Perception of [ŭ] in Place of [l] Among Modern Bulgarians

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Перцепция на съгласния звук [ў], използван вместо [l], от съвременни българи

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Abstract. This paper presents an experimental study on the perception of [ŭ], focusing on four perceptual styles that vary by context and attentional demand. These styles include: (a) a single isolated word with [ŭ]; (b) a group of three words, one containing [ŭ]; (c) a short sentence with one [ŭ] word; and (d) a short paragraph of three or four sentences including one [ŭ] word. As the amount of contextual material increases, the listener's attention span typically decreases. The study aims to determine whether listeners can reliably recognize [ŭ] across these different perceptual styles and to establish a hierarchy of recognition success. Data were gathered through an online, non-representative survey involving participants of various ages. The analysis also takes into account existing research on the emergence and increasing frequency of [ŭ] in contemporary spoken Bulgarian, particularly among younger speakers. The study confirms that the perception of [ŭ] in place of [l] depends on the perceptual style: recognition rates are highest in isolated words and lowest in coherent texts, while socio-demographic factors show little influence.

Абстракт. В статията се изследва експериментално перцепцията на [ў] в няколко вида контекст, които означаваме терминологично като перцептуален стил. Те се отличават по степента на внимание на слушащия към обекта, който е речево явление. Подбрани са стилове, при които вниманието намалява поради множествеността на елементите от контекста: (а) отделни думи, (б) 3 думи, между които само в една има [ў], (в) кратко изречение с единична поява на [ў], (г) кратък текст от 3–4 изречения с поява на [ў]. Целта е да се придобият знания за това дали в различните стилове се разпознава [ў] и каква е йерархията между тези стилове според успешността на разпознаване на [ў]. Проучването се базира на непредставително анкетно проучване онлайн с хора на различна възраст. В статията се опираме върху всички изследвания, които засягат проблема с появата на [ў] в речевата практика и масовизирането на този вариант особено сред по-младите поколения в българското общество. Проучването потвърждава, че разпознаването на [ў] вместо [л] зависи от перцептуалния стил: най-висока е разпознаваемостта при отделни думи и най-ниска – при свързан текст, като социално-демографските фактори оказват слабо влияние.

Keywords: labiovelar approximant [ŭ], perceptual styles

Ключови думи: лабиовеларен апроксимант [ў], перцептуални стилове

1. Introduction

1.1 The Perception of [l]

The replacement of the lateral [l] with a labiovelar approximant, not only in colloquial, everyday Bulgarian, but also in formal contexts, was described already in the 1970s. At first, it was characterized as a sporadic phenomenon observed in the speech of Sofia students (Holiolchev, 1974, pp. 32–33). Just a few years later, the use of [ŭ] or

"dark", velarized [ɬ] instead of [l] around back vowels was reported in the speech of 30-year-old Bulgarians (Holiolchev, 1980, p. 197).

Half a century seems enough for a decisive change in favor of the vocalization of [l]. In fact, the pronunciation of the hard lateral consonant has become rare; [l] is giving way to the labiovelar [w], even, or in some cases to the velar approximant [ɯ] (Zhobov, 2004, p. 65). According to some researchers, the replacement of the hard [l] with the labiovelar approximant can be linked to the Western Bulgarian origin of the speakers, and thus to the dialects spoken in this region, highlighting that it is somewhat surprisingly observed in the language of the intelligentsia (Kochev, 2007, p. 22) – a status class consisting primarily of university-educated individuals, who strive to shape the cultural, ethical, and political values of the nation they belong to, such as teachers, TV and radio presenters. Mitsova et al. (2022, p. 310) hypothesize that since the phenomenon is associated with the prestigious youth slang spoken in the Bulgarian capital Sofia, it has easily spread to other areas of the country, not without the help of the media (Mitsova et al., 2022, p. 310). The authors of more recent studies on the issue are unanimous that [ŭ] is now even perceived as part of the Bulgarian pronunciation standard (Naydenova, 1998; Murdarov, 2001; 2003; Padareva-Ilieva & Mitsova, 2014; Burov, 2013; Soroka, 2013; Albul & Soroka, 2014; Aleksova, 2016, inter alia). It is worth mentioning that the vocalization of [l] is in fact part of a general trend that affects languages from different language families (see, e.g., Tisheva, 2012; detailed overview in Mitsova et al., 2022, pp. 305–306).

