewhat under-utilized in the study of indigenous languages, with the aim of recruiting participants from both genders and across a wide age range; we specifically designed a data collection procedure with three 'generations' (roughly, parents, grandparents, and great-grandparents), yielding six gender/age combinations. For example, Labov (1972) has shown that both of these extralinguistic variables play a role in variation in some dialects of English, as female speakers in New York tend to use fewer stigmatized forms than men, and certain changes that take place over time are such that age is a predictor for whether /r/ is realized in coda position. Rodrigues (1999), discussing the Macro-Je stock, cites an extreme example of how gender can be a relevant factor for variation: for male speakers of Karajá, there is a complete absence of the phoneme /k/, whereas female speakers possess this consonant. This is further complicated by the fact that other morphophonological processes interact with the absence of /k/, as shown by Ribeiro (2012a). We therefore specifically aimed to investigate whether, major socioeconomic differences notwithstanding in this village, these other two demographic variables would influence the outcome of consonant realizations in coda position.

In terms of linguistic factors to be examined, the lenition of consonants in Maxakalí occurs in both word-medial and word-final codas. In some contexts, it is predictable whether the vocalic allophone will be realized or not. For instance, as shown by GPP (1970) and Wetzels and Sluyters (1995), coda consonants followed by homorganic onsets have only the vocalic realization, as Maxakalí does not allow geminate consonants. Thus /kot nak/ → [kuɔ'dau] 'dry cassava' but *[kut'dau]. We hypothesize that in internal syllables, consonants maintain their "original" value through sharing manner with the following heterorganic consonant. In addition, although Maxakalí is a stress final language, perhaps word final consonants tend to be lenited because the end of words is a typical weaker position, often followed by silence. We also had reason to believe that manner and place of articulation might be variables of interest, as Operstein (2010) shows that liquids and fricatives are much more prone to suffer prevocalization. Finally, the position inside a sentence could affect the rate of lenition, with the latter more common in sentence-final position, given the phenomenon of final weakening at the phrasal level and decreased informational status in postverbal position.

4. METHODS

We gathered data from July 8th to July 29th 2013, in *Aldeia Verde* (Green Village), one of the four Maxakalí villages, located near Ladainha, in the state of Minas Gerais, Brazil. This village was founded in 2006 after some internal conflicts among the indigenous population. At the time of our fieldwork, this village had 338 inhabitants, all of them speakers of Maxakalí, with the exception of one family. According to the people at *Aldeia Verde*, there is no societal division into clans.

We recorded 18 people, or 5,32% of the village population. They were recruited based on division into three age groups, according to the culturally-relevant notion of generation: marriages (and consequently childbearing) start at about 15 years old in this society. We therefore defined the 'young' as 15 to 29 years old, the 'adult' group spanning 30 to 44 years old and, the 'elder' group from 45 years and up (where it must be said that there are few individuals over age 70 within this village). Given these 6 groups, we recruited 3 individuals for each, thereby totaling 18 participants.

Two experiments were designed and applied to test our hypotheses; each contained the same 32 stimuli. We selected these words considering manner (voiceless or nasal), place (labial, dental, palatal and velar) and position of the coda inside the word (medial or final). For each of the resulting 16 combinations, we included items, yielding 32 words. For the second experiment we also considered the position of the word inside the sentence: whether pre- or post-verbal.

The first experiment consisted of elicited picture naming. We showed an image of an animal, plant or body part, and the participant had to name what he/she was seeing. We collected 576 tokens (18 people × 32 words). Experiment Two involved sentential repetition. We produced a sentence in Maxakalí and the participant had to repeat it. There were four frames: SOV ~ SVO and SV ~ VS. Maxakalí has flexible word order (though pre-verbal vs post-verbal sentences may correspond to distinct information-structural influences); the target token was always in the absolute case.⁴ We collected

4. According to Popovich (1985), while there are different intonational patterns between sentences with pre- and post-verbal objects (SOV versus SVO), there are not differences between sentences with one or two arguments (SV and SOV).

