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Raising of the Final Atonic Vowel /o/ in Irati, Paraná

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Abstract:
This research (with the support of CNPq, Process number: 443809/2014-3), based on the theoretical and methodological assumptions of Variationist Sociolinguistics (LABOV, 1994, 2008), sought to investigate the raising process of the mid vowel /o/ in final posttonic position in the Portuguese spoken by descendants of Slavic immigrants (Ukrainian and Polish) in the rural area of Irati, a city located in the South Central region of Paraná. Twenty-four sociolinguistic interviews (with a minimum of 40 minutes speech each) were analyzed. All of them belong to the database of the VARLINFE project (Variação Linguística de Fala Eslava, or Linguistic Variation of the Slavic Speech), and were stratified according to *gender*, two *age ranges* (26 to 49 and 50 years of age or older) and three levels of *education* (Elementary school, Middle school and High school). In total, seven linguistic variables and four social variables were listed and tested. The data were submitted to the GoldVarbX program statistical treatment and have indicated that the studied vowel presents a low raising rate.

Keywords:
Vowel raising. Slavic ethnicity. VARLINFE Project.

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Introduction

The vowel system of the Portuguese language spoken in Brazil has been described by Câmara Jr. (2004) in accordance with the incidence or not of the stress. As stated by the author, Portuguese comprehends tonic (stressed) vowels, pretonic vowels, non-final posttonic vowels, and final posttonic vowels. In a tonic syllable, because of its distinctive function, a system of seven vowels /i u e o ɔ ɛ a/ is preserved, as shown by the following examples given by Bisol (2010, p. 42): s[i]co (flea), s[e]co (dried), s[ɛ]co (I dry), s[a]co (sack), s[ɔ]co (I punch), s[o]co (punch) and s[u]co (juice).

In atonic syllables, considering that certain oppositions are suppressed, this system of seven vowels is reduced, which was interpreted by Câmara Jr. (2004) as neutralization. In the pretonic position the distinction between the mid vowels e/ɛ and o/ɔ is lost, resulting in a five-vowel system: /i u e o a/. Regarding to the non-final atonic vowels, the author explains that the neutralization process occurred between the mid vowels /o/ and /u/, but not between /e/ and /i/, resulting in an atonic non-final vowel system of four vowels: /i u e a/. To illustrate the neutralization between /o/ and /u/, Bisol (2003, p. 273) cites as examples the words fósf[u]ro (mach) and abób[u]ra (pumpkin).

According to Câmara Jr. (2004), due to the neutralization that occurs between the mid and highs vowels, the ones in the final atonic syllables are reduced to three. In this case, the feature that distinguishes /e/ and /i/ on one side, and /o/ and /u/ on the other, in terms of mid versus high, is neutralized, as in: *tard[i]* (late) and *bol[u]* (cake). The final posttonic framework is, therefore, represented by only three vowels: /i a u/.

However, in a footnote, Câmara Jr. (2004, p. 44) states that: "In one or another area of Southern Brazil there is no neutralization and, for example, the word *jure* (to swear) opposes to *júri* (jury)". Therefore, the author acknowledges that the realization of the final atonic vowels in the South of Brazil presents a distinct frame, owing the fact that in some areas the neutralization of these vowels does not occur, as proven by several studies, carried out decades after the writings of Câmara Jr.

Thus, it can be said that both the final atonic vowel /o/ and the final atonic vowel /e/ show almost categorical raising tendencies in most Brazilian cities. However, in the Portuguese spoken in the South of Brazil, the raising of these final vowels presents a variable frame and the realization of both, the system of three vowels /i, a, u/, and of five vowels /i, e, a, o, u/ is possible, as studies carried out in this region show.

Considering this variation in spoken Portuguese, the aim of this research is to describe the realization of the final posttonic vowel /o/ and the linguistic and social factors that condition the raising of this vowel in the speech of twenty-four informants, descendants of Poles and Ukrainians, who reside in the rural area of Irati, Paraná. In the first instance, we will mention some studies that analyzed the realization of the final atonic vowels in Brazilian Portuguese.

The Final Atonic Vowels in Southern Brazil

Two studies by Vieira (2002, 2009) present analyzes of the final atonic vowels raising in Southern Brazil. In Vieira (2002), the author analyzed the final and non-final vowels /e/ and /o/ of eight informants from each of the cities that are part of the VARSUL (Urban Linguistic Variation in Southern Brazil) database. The results showed that the final atonic vowels are preserved in the speech of the inhabitants of some of these cities, including Curitiba, Chapecó, Flores da Cunha and Irati.

In Vieira (2009), the author analyzed the linguistic behavior of the mid vowels /e/ and /o/ in the speech of 48 informants, 16 informants from each of the Southern Brazilian capitals, Curitiba, Florianópolis and Porto Alegre. Regarding the final posttonic /o/, the author verified that the percentage of application of the final posttonic /o/ raising rule is quite high in the three capitals and can be considered almost categorical in Porto Alegre (97%) and Florianópolis (95%). Curitiba also presented an important raising percentage (81%).

In the state of Rio Grande do Sul, Machry da Silva (2009) analyzed the raising of the mid posttonic vowels in speech data of 14 informants from Rincão Vermelho, a rural village located on the border with Argentina. The results show that the raising of the vowels /e/ and /o/ in the final position is variable, with a higher probability of application to the mid vowel /o/. The speakers of the studied community raise this vowel almost as much as they preserve it, with only a slight tendency towards its raising (55%).