The approximant [ŭ] in Bulgarian is expected to occur instead of [l] in various phonetic environments: word-initially and word-finally, after back and before mid-vowels, after front vowels and before velar consonants, after consonants and before mid-vowels, before back and mid-vowels, and before consonants (Albul & Soroka, 2014, p. 76; Padareva-Ilieva & Mitsova, 2012; Bozhanina, 2016, p. 116). The variant does not appear before front vowels.

The systematic replacement of [l] with [ŭ] has some interesting implications. It leads to the emergence of a new type of spelling problem, especially in loanwords, for example Уиндолс (*Uindols*) instead of Уиндоус (*Uindous*) ('Windows'); Ауцхаймер (*Autshaymer*) instead of Алцхаймер (*Altshaymer*) ('Alzheimer') (Padareva-Ilieva & Mitsova, 2012, 2020). The [ŭ] speech also has a negative impact on the acquisition of similar lateral L2 approximants. For example, the transfer of phonotactics from Bulgarian learners of German leads to realizations of the palatal German [l] as [ɬ] or [w] before back vowels (Dimitrova, 2017, p. 184). English teachers report that in the place of the apical English [l] the laminal [l] nowadays is replaced by [w] (Mitsova et al., 2022).

On the other hand, teachers of Bulgarian as a foreign language struggle with the discrepancy between the normative description of the lateral consonant that can be found in the literature and the textbooks and the reality of the spoken language. Even though the preference for the use of the "new", "lazy" [l] might be considered by some linguists and non-specialists a feature of non-standard Bulgarian or a result of articulation disorder (lambdacism), it is so common, that many do not identify [ŭ] as different from [l].

1.2 Hypotheses

In this paper, we use empirical data from a non-representative survey to test the following hypotheses:

- A significant proportion of respondents do not recognize the mispronunciation of [ŭ] in place of [l] (here, we will also use the term [l] substitution).
- The recognition of the pronunciation of [ŭ] in place of [l] depends on the immediately following vowel or consonant.
- The recognition of the pronunciation of [ŭ] in place of [l] depends on the perceptual style: listening to (1) a short coherent text, (2) a simple sentence, (3) a group of three words, and (4) a single isolated word. These perceptual styles differ in the degree of attention paid to the spoken text; the attention decreases as text length increases (Labov, 1966; Aleksova, 2023).
- The recognition of the pronunciation of [ŭ] in place of [l] depends on the socio-demographic characteristics of the respondents, and we believe that the most significant factor is the respondents' educational background (philological vs. non-philological), followed by age, as our preliminary observations suggest that the [l] substitution becomes more common with each successive generation.

2. Methodology

2.1 Materials

After forming the hypotheses for empirical testing, we proceeded to create a model of the positions in which [ŭ] occurs in place of [l]. These are all cases in which [l] does not immediately precede the front vowels [ɛ] and [i]. We compiled a list of positions, illustrated by suitable examples, which we then used in a questionnaire: before the vowel sounds [a], [ɤ], [ɔ], and [u]; before bilabial, labiodental, alveodental, alveolar, palatal, and velar consonant sounds. We then selected the elements for each perceptual style so that there were no word repetitions:

1. short texts of 3–4 sentences with each of the listed [l] positions
2. simple sentences that contain one word with one [l] position
3. sequences of three words with all [l] positions
4. single words with [l] in the selected positions

The tasks for recognizing [ŭ] are arranged in a deliberately chosen order, starting from short texts consisting of 3 to 4 sentences, moving to simple sentences, then to a section of lists of 3 words, and finally one-word prompts. The motivation behind this ordering is that placing the perceptual style with the highest concentration of attention at the beginning would affect the perception of the text in perceptual styles with lower concentration of attention, which will distort the data.