1152 items in this experiment (18 people × 32 words × 2 occurrences for each word). The software used to perform statistical analysis was the R software package, version 3.1.1.

5. RESULTS

We had to discard 152 items for Experiment one and 114 for Experiment two, given factors such as background noise (somewhat unavoidable in a village context, even while recording in the school classroom) the quality of recordings, and participants' responses on particular trials, yielding 424 and 1038 analyzable items respectively. As the first experiment allowed the individual to answer freely, sometimes we elicited unexpected responses that did not contain the target word of interest and therefore could not be analyzed alongside the rest. For the purpose of binary classification of responses, we considered realizations of consonant alone or prevowel plus consonant as *non-lenited* and the realization of the vowel alone as lenited. In the following figures, 0 means no lenition, while 1 means full lenition; the y-axis represents the percentage of lenition per variable of interest.

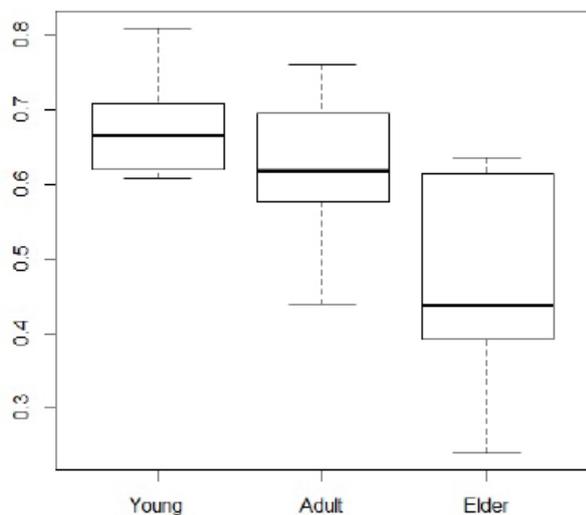


Figure 1: Lenition by age in Experiment 1

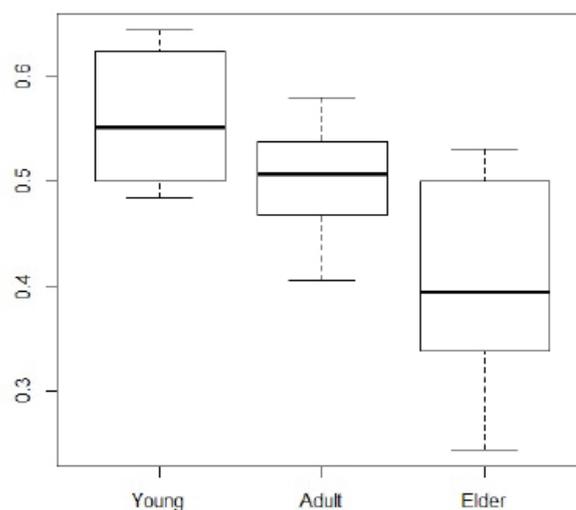


Figure 2: Lenition by age in Experiment 2

Figures 1 and 2 demonstrate the lenition rate considering age. In these figures, the smaller the number, the more conservative the realization of the consonants. As we can see, elders weaken the coda consonant much less than the younger and adult groups, suggesting that lenition has become increasingly prevalent over time within this population.

Looking at Figures 3 and 4, concerning place of articulation, it is evident that acute consonants (dental and palatal) are more prone to lenite than grave ones (labial and velar), using terminology from acoustic phonetics.