Also in the state of Rio Grande do Sul, Mileski (2013) analyzed the raising of the final atonic mid vowels in the Portuguese spoken by 24 informants, descendants of Polish immigrants, who reside in the rural village of Vista Alegre do Prata. The results showed a significantly lower raising percentage when compared with those found in other localities, with a raising rate of the final atonic vowel /o/ of 5.6% of and of 2.5% of the final vowel /e/ raising.

The studies cited above, among others, present fairly significant results on the variable realization of the final vowel /o/ in the Southern Brazilian states. As far as possible, we will try to compare our results with the ones obtained in these studies. However, it is noteworthy that each of these works organized the independent variables and its factors distinctly, especially with regard to the preceding and following context variables, a fact that, in some cases, hinders generalizations.

The Community of Irati, Paraná

By 1830, two adventurers, Pacifico de Souza Borges and Cipriano Francisco Ferraz pioneered the region where the city of Irati is currently located. After finding a huge beehive, they named the location Iraty, a word of Tupi origin that consists of *ira* and *ty* and means, respectively, "honey" and "river" in the indigenous language. Later on, the town of Covalzinho emerged in the region and in 1890, when the railway São Paulo - Rio Grande do Sul crossed the town, a railway station was built and denominated Iraty. In 1907, the hitherto village of Iraty became a district.[1]

According to the records of the Brazilian Institute of Geography and Statistics – IBGE (2017b),

> until the time of the declaration of the war, in the year of 1865, the territory of the current municipality of Irati was a backcountry. Soon after the declaration of the war, the recruitment of the National Guard and the first line troops was decreed. Several families, fearful of being affected by the recruitment, fled inland and founded a small settlement, which was denominated Covázinho or Covalzinho. Later on, in 1899, Colonel Francisco de Paula Pires and Mr. Emilio Batista Gomes acquired a vast area of land in the locality and settled in the heart of an untouched forest to lay the foundations of the future city of Irati. At that time, the region was constituted as a territorial area of the municipality of Santo Antônio de Imbituva, later simply lmbituva. The first project for its location was that of Vila de São João, currently known by the name of Irati Velho. Located in a high, flat, picturesque and pleasant place, it had the aspiration of being accessed by the São Paulo - Rio Grande Railway in the future, which, however, did not happen. When that railway was built, it was diverted from the village, marginalizing the hills to reach Covalzinho, and that is when the Railway and the Telegraph Station were inaugurated and denominated Irati Station.

According to the Linguistic Atlas of Paraná (AGUILERA, 1996), immigrants of various ethnicities settled in Irati in different periods of time: the Bandeirantes Paulistas arrived in 1839, new waves of colonizers from the South of Paraná arrived around 1864, and in 1908 the city received an influx of Ukrainian, Polish and Dutch immigrants, attracted to the country by the colonizing movement directed by the Federal Government. Currently, as reported by IBGE (2017a), the total population of the municipality is 60,070,000, of which 79.94%, or 44.932, is considered urban and 20.06%, or 11,275, is considered rural. The city is located 150 km from Curitiba and has a total area of 999.5 Km^2.

[1] The historical information of the city of Irati is available at: www.irati.pr.gov.br. Accessed on 10/08/2012.

Methodology

This study is primary supported by the assumptions of the Theory of Language Variation and Change, outlined by Weinreich, Labov and Herzog (2006) and Labov (2008). The raising and non-raising data of the back mid-high vowel /o/ in the final atonic position were collected through auditory analysis of 24 sociolinguistic interviews (with at least 40 minutes speech each), conducted with descendants of Poles and Ukrainians, who reside in the rural area of Irati, a city located in the South Central region of Paraná.

The 24 informants of the sample were stratified into two age groups (12 of 25 to 49 years of age, 12 of 50 years of age or older), gender (12 females and 12 males) and three levels of education (8 informants with 1 to 4 years of schooling, 8 with 5 to 8 years of schooling, 8 with 9 to 11 years of schooling). The interviews are part of the Linguistic Variation of Slavic Speech - VARLINFE database, which contains speech samples from seven cities located in the South Central region of Paraná, namely Mallet, Irati, Prudentópolis, Rio Azul, Rebouças, Ivaí and Cruz Machado. For the statistical analysis of the data, the GoldVarbX program was used.

The VARLINFE Database

The VARLINFE database[2] was set up by researchers from the Sociolinguistic area of Unicentro, Irati *campus*, and emerged in a scenario of strong Slavic immigration as an important way of recording the immaterial / linguistic heritage of Slavic descendants from seven cities in the Southeast region of the state of Paraná: i) Irati; ii) Rebouças; iii) Rio Azul; iv) Ivaí; v) Mallet; vi) Prudentópolis, and vii) Cruz Machado.

The same methodology adopted by the Urban Linguistic Variation in the Southern Region - VARSUL was used to establish the VARLINFE database, however, with an important distinctive feature: the choice to record the speech of Slavic descendants from the rural areas of the selected villages. The informants' profile included the following sociolinguistic research criteria: 1. The speakers must be of Slavic descent (i.e. the informant must be a descendant of Ukrainians or Poles, from the father's, mother's or both sides, must be born in the community and / or have moved there, at the most, at 2 years of age). 2. Must not have traveled to other locations (i.e. the informant could not have been a truck driver or a seller). 3. Must live in the rural area of one of the seven municipalities included in the sample.