2.2 Participants

We chose the following socio-demographic determinants of recognition of [ŭ]: gender, age (up to 19, 20 to 30, 31 to 40, 41 to 50, 51 to 60, 61 to 70, over 70), educational level (primary, secondary or secondary special and higher), academic major (philological or non-philological), birthplace and place of residence (the capital Sofia, regional city, non-regional city, village, abroad). These characteristics were included in the questionnaire, and they were then considered as independent variables (attribute factors) that were related to the perception of the [l] substitution.

The next step was to prepare an anonymous Google Form questionnaire. The study is not representative, so the results are valid only for the group surveyed. We tested the survey among our acquaintances, philologists and non-philologists, to make sure that it was correctly constructed and would actually verify the hypotheses put forward. A total of 201 responses were collected. The answers by one of the respondents were dismissed due to their irrelevancy. Therefore, the total number of surveys was 200. Table 1 summarizes the distribution of respondents by gender, educational level, age group, academic major, and place of residence.

Table 1. Respondent distribution by category (N = 200).

Category	Group	Percentage
Gender	Women	72.14
	Men	27.86
Educational Level	Primary	6.96
	Secondary/Vocational	22.89
	Higher	70.15
Age Group	<19	8.45
	20–30	26.87
	31–40	14.43
	41–50	30.85
	51–60	10.45
	61–70	7.46
	>70	1.49
Academic Major	Philological	45.77
	Non-philological	54.23
Place of Residence	Sofia	53.73
	Regional city	27.86
	Non-regional city	2.98
	Village	2.48
	Abroad	12.94

3. Results

3.1 Recognition of [ŭ] in Place of [l] in Short Texts of 3–4 Sentences

The first short text contains the following sentences in which [l] is followed by the vowel [o]. Only 6.96% of respondents correctly indicated the mispronunciation of *lošo* 'badly' as [ŭɔʃɔ] instead of [lɔʃɔ]. Another 21.89% reported a different (non-existent) error, while 71.14% indicated that they perceived no error at all (Figure 1). These results suggest that in the context of a short narrative, the substitution of [l] with [ŭ] often goes unnoticed: a total of 93.03% of respondents either failed to detect the mispronunciation or misidentified the error.

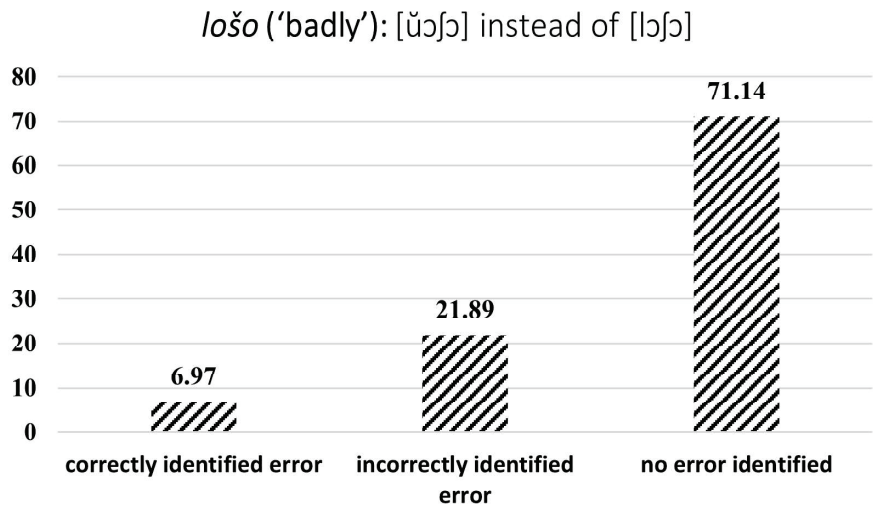

Figure 1. Recognition of [ŭ] in place of [l] in the stimulus text: "Yesterday morning the students played a game in the schoolyard. Ivan fell and hurt his leg badly (*lošo*). They took him to the doctor's office" (in %; N = 200).