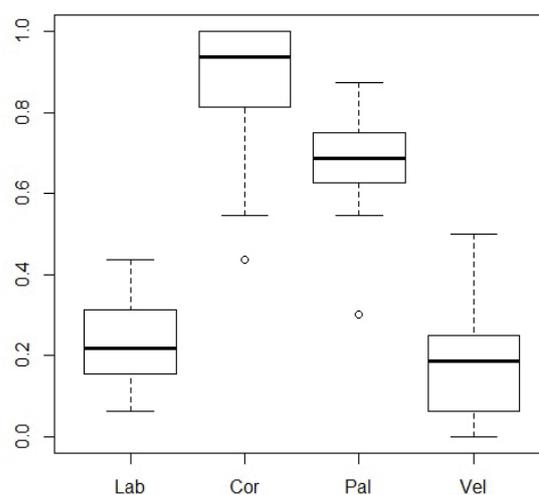
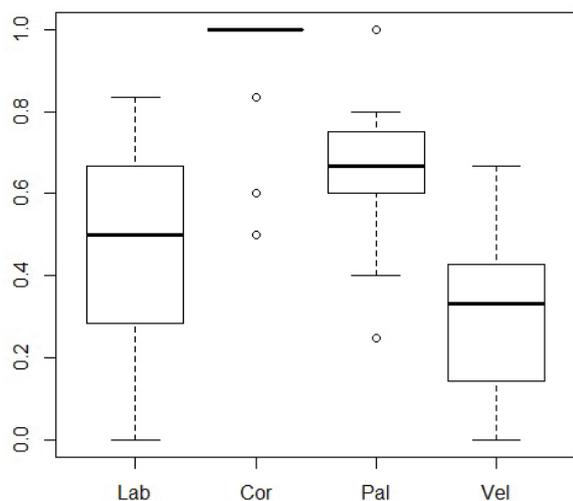


Figure 3: Lenition by place of articulation in Experiment 1 **Figure 4:** Lenition by place of articulation in Experiment 2

Gender and manner of articulation presented almost no variation between the variables, indicating that these two variables probably do not play a role in the phenomenon analyzed here. Figures 5 and 6 exhibit the data for gender. Variation among the female speakers is virtually nonexistent (perhaps reflecting the higher network density and close-knittedness among females in this community) and while the male speakers show more variation among them, the overall means between males and females is very similar. Figures 7 and 8 show the variation by manner: whether the stop in question is nasal or not does not play a significant role in influencing its rate of lenition.

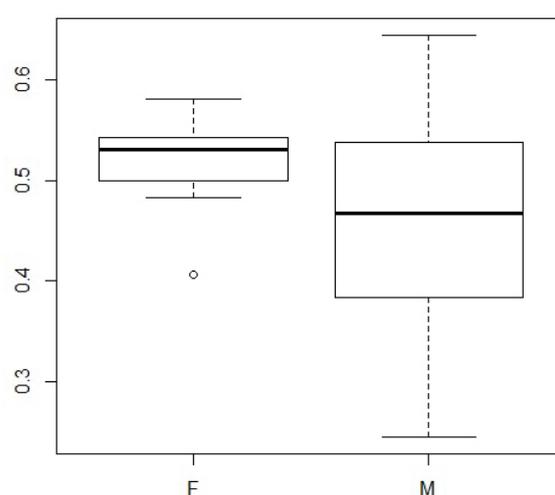
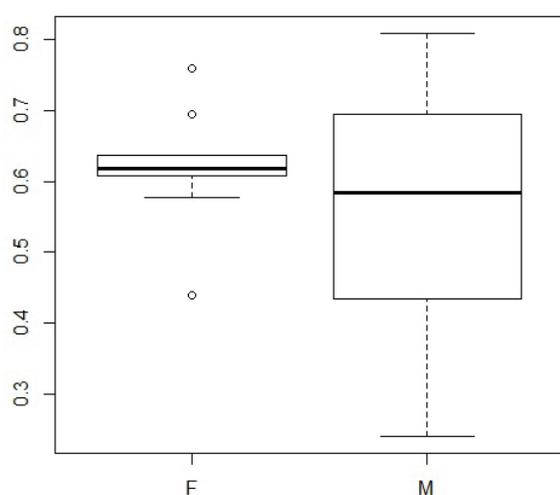