The social characteristics of the VARLINFE informants are: *gender* (12 male and 12 female informants); *age* (12 informants from 25 to 49 years of age and 12 of 50 years of age

[2] Further details can be obtained in Loregian-Penkal et al. (2013).

and older) and *education* (8 informants from 1 to 4 years of schooling, 8 from 5 to 8 years of schooling, and 8 informants from 9 years of schooling or more).

Besides these criteria, the creation of the database met other necessary requirements, such as: (i) the preparation and completion of a social form, which details the social profile of the interviewee; (ii) elaboration of the questionnaire, which prioritizes the gathering of personal experience narratives; (iii) obtention of the interviewee's agreement to participate by signing the Term of Free and Informed Consent - TCLE.

The Analyzed Variables

In this research, all occurrences of the mid back vowel /o/ in the final posttonic syllabic context of 24 sociolinguistic interviews carried out in Irati – Paraná, were identified. The interviewees were residents of the rural area of the municipality and were all descendants of Poles / Ukrainians with strong association with the culture of these ethnic groups.

As a dependent variable we postulate the raising versus non raising of the final atonic /o /. In the rounds, we defined the raising rule as the application value. The social variables analyzed were four: age range (25 to 49 years of age, 50 years of age or older); education (1 to 4, 5 to 8, 9 to 11 years of schooling); Gender (male, female) and ethnicity (Ukrainian, Polish and hybrid). The independent linguistic variables considered in the analysis and their respective examples of occurrence are specified below.

1. Type of consonant / vowel in preceding context

This variable was considered in order to verify whether the type of consonant - or vowel - that precedes the vowel /o/ interferes in its raised to /u/ or unraised production. The controlled factors were as follows:

1.1 Stops [p, b, t, d, k, g]: "Os anti*g*o eram rígi*do* na religião"[3] (IRT 20 M1COLP)[4]
(The elderly were rigid in religion).

1.2 Fricative [f, v, s, z, ʃ, ʒ, x)]: "Brincava com balan*ç*o de cipó" (IRT 17M1GINH)
(I used to play with a woody vine swing).

1.3 Nasal [m, n, ɲ]: "E assim que nós consegui*mo* se formá"((IRT 20 M1COLP)
(This is how we managed to graduate).

1.4 Lateral [l, ʎ]: "Sai na casa dos fi*lho,* dos parente" (IRT 23M2PRIU)
(I visited the children, the relatives).

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[4] In the examples of speech data, we chose simple orthographic transcription.

[5] Notation that identifies informants and social variables: Ma - Mallet, number identifying the informant, M or F - gender, 1 or 2 - 1 age gr0oup up to 50 years and 2 age group over 50 years, PRI (Elementary school, 1 to 4 years of schooling), GIN (Middle school, 5 to 8 years of school), COL (High School, 9 to 11 years of school) - schooling level, P (Polish), U (Ukrainian), H (Hybrid: Ukrainian and Polish.) - ethnicity.

1.5 Rothic [ɾ]: "Mas não sei quanto que tinha que tê de dinhe*ru* e ai desisti" (IRT 06 F1COLH)
(But I don't know how much money I was supposed to have, so I gave up).
1.6 Vowel [i]: "De nav*iu* sessenta dia e ssesenta noite de nav*iu* né**"** (IRT 06 F1COLH)
(By ship sixty days and sixty nights by ship you know).

2. Place of articulation of the consonantal sound in preceding context

By controlling this variable, we intended to analyze the influence that the place of articulation of the consonant in preceding context exerts in the realization of the mid posttonic vowel /o/. The following factors were controlled:

2.1 Bilabial [p, b, m]: "Eu com fu*mu* nunca trabalhei" (IRT 14 F2COLH)
(I have never worked with tobacco).
2.2 Labiodental [f, v]: "Lá tinha muito fa*vu* de mel tamem" (IRT 11 F2GINH)
(There was a lot of honeycomb there too).
2.3 Alveolar [t, d, n, s, z, ɾ, l]: "dai ficô trabalhan*do* e estudan*do*."(IRT 17M1GINH)
(So, he/she kept working and studying).
2.4 Post-alveolar [tʃ, dʒ, ʃ, ʒ]: "A*cho* que era trigo, fejão" (IRT 23M2PRIU)
(I think it was wheat, beans).
2.5 Palatal [ɲ, ʎ]: "Eles fazium esses bolin*hu* né?" (IRT 11 F2GINH)
(They used to make these doughnuts, you know?).
2.6 Velar [k, g, x]: "Tinha casti*go* esses tempo" (IRT 15M1PRIH)
(There was punishment at that time).

3. Type of sound in the following context

The type of sound in the following context was controlled to verify whether the context succeeding the variant under analysis could interfere in the preservation of /o/ or in its raising to /u/. The considered factors were:

In case of a consonant:

3.1 Occlusive [p, b, t, d, k, g]: "eu sô o mais nov*o d*a turma" (IRT 25M2GINU)
(I'm the youngest of the class).
3.2 Fricative [f, v, s, z, ʃ, ʒ, x]: "Mais sofrid*u s*ó que como a gente era criança" (IRT 02 F1PRIU)
(It was very difficult but we were children).
3.3 Nasal [m, n, ɲ]: "Já tá passando do pont*o m*inhas muda"(IRT 15M1PRIH)
(My seedlings are already overgrowing).
3.4 Lateral [l, ʎ]: "Eu não tenh*o l*embrança" (IRT 23M2PRIU)
(I don't remember).
3.5 Rhotic [ɾ]: "É tudo misturado, é quatr*o r*eligião ali" (IRT 24M2GINP)
(It's all mixed up, there are four religions there).