In the second short text, a significant proportion of respondents did not hear the mispronunciation (Figure 2). The variant [ŭ] appears before the voiced consonant [b]. Only 3.48% of respondents correctly identified the mispronunciation, 17.91% indicated some other (non-existent) error, and 78.61% heard no error. If the respondents who indicated different errors and those who thought there was no error at all are added together, the result is 96.52%, which is an even higher percentage than the one for the previous text.

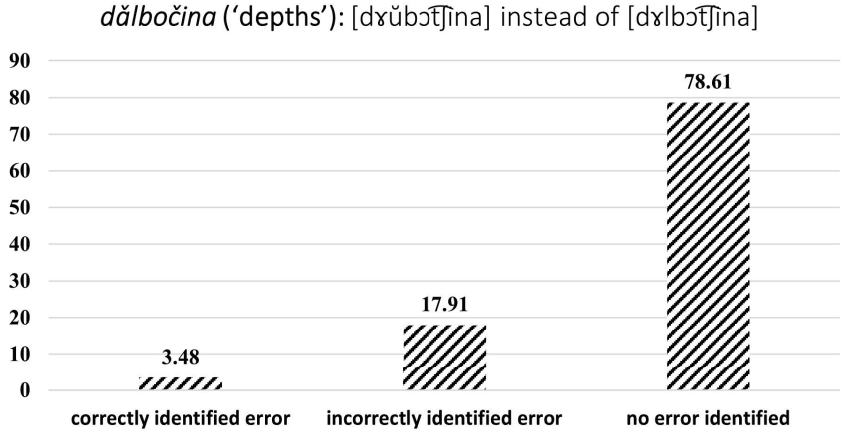

Figure 2. Recognition of [ŭ] in place of [l] in the stimulus text: "Every day they dive to different depths (*dălbočina*). Interesting discoveries are expected" (in %; N = 200).

In the third text, [ŭ] is followed by an alveodental [t͡s] consonant (Figure 3).

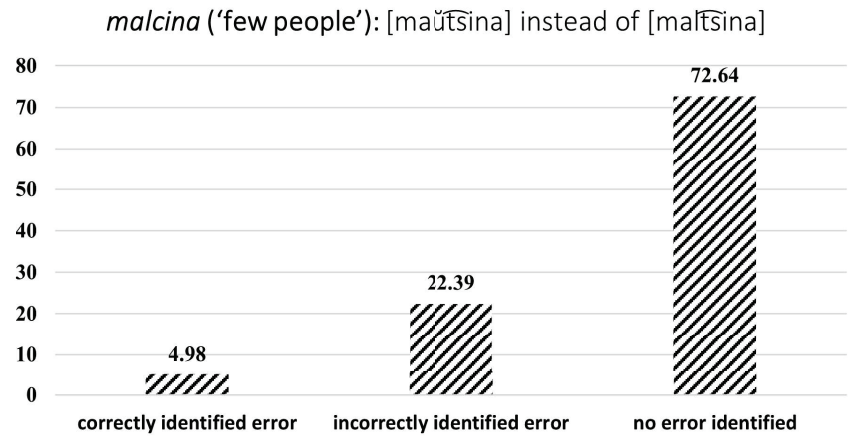

Figure 3. Recognition of [ŭ] in place of [l] in the stimulus text: "Few people (*malcina*) know that the renovation of the school starts today. Harmless paints will be provided. The renovation will be completed before September 15" (in %; N = 200).

The percentage of the participants who identified the pronunciation of [ŭ] is very small: 4.97%. A total of 95.03% did not recognize the [l] substitution before an alveodental consonant. In the fourth text, [ŭ] is followed by the alveodental consonant [d] (Figure 4).