Figure 5: Lenition by gender in Experiment 1

Figure 6: Lenition by gender in Experiment 2

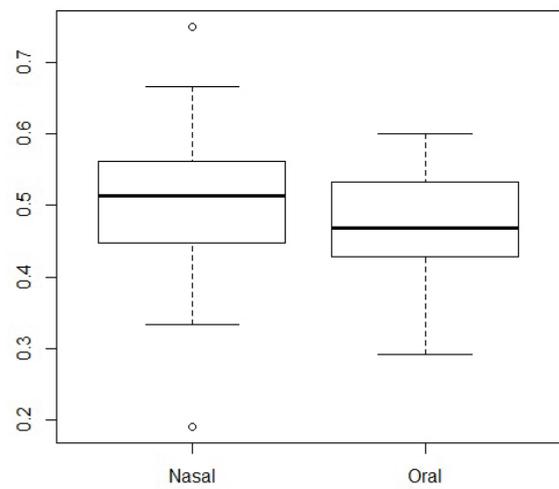
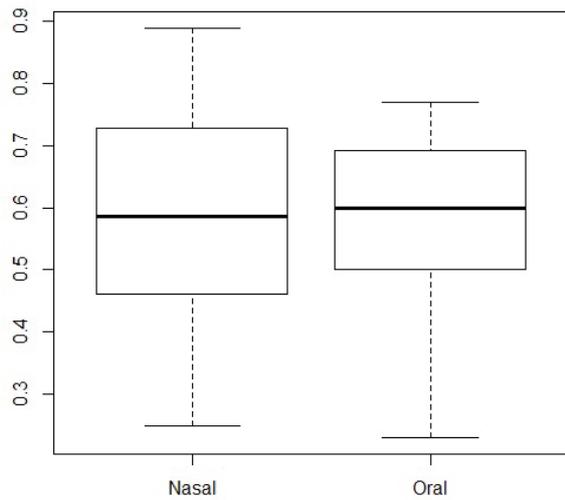


Figure 7: Lenition by manner of articulation in Experiment 1 **Figure 8:** Lenition by manner of articulation in Experiment 2

Finally, Figures 9 to 11 reveal that both the coda position inside the word and the word position inside the sentence are, at least by themselves, significant, with greater lenition rates for word-final consonants than for word-internal consonants, and greater lenition rates for post-verbal noun phrases than for pre-verbal noun phrases (the latter comparison was only addressed in Experiment 2).

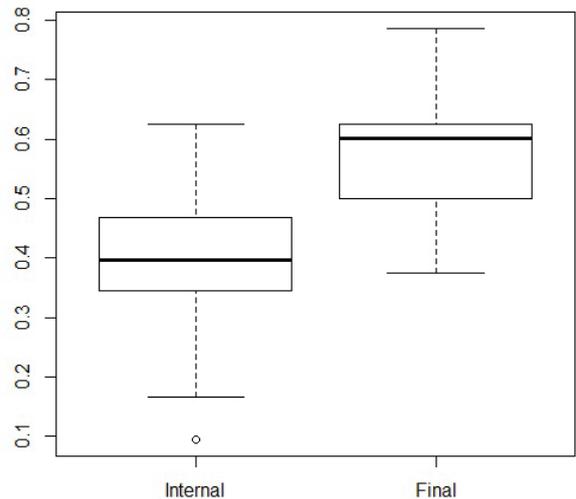
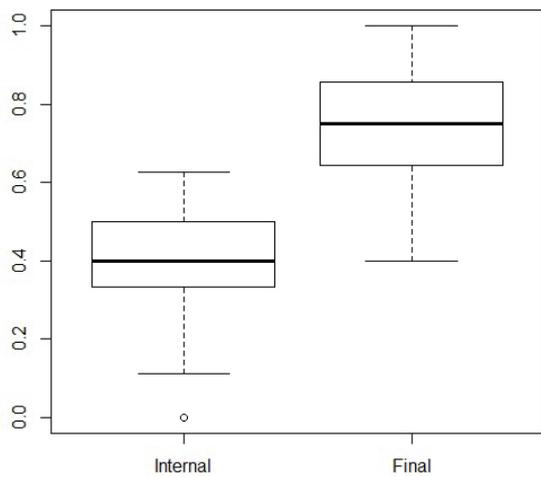