3.6 Affricate [tʃ, dʒ]: "É a única coisa que tá dand*o dʒ*inhero né" (IRT 18M1GINU)
(It's the only way of making money, you know).

In case of a vowel:

3.7 Front high [i]: "Tem quatr*o i*greja" (IRT 23M2PRIU)
(There are four churches).

3.8 Front mid [e, ɛ]: "O fum*o e*les mesmo produziam" (IRT 26M2COLP)
(They produced tobacco by themselves).

3.9 Back high [u]: "Eu tenh*o u*ns pé de couve flor" (IRT 16M1PRIH)
(I have a few cauliflowers).

3.10 Back mid [o, ɔ]: "Era fund*o o*s riu**"** (IRT 22M2PRIP)
(The rivers where deep).

3.11 Low [a]: "e deu aquele fri*u a*quela veiz" (IRT 15M1PRIH)
(and I got goose bumps at that moment).

3.12 Pause: "Nós plantamo fum*o*." (IRT 18M1GINU)
(We produce tobacco).

4. Place of articulation of the following consonantal sound

This variable was considered in order to verify whether the place of articulation of the consonant following the vowel /o/ interferes in in its raised to /u/ or unraised production. The following factors were controlled:

4.1 Bilabial [p, b, m]: "A gente respondia em brasiler*o p*ra ele" (IRT 27M2COLP)
(We responded him in Brazilian).

4.2 Labiodental [f, v]: "Pegum o alt*o f*alante e ficum cantandu lá né?" (IRT 08 F1COLU)
(They take the loudspeaker and sing there, you know).

4.3 Alveolar [t, d, n, s, z, ɾ, l]: "Era sofrid*o t*ambém" (IRT 24M2GINP)
(It was difficult too).

4.4 Post-alveolar [tʃ, dʒ, ʃ, ʒ]: "Tanto ucraín*o dʒ*iminuíu como os polaco" (IRT 24M2GINP)
(The number of both Ukrainians and Poles has declined).

4.5 Velar [k, g, x]: "É clar*o qu*e sempre muda" (IRT 16M1PRIH)
(Of course it always changes).

5. Sonority of the preceding segment

This variable was considered in order to verify whether the sonority (voiced or voiceless sounds) of the consonant preceding the vowel /o/ influences in its raised to /u/ or unraised production. The following factors were considered:

5.1 Voiced: "Daí é mais diverti*du* né? (IRT 06 F1COLH)
(It is more fun then, you know).

5.2 Voiceless: "Aquele charu*to***,** pirogui, já dexavam pron*to* né" (IRT 17M1GINH)
(That cigar, pirogui, they would have it ready, you know).

6. Type of Syllable

By controlling this variable we tried to verify whether the syllable type (heavy / CVC or light / CV) influences in the behavior of the mid vowel /o/ in the posttonic position, favoring or inhibiting the raising. For this purpose the following factors were considered:

6.1 With coda: "Diferença de um ano e meio**,** dois a*nus* assim" (IRT 25M2GINU)
(A difference of a year and a half, two years, or so).

6.2 Without coda: "A mãe entende um po*co* de ucrania*no* né" (IRT 16M1PRIH)
(Mom understands a bit of Ukrainian, you know).

7. Presence / absence of a high vowel in the word

This variable was considered in order to verify whether the presence of a high vowel - /i/ and /u/ - in the word influences the preservation of the final atonic /o/ or its raising to /u/. The following factors were considered:

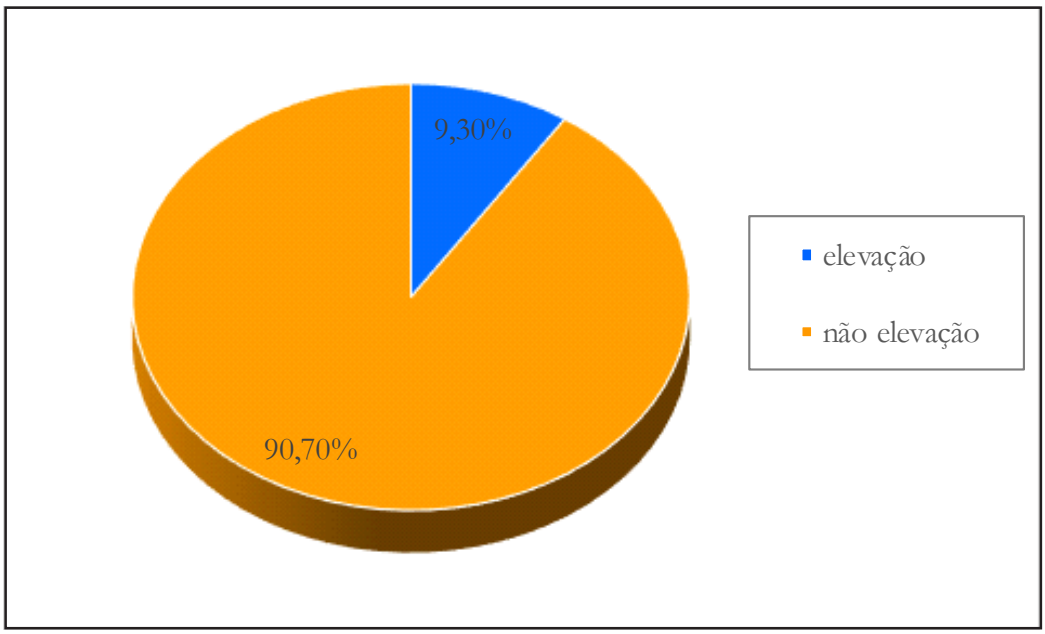
7.1 Presence of the high vowel: "Tem *pinherinhu* eles enfeitum o *pinherinhu."* (IRT 08 F1COLU).
(There is Christmas tree, they decorate the Christmas tree)