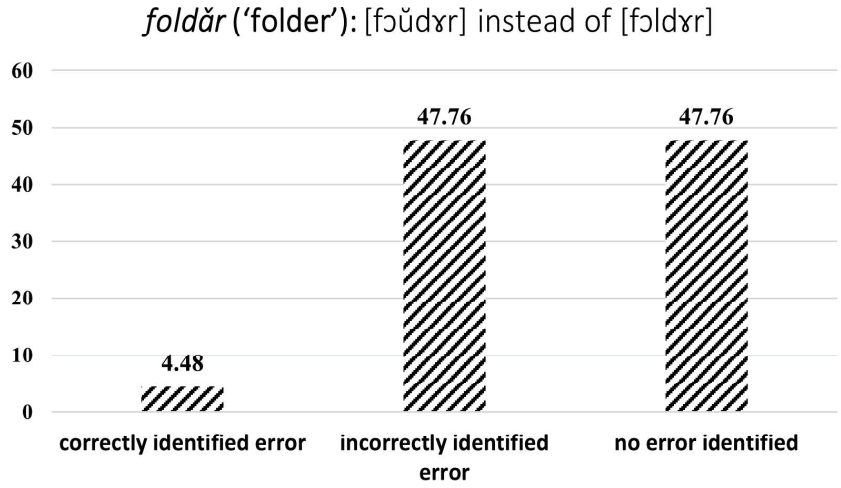

Figure 4. Recognition of [ŭ] in place of [l] in the stimulus text: "The fourth short text is this: Yesterday morning, he was searching for a file on his computer. He needed it for an important article. Finally, he found it incorrectly saved in another folder (*foldăr*)" (in %; N = 200).

Only 4.47% of respondents correctly recognize the mispronunciation of [ŭ] in place of [l]. A further 47.76% indicated a different "error", most often commenting on the use of the loanword *foldăr*, while another 47.76% perceived no error at all. A total of 95.52% did not detect the pronunciation of [ŭ] in place of [l] before the consonant [d]. The fifth short text, the variant [ŭ] is followed by the alveolar consonant [n] (Figure 5).

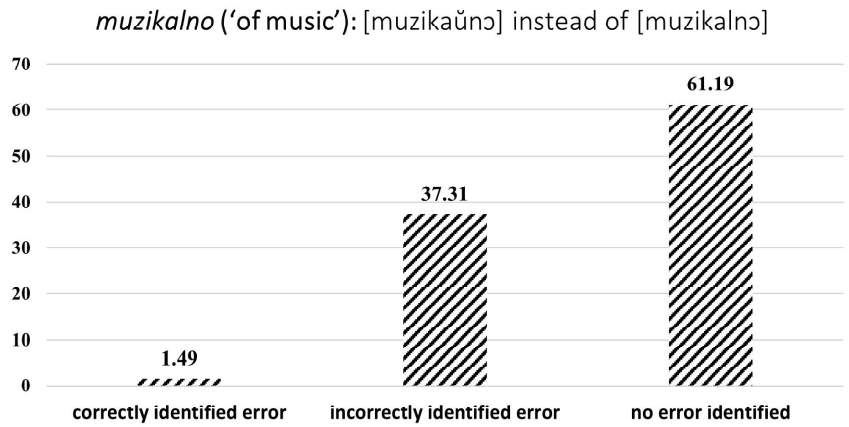

Figure 5. Recognition of [ŭ] in place of [l] in the stimulus text: "Today you will hear a new piece of music (*muzikalno*). It can hardly be considered as belonging to a single genre" (in %; N = 200).

As shown in Figure 5, the number of respondents who recognized the substitution of [l] with [ŭ] is even lower than in the previous cases – only 1.49%. A total of 98.5% of respondents either identified a different (non-existent) error (37.31%) or indicated that there was no error at all (61.19%). This very high percentage demonstrates that the mispronunciation of [ŭ] before the sonorant [n] largely goes unnoticed. In the sixth text, [ŭ] appears before the sonorant [r] (Figure 6).