Figure 9: Lenition by coda position in Experiment 1

Figure 10: Lenition by coda position in Experiment 2

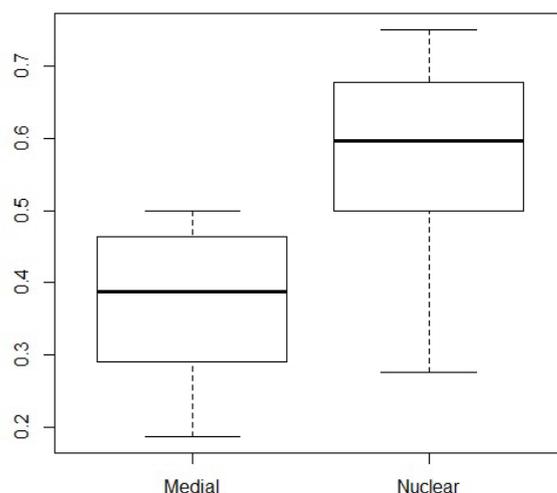


Figure 11: Lenition by word position in Experiment 2

In statistical analysis, sometimes factors that are significant when considered in isolation may be in co-variation with other factors, and may no longer be significant when considered jointly. For this reason, we performed a series of linear mixed-effects models, with participant and item as random effects, and all of the variables of interest as fixed effects. Tables 3 and 4 provide the *p*-values and standard score (given as *Z*) for Experiments 1 and 2:

Table 3: Logistic Regression of Experiment 1

Factor	Z-value	<i>p</i> -value
Age (young vs. elder)	3.685	0.000229
Age (adult vs. elder)	2.500	0.012431
Position inside the word (internal vs. final)	-3.834	0.000126
Place (acute vs. grave)	5.577	2.45e-08
Gender (male vs. female)	-1.386	0.165878

Table 4: Logistic Regressions of Experiment 2

Factor	Z-value	<i>p</i> -value
Age (young vs. elder)	3.633	0.000281
Age (adult vs. elder)	2.625	0.008675
Position inside the word (internal vs. final)	-3.767	0.000165
Place (acute vs. grave)	8.064	7.40e-16
Gender (male vs. female)	-1.973	0.048460
Frame (preverbal vs. postverbal)	7.193	6.35e-13

Confirming the trends witnessed in the Figures presented above, the statistical analysis revealed that four variables most strongly condition prevocalization in Maxakalí: (1) age, (2) place of articulation, (3) consonant position inside the word and (4) position within the sentence. Gender appears to be irrelevant for lenition.

The factor age demonstrates an “apparent time” effect in variation of lenition rates, but this may not necessarily mean that we are witnessing an inexorable linguistic change. The significant difference between elders against adults and youth may have to do with the history of this village in particular, as it was recently founded and may reflect patterns of who has migrated there. This line of inquiry explanation can only be investigated further through comparison with other villages.

Turning to place of articulation, acute consonants suffer lenition much more than grave ones. This finding reflects the general crosslinguistic trend for coronal (and by extension palatal) consonants to undergo deletion, perhaps related to the degree of specification and predictability of these consonants (Lahiri & Reetz 2002). Silva (in preparation), using the Articulatory Phonology approach developed by Operstein (2010), argues that in Maxakalí both labials and velars have Dorsal/Tongue Body gestures. Under Operstein’s model, every consonant, even stops and nasals, can bear both a consonantal gesture and a vocalic gesture, which can vary in their exact values across languages. On this view, velar consonants in Maxakalí have both a consonantal and vocalic velar gesture. Labials on the other hand have a labial consonantal gesture but a velar non-labial vocalic gesture, thus elucidating why the prevowel of labial consonants is an unrounded [ɣ] and not an expected [w]. Silva (in preparation) argues that an articulatory movement can yield a perceptual classification relevant to the language, and provides a limited discussion of whether type frequency can explain the place effect.