7.2 Absence of the high vowel: "Faz *tempo, logo* que casei" (IRT 25M2GINU)
(It's been a long time, right after I got married)

These seven linguistic variables, added to the social variables such as gender, schooling, age group and ethnicity were duly codified so that we could operate the GoldVarbX program. The results achieved are presented in the following section.

Results of the Analysis of the Final Atonic Vowel /o/ in Irati, Paraná

In the analysis of the 24 interviews carried out in Irati, in a total of 5573 tokens, we obtained 9.3% (517 tokens) of raising and 90.7% (5056 tokens) of non-raising. That is to say, there is a very high percentage of non-raising of the final vowel /o/. We verified, therefore, that in only 9.3% of the occurrences the speakers performed the raising of the final atonic vowel /o/ to /u/, which confirms the low application of the raising rule in Paraná. Graph 1 illustrates the realization of this final vowel in the Irati data:



Source: VARLINFE (2013).
(Elevação = Raising. Não elevação = Non-raising)

Graph 1 – Raising of the final atonic vowel /o/

The findings also revealed that this raising percentage in Irati (9.3%) is very low when compared to the results obtained by Vieira (2009) in the capitals of the Southern region (Curitiba: 81%, Florianópolis: 95%, Porto Alegre: 97%) and by Macrhy da Silva (2009) in Rincão Vermelho - RS (55%), with much higher percentages of application of the /o / raising rule. On the other hand, the work of Mileski (2013), in Vista Alegre do Prata - RS, a community of descendants of Polish immigrants, presented a similar result to ours, with a raising rate of the vowel /o/ of only 5.6%.

It is also worth noting that in the general round of the Irati data, the statistical program presented an input of only 0.032 for the raising of the final atonic /o/, a result that confirms the low percentage already verified in the data.

Regarding the linguistic and social variables, the GoldVarbX program selected the following variables in significance order: 1. Type of syllable; 2. Gender; 3. Type of consonant/ vowel in preceding phonological context; 4. Ethnicity; 5. Place of articulation of the consonant in a preceding phonological context; 6. Presence / Absence of high vowel; 7. Sonority of the preceding segment; 8. Place of articulation of the following consonant; 9. Education; 10. Following phonological context. Only the age group was not selected by the statistical program. The results of the selected linguistic variables, followed by the results of the social variables, are presented below.

Language Variables

The variable selected in the first position, therefore the most relevant for the raising of the target vowel, was the type of syllable (with coda or heavy, and without coda or light). The results of this variable are shown in Table 1:

Table 1 – Type of Syllable (raising)

Factors	Application/ Total	Frequency	R. Weight
With coda	227/530	42.8	0.95
Without coda	290/5043	5.8	0.42
Total *Input: 0,032*	517/5573	9.3	

Source: VARLINFE (2013).

As we can observed in the table above, syllables with coda (*muitus* – (many), *novecen**t**us* – (nine hundred)) are highly favorable to raising (0.95); while the syllables without coda (*casamento* - marriage, *fumo* - tobacco) disfavor the raising (0.42), presenting a relative weight of 0.58 for the non-raising of the final atonic vowel /o/. It's important to emphasize that the great majority of the raising tokens presented the coda /s/, which makes us think that what triggers the raising of the vowel is either the coda or the consonant /s/.

Therefore, regarding the syllables with coda, the results of our data (0.95 for raising) corroborate those obtained in Vieira (2009), Machry da Silva (2009) and Mileski (2013), since in all of these studies the syllables with coda /s/ favored the raising of /o/ to /u/, with rates of 0.82, 0.90 and 0.84, respectively.

As for syllables without coda, our results (0.42), as well as Mileski's (0.38), show these syllables as favoring the non-raising of the final atonic /o/. In the other studies cited, with very similar results, the syllables without coda present values close to the neutral point, which indicates, as Vieira (2002) points out, that the absence of coda does not seem to influence the preservation of /o/ or it's raising to /u/.

Thus, we verified that the result of the syllable type variable in the Irati sample confirms the one obtained in previous analyzes, especially with regard to the factor syllable with coda, which favors the raising of the final vowel /o/.

The results of the consonant (or vowel) type variables in the preceding phonological context, place of articulation of the preceding consonant and sonority (selected in 2nd, 5th and 7th position, respectively), that refer to the preceding segment to the analyzed vowel, are combined in Table 2.

Table 2 – Consonant / preceding vowel

Factors	Application/ Total	Frequency	R. Weight
Type of consonant / vowel			
Vowel -i	52/257	20.2	0.83
Nasal	138/1186	11.6	0.57
Occlusive	188/2739	6.9	0.52
Lateral	58/304	19.1	0.47
Rhotic	42/572	7.3	0.38
Fricative	39/515	7.6	0.23
Place of articulation			
Labiodental	41/152	27	0.83
Bilabial	69/512	13.5	0.64
Palatal	32/465	6.9	0.49
Alveolar	309/3595	8.6	0.47
Velar	22/496	4.4	0.45
Sonority			
Voiced	466/3971	11.7	0.56
Voiceless	51/1602	3.2	0.36

Source: VARLINFE (2013).

The variable type of consonant / preceding vowel presented the vowel -i (0.83) as well as nasal vowels (0.57) as favorable factors for raising. The occlusive and lateral ones had a relative weight close to the neutral point (0.52 and 0.47, respectively); while the rhotic (0.38) and mainly the fricatives (0.23) did not favor the raising from /o/ to /u/.

This variable, allied to the place of articulation of sounds and defined as preceding context in other researches, was selected in all cited studies. However, the differences in the constitution of variable factors make comparisons between results or generalizations difficult. In our analysis, we separated the preceding context by the manner of articulation of sounds (occlusive, fricative, rhotic, lateral, etc.) and place of articulation (alveolar, bilabial, palatal, etc.); the other studies analyzed the consonants as coronal [frontal+] and [frontal -], dorsal and labial, amalgamating or isolating the different factors.

In Irati's data, the results of the variable place of articulation of the consonant in a previous phonological context show that raising is favored mainly by labiodental consonants (0.83), followed by bilabials (0.64); the other consonants (palatal, alveolar and velar) appear close to the neutral point.

In the analysis by Machry da Silva (2009), the labial consonants (*adubo* (fertilizer), *primo* (cousin)) presented a relative weight of 0.45 and were considered neutral with a slight tendency to preservation. The coronals [frontal +] (*brinquedo* (toy), *curso* (course) with a

relative weight of 0.55, presented a slight favor to the process of raising. With lower relative weight, 0.38, are the amalgamated coronal and the dorsal ones (*tacho (pan), plastic (*plastic), showing that it is the context that most inhibits the raising of the final vowel /o/. In Mileski (2013), the labials (0.42) also showed little favoring to raising, so did the high vowels (0.42) and the coronals [frontal +] (0.33), since all of them presented a relative weight below neutral point. The results of this author also indicate that the coronal consonants [frontal -] favor the raising of the atonic final vowel /o/ (0.76) while the dorsal consonants and the [s, z] segments show a neutral behavior (0.52 and 0,51 respectively).

In contrast to Vieira's (2010) data, labial consonants (0.60) and vowels (0.64), as well as fricatives (0.60), favored raising of the final vowel /o/; on the other hand, the occlusive, the liquid and the dorsal ones presented relative weights of 0.55, 0.54 and 0.53, respectively, for the preservation of the vowel /o /.

Considering the different organization of the factors in the cited studies, we highlight the difficulty of comparisons between the results of our sample and those presented in the previous analyzes. In spite of this, we can say that the results of Irati approximate partially those obtained by Vieira (2010), since the labiodental and bilabial (labial) consonants and the vowels, in both studies, favored the raising of the final vowel / o /. In Machry da Silva (2009) and in Mileski (2013), the labials did not favor the raising of / o /.

The sonority variable, which was considered to verify whether voiced or voiceless segments preceding the vowel / o / influence in its raised to /u/ or unraised production, was also considered significant in our analysis. Our findings show that the raising predominates with the voiced segments (0.56); while the voiceless ones, with relative weight of 0,36 for the raising, favored the preservation of the final vowel /o /.

The presence or absence of high vowel in the word was the sixth variable selected by the statistical program. The results of this variable are presented in Table 3:

Table 3 – Presence / absence of high vowel in word

Factors	Application/ Total	Frequency	R. Weight
Presence	344/2808	12.3	0.60
Absence	173/2765	6.3	0.39
Total	517/5573	9.3	

Source: VARLINFE (2013)

The results show that the presence of high vowel in the word favors the raising of the vowel / o / to / u /, with a relative weight of 0.60; while the absence of a high vowel does not favor its raising (0.39). According to Vieira (2002), this behavior is associated to a process of progressive assimilation, by which the mid posttonic vowel assimilates the height trace of the vowel of the preceding syllable.

The analysis of Vieira (2009) and Machry da Silva (2009) pointed to the presence of a high vowel in the word as one of the most favorable factors for the raising of the final atonic / o / (0.82 and 0.90, respectively); while the absence of a high vowel inhibited the raising of / o /, with relative weights of 0.28 and 0.30. In the study by Mileski (2013), the presence of a high vowel favored the raising of the final atonic / o / (0.57), and its absence did not favor it (0.42).

Our results for the variable presence / absence of high vowel in the word, similar to those of Mileski (2013), and although not as polarized as those obtained in the other studies cited, confirm the hypothesis that the presence of high vowel in the word conditions the raising of the final vowel / o / to / u /, as already demonstrated by Vieira (2009) and Machry da Silva (2009).

Regarding the following consonant, the variables place of articulation of the next consonant (8th position) and type of consonant / vowel (10th position) were selected. The results of these variables are shown in table 4:

Table 4 – Place of articulation and following context

Factors	Application/ Total	Frequency	R. Weight
Place of articulation			
Post-alveolar	30/125	24.0	0.73
Alveolar	158/1799	8.8	0.53
Bilabial	27/435	6.2	0.47
Velar	26/476	5.5	0.42
Labio-dental	5/127	3.9	0.23
Following Context			
Fricative	51/335	15.2	0.66
Back mid (o, ó)	41/194	21.1	0.63
Front mid (e, é)	92/565	16.3	0.54
Low (a)	67/582	11.5	0.54
Stop	119/1501	7.9	0.52
Lateral	5/102	4.9	0.49
Pause	67/1126	6.0	0.45
Back high(u)	5/59	8.5	0.44
Nasal	69/981	7.0	0.44
Back High (i)	1/73	1.4	0.13

Source: VARLINFE (2013).