Finally, if the consonant is located at the end of the word and/or at the end of the sentence, it tends to be weaker than if it is not. We contend that these positions favor lenition because they are perceptually weaker than non-final positions, as they are in a boundary near silence, even though the stress in Maxakalí falls on the last syllable of the word.⁵ Recall that the canonical word order in Maxakalí is S(O)V, so in a SVO/VS order, in which the words analyzed were in sentence-final position, we are dealing with a similar context as the word level one.

6. CONCLUSIONS

We contend that a sociolinguistic approach presents a promising way to understand linguistic change and to make sense of variation within an indigenous language context, and, given the design of a straightforward production task, provides a way to integrate data collection methods with a wide range of the community of speakers. We demonstrated in this paper that this kind of analysis is possible for an intriguing phenomenon in phonology, namely consonant prevocalization, and investigated the role of both linguistic and extralinguistic variables in conditioning the allophones found in coda position.

5. While the analysis of greater lenition in final position due to final weakening is likely, see however Nevins (to appear) for an interpretation of cases of prevocalization in stressed position as a manifestation of the Stress-to-Weight Principle, whereby stressed syllables strive for greater syllable weight. Under an analysis along these lines, prevocalization, yielding creation of a diphthong, may actually provide more syllable weight than an obstruent coda for a stressed position.

The demographic variables in the Maxakalí community are not exactly the same as in modern industrial societies. In general, age, gender, and clan division can have a major role in variation in smaller traditional cultures, while socioeconomic class plays a smaller role. Although there are some teachers who work for the village schools, and are paid by the state government, we largely excluded this group of factors from our design (as they did not constitute part of either the younger or elder age groups). It must be said that as this group of teachers has more contact with non-indigenous society and a better command of Portuguese, future studies may include these a specific comparison with these variables to investigate if metalinguistic awareness or symbolic capital play a role in conditioning this lenition process. We note that gender differences play little to no role in the overall rate of prevocalization.

Further comparison with other villages may be fruitful, in order to see whether the ‘apparent time’ phenomenon observed here, in which younger and adult speakers show more lenition than adults, represents a general trend within the language, or is limited to this speech community. In addition, a comparison with these very same younger and adult speakers in a decade from now could shed light on whether the tendency to lenite increases for them as well or remains constant in comparison to a yet younger generation. In addition, it may be revealing to carry out perception tests or tasks of metalinguistic awareness, to see whether lenited vs non-lenited forms are consciously accessible to speakers, and whether there is any prestige for one or the other.

Recall that our results demonstrate that prevocalization affects all four places of articulation, with greater rates among the coronal and palatal consonants, and no major difference at all based on manner (e.g. stop vs nasal), and that word-final and sentence-final position favor greater rates of lenition. We are keen to point out the need for future studies to include a more refined acoustic analysis, as the present research was conducted auditorily and therefore resulted in a binary classification of lenition vs non-lenition. Moreover, the present study was designed in terms of final vs medial position of the consonant, without specific control of the particular segmental contexts surrounding them, and no doubt further insights may be gathered by carefully investigating whether particular vocalic nuclei preceding the target will attract or repel prevowels (as these create vocalic sequences) and whether particular consonantal segments following the target protect it from lenition.

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APPENDIX

The table below contains the words used in the experiments, including the phonological representation, according to GPP (1970), the phonetic realizations found in our corpus, the orthographic form and an English translation. We indicate the phoneme under analysis in boldface and underline.