The analysis of the following context showed that the place of articulation of the following consonant may also be interfering in the process of raising or non-raising of the

posttonic vowel /o/. As it can be observed in table 4, the results pointed to the post-alveolar consonants (0.73) as factors that favor raising; the alveolar (0.53) and the bilabial (0.47) appear close to the neutral point while the velar consonants (0.42) and specially the labiodentals (0.23) did not favor raising.

As for the following consonant / vowel type, we verified that fricative consonants (0.66), as well as the mid back vowel (0.63) favor raising while the back high vowel does not favor raising (0,13). The other consonants and vowels appear close to the neutral point, sometimes slightly favoring the raising (mid back vowel, low vowel and occlusive consonant), sometimes with weights slightly below the neutral point for raising (lateral consonants, nasals and back high vowel). The affricates (38 tokens) and the rhotic (15 tokens) stood out with a 100% of non-raising occurrences. Regarding the vowels, the results did not confirm what was expected, since the high vowels in the following context, which we believed would favor the raising, actually disfavored it

Other researches have also analyzed the role of the following context in the realization of the final atonic /o/, even though they have determined this context in terms of distinct phonological traits, as we have already mentioned in our analysis of the preceding context. In relation to the analysis of the vowels, we verified that Machry da Silva (2009) and Mileski (2013) analyzed all the vowels together; while in our research, we classified the vowels according to its position and height (front/ back and high / mid / low).

In Rincão Vermelho - RS, Machry da Silva (2009) verified that the following vowel context, with a relative weight of 0.57, favored the raising of /o/ in the final position. The coronal consonants [frontal +] and the pause had a relative weight of 0.50, appearing as neutral. The author also observed a neutral behavior for the labial consonants, with a relative weight of 0.48. Meanwhile, the coronal consonants [frontal -] amalgamated with the dorsal ones, with a relative weight of 0.43, showed a slight tendency to preserve the vowel.

In Vista Alegre do Prata - RS, Mileski (2013) found that dorsal consonants (0.61), vowels (0.60) and the pause (0.56) favored the raising of the final atonic vowel / o /, labial consonants showed a neutral behavior (0.50) and the coronal [frontal +] and coronal [frontal -], with relative weight below the neutral point (0.43 and 0.28, respectively), did not favor the raising.

We observed, therefore, that in Machry da Silva (2009) and Mileski (2013) the vowels (analyzed together) favor the raising. In our study, the mid and low vowels also favor the raising, while the high vowels, contrary to expectations, favored the preservation of / o /. Regarding the consonants, we observed that the studies present quite different results.

Social variables

From now on, we will present the results of the social variables gender, ethnicity and education, selected in 2nd, 4th and 9th positions, respectively. The gender variable, selected in 2nd position, presented very significant results in our data, as shown in Table 5:

Table 5 – Gender

Factors	Application/ Total	Frequency	R. Weight
Female	375/2480	15.1	0.77
Male	142/3093	4.6	0.27
Total	517/5573	9.3	

Source: VARLINFE (2013).

As it can be observed in the table, women favor the raising of the final vowel /o/ (0.77) while men favor the preservation of the final vowel / o / with a raising rate of only 0.27. These results seem to show that women, generally more sensitive to higher prestige standards or innovations, are more favorable to the raising of the final posttonic vowel /o/.

Several studies have already demonstrated the influence of the gender factor in the choice of language forms used by men and women. Labov (2008) points out that in a situation of stable variation, women have shown a preference for the use of prestige forms. However, according to this author, the tendency of women to lead to innovative ways cannot be generalized, since it is necessary to verify the role of other social factors that can interfere in this behavior.

In Rincão Vermelho, Rio Grande do Sul, Machry da Silva (2009) found that men presented a slight favoring (0.54) for raising and women a slight tendency to preserve the final mid vowel /o/ (0.46). In order to better understand the linguistic behavior of the men and women in his sample, the author performed a cross-checking between the variables type of contact with the neighboring centers and gender. This cross-checking showed that men and women who have frequent contact with neighboring centers tend to raise the final posttonic vowel /o /. According to the author, such results confirm that the type of contact with urban centers influences the linguistic behavior of men and women, and it is more evident among women.

In the studies by Vieira (2009) and Mileski (2013) the gender variable was not considered significant for the raising or non-raising of the final atonic vowel /o /.

Concerning ethnicity, we verified whether the informant had Ukrainian, Polish or hybrid descent, from the father, mother or spouse side. When the informants were Ukrainian and Polish descents, they were classified as hybrid. This third classification was necessary because there were several informants in the sample, who have both Ukrainian and Polish descendance, a quite common "miscegenation" in the surveyed region.

The results of the ethnicity variable, selected in 4th position by the statistical program, are presented in Table 6:

Table 6 – Ethnicity

Factors	Application/ Total	Frequency	R. Weight
Polish	176/1676	10.5	0.70
Hybrid	197/1844	10.7	0.47
Ukrainian	144/2053	7.0	0.36
Total	517/5573	9.3	

Source: VARLINFE (2013)

The results show that the ethnic group that favors the raising of the final atonic /o/ in Irati is Polish (0.70), the hybrids appear close to the neutral point (0.47) and the Ukrainians disfavor raising (0,36), and favor the preservation of the final vowel /o /.