Phonological representation	Phonetic realizations	Orthographic form	Meaning in English
/te <u>pta</u> /	[tɛp' ta] ~ [tɛxp' ta]	tepta	banana
/te <u>ptep</u> /	[tɛp' tɛp] ~ [tɛxp' tɛp] ~ [tɛxp' tɛx]	teptep	bellbird
/ci <u>pip</u> /	[tʃi' pi:p] ~ [tʃi' pi:ɣp] ~ [tʃi' pi:x]	xupup	nose
/pa <u>cap</u> /	[pa' ʃap] ~ [pa' ʃaɣp] ~ [pa' ʃaɣ]	paxap	coconut
/nĩ <u>m</u> koc/	[nĩmp' koj] ~ [nĩɣmp' kuj] ~ [nĩx̃' kuj]	yĩmkox	ear
/ã <u>m</u> kak/	[ãmp' kak] ~ [ãɣmp' kak] ~ [ãx̃' kau]	ãmkak	macaw
/nĩ <u>m</u> /	['nĩɣm] ~ ['nĩx̃]	yĩm	arm
/õn <u>ã</u> m/	[ũõ' nãm] ~ [ũõ' nãɣm] ~ [ũõ' nãx̃]	õnyãm	porcupine
/ce <u>t</u> coc/	[ʃɛt' ʃuj] ~ [ʃɛɣ' ʃuj]	xetxox	mouse
/to <u>t</u> cipec/	[tuɔʃi' pej]	totxuxpex	watermelon
/ko <u>h</u> ot/	[ko' hot] ~ [ku' huɔ]	kohot	cassava
/ko <u>ci</u> t/	[ko' ʃiɥɔ] ~ [ku' ʃiɥɔ] ~ [ko' ʃiɣ]	koxut	armadillo
/mĩ <u>n</u> kip/	[mĩõnt' kiɣp] ~ [mĩõ' kiɣp] ~ [mĩõ' ki:x]	mĩnkup	sugar cane
/co <u>k</u> ãnĩn/	[ʃukãn' nĩõ] ~ [ʃukãõ' nĩõ]	xokãnyĩn	dragonfly
/co <u>k</u> nĩn/	[ʃogŋ' nĩõ] ~ [ʃuɥ' nĩõ]	xokyĩn	meat
/nã <u>h</u> ãn/	[nã' hãn] ~ [nã' hãõ]	nãhãn	annatto
/ci <u>n</u> ãn/	[ʃiɣc' nãŋ] ~ [ʃiɣc' nãŋ] ~ [ʃiɣ' nãŋ]	xuxnãg	rice
/ki <u>t</u> icoc/	[kitiɣ' ʃuj]	kutuxxox	centipede
/ko <u>ke</u> c/	[ko' kæç] ~ [ku' kæjç] ~ [ku' kæj]	kokex	dog
/co <u>c</u> /	['ʃowiç] ~ ['ʃuwi] ~ ['ʃuj]	xox	tooth
/mũnĩ <u>n</u> tit/	[mũnĩŋç' tiɥɔ] ~ [mũnĩ' tiɥɔ]	mũnũytut	cow
/mũnĩ <u>n</u> tiãnã/	[mũnĩŋ' tiɥɔ' nãŋ]	mũnũytutnãg	goat
/kõ <u>m</u> ĩn/	[kõ' mĩŋ] ~ [kũ' mĩ]	kõmĩy	potato
/mã <u>?</u> ãn/	[mã' ?ã]	mã'ãy	alligator
/ki <u>k</u> mac/	[kiɣ' baj] ~ [kiɥ' baj] ~ [keɥ' baj]	kukmax	turtle
/ko <u>k</u> tic/	[kok' tiɣ] ~ [kouɣ' tiɣ] ~ [kuɥ' tiɣ]	koktix	saki monkey
/co <u>k</u> akak/	[ʃukauɣ' kak] ~ [ʃukauɣ' kau] ~ [ʃuka' ka]	xokakak	chicken
/ci <u>p</u> cak/	[ʃiɣp' ʃak] ~ [ʃiɣp' ʃau]	xupxak	papaya
/mõ <u>ŋ</u> mõka/	[mõŋmũ' ka] ~ [mõũmũ' ka]	mõgmõka	hawk
/mã <u>ŋ</u> koc/	[mãŋ' kuj] ~ [mãũ' kuj]	mãgkox	navel
/nĩ <u>c</u> õŋ/	[nĩ' ʃõŋ] ~ [nĩ' ʃõũ]	yĩxõg	tongue
/kõ <u>n</u> õŋ/	[kũ' nũŋ]	kõnõg	parrot