We observed that the results for the Polish and Ukrainian ethnicity in our analysis of the vowel /o/ raising are similar to those obtained by Loregian-Penkal and Costa (2015) in the analysis of the final atonic vowel /e/ in the community of Mallet, PR, which also consists of Polish and Ukrainians descents. In this community, the authors verified that the Polish descents favored the raising of the final vowel and the Ukrainians, on the other hand, favored its preservation.

According to Loregian-Penkal and Costa (2015), the maintenance of the culture of origin could be influencing the tendency to increase or not the /e /. Thus, the preservation of the final vowels by the descents of Ukrainians would be related to the greater contact with their culture of origin (cultural and religious activities, use of the language), while the raising of the final atonic vowels, that is, the more frequent use of the innovative form by the Polish descents, would be related to the lower maintenance of the culture of origin in this group. Thus, we believe that in the rural area of Irati as well as in Mallet, the greater preservation of the final /o/ by the descents of Ukrainians and its raising to /u/ in the speech of Polish descents is related to the greater /lesser contact of this groups with their culture of origin.

The last social variable considered significant was education, selected in 9th position.

Table 7 – Education

Factors	Application/ Total	Frequency	R. Weight
High School	241/1840	13.1	0.58
Elementary school	174/1892	9.2	0.50
Middle School	102/1841	5.5	0.43
Total	517/5573	9.3	

Source: VARLINFE (2013).

The analysis of the results leads us to conclude that the informants with high school education, with a relative weight of 0.58, are more favorable to the process of raising the posttonic /o/ in final position. On the other hand, the informants with elementary school appear at the neutral point (0.50) and those with middle school tend to preserve the vowel at that position (0,43).

Machry da Silva (2009) and Mileski (2013) analyzed the following levels of education: higher education, high school and elementary school. In the results of Machry da Silva, higher education and high school (0.71 and 0.66, respectively) favored the raising and the elementary school disfavored it (0,24). In Mileski's (2013) data, elementary and high school had a relative weight slightly above the neutral point (0.52) and higher education presented only 0.21 for the raising. Thus, while the results of Machry da Silva (2009) seem to confirm the hypothesis that the informants with higher educational level would behave more favorably to the process of raising the posttonic vowels, the results obtained by Mileski (2013) contradict this hypothesis .

In Irati's data, although we do not have a gradual decreasing scale in the weights attributed according to the level of education of the speakers, what we can infer is that the raising predominates in the higher level of education, the high school. However, considering the results of the elementary and middle school levels, we have little evidence to confirm the hypothesis that the informants with the highest level of education present a more favorable behavior to the process of raising the final vowel /o/. This result, therefore, needs more refinements so that it will be possible to draw more consistent conclusion.

Final Considerations

From the results obtained in our study, we found a reduced raising percentage of the final atonic vowel /o/ in the Irati - PR data (9.3%), that is, we obtained a non-raising rate of this vowel of 90.7%. We also observed that the percentage of raising in Irati is close to that obtained by Mileski (2013) in Vista Alegre do Prata - RS, a rural community, also constituted by Slavic descendants.

Considering the linguistic variables, the results of the syllable type and presence/ absence of high vowel in the word presented similar tendencies to those obtained in the other studies cited. In our study, the raising from /o/ to /u / was favored in syllables with coda (0.95) and in words with a high vowel (0.60).

In relation to the other selected linguistic variables (type of consonant / vowel in preceding context, place of articulation of the preceding and following consonant), differences in the constitution of the factors of these variables made it difficult to compare results or infer generalizations. In our analysis, as we have already pointed out, we separated the preceding and following context by the type and place of articulation of the sounds, whereas the other works have adopted different forms of grouping and classifying these contexts.

The results of the variable type of consonant / vowel in the preceding context, in our sample, indicated that the vowel -i (0.83) and the nasal consonants (0.57) favored raising. Concerning the place of articulation of the preceding consonant, the labiodental consonants (0.83) and the bilabial consonants (0.64) favored the raising from /o/ to /u /.

The variable place of articulation of the following consonant pointed out that mainly the post-alveolar consonants (0.73) favored raising. As for the type of the following consonant /vowel, the raising predominated with the fricative consonants (0.66) and the mid back vowel (0.63); the high vowels, contrary to what was expected, disfavored the raising.

Regarding the social variables, the results seem to show that the female speakers are more sensitive to the norms of greater prestige or innovations, since the women in the Irati sample were more favorable to the raising of the final posttonic vowel /o / (0.77) while men favored the preservation of the final vowel / o / with a raising rate of only 0.27.

The results show that the ethnic group that favors the raising of the final / o / in Irati is Polish (0.70), the hybrids appear close to the neutral point (0.47) and the Ukrainians do not favor the raising (0.36), but the preservation of the final vowel / o /. These results seem to indicate that maintaining or not the culture of origin would be conditioning the preservation of the final / o / by the descendants of Ukrainians and their raising to / u / in the speech of Polish descendants.

Regarding education , the results show that we do not have a gradual decreasing scale in the weights attributed to the different levels of education of the speakers, since we found that high school education favors raising (0.58), the middle school disfavors it (0.43) and the elementary school appears at the neutral point (0.50). These results therefore need further refinements in order to make it possible to draw more consistent conclusions.

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