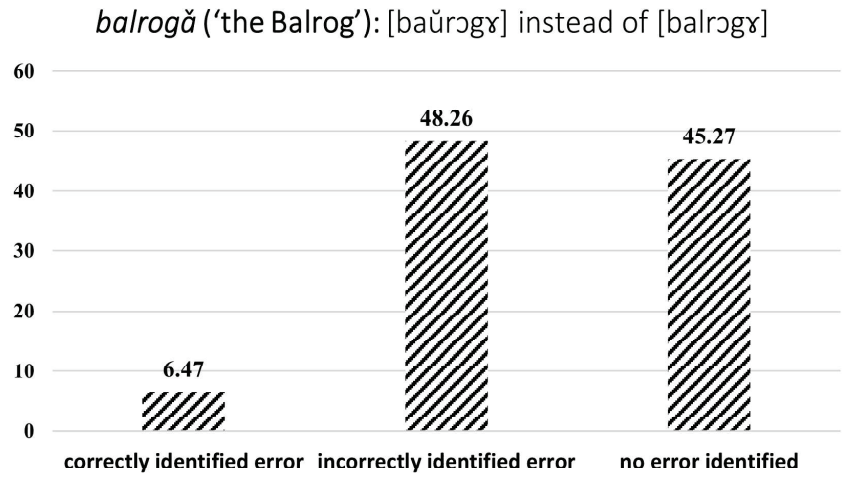

Figure 6. Recognition of [ŭ] in place of [l] in the stimulus text: "The Balrog (*balrogă*) appears in Tolkien's most iconic fantasy work. They were thought to be fire spirits, most of whom were slain at the end of the First Age of Middle-earth" (in %; N = 200).

Compared to the fifth text, the number of respondents who recognized the pronunciation of [ŭ] as an error is slightly higher, 6.47%. An additional 48.26% incorrectly identified a different type of error. Most of these participants commented on the loanword balrog, noting that it should be pronounced with the full-form definite article (*balrogăt*) instead of the short form (*balrogă*). The remaining 45.27% indicated that there was no error. In total, 93.53% did not perceive the pronunciation of [ŭ] in place of [l], which once again represents a substantial majority. In the seventh short text, the variant [ŭ] precedes the velar consonant [g]. The results for the recognition of the [l] substitution can be seen in Figure 7.

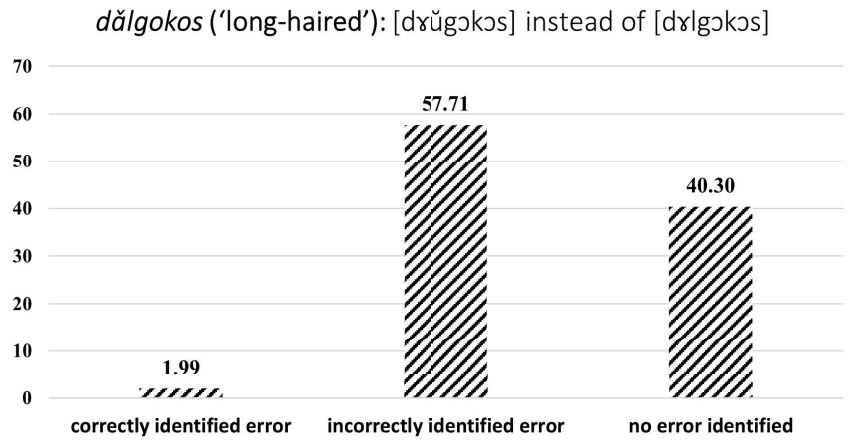

Figure 7. Recognition of [ŭ] in place of [l] in the stimulus text: "Yesterday, a robbery took place in a shop in the city center. The cameras captured a long-haired (*dălgokos*) man entering at night" (in %; N = 200).

A very small group of participants recognized the substitution of [l] with [ŭ] in *dălgokos*: 1.99%. A total of 98.01% did not hear the [ŭ]. Of these respondents, 57.71% indicated some other non-existent error, and 40.30% wrote that there was no error. Again, the percentage of those who did not recognize the pronunciation of [ŭ] was very high.

In conclusion, the analysis of recognition rates for [ŭ] in place of [l] in short texts of three to four sentences reveals a consistently low percentage, ranging from 1.93% to 6.96%.

3.2 Recognition of [ŭ] in place of [l] in a simple sentence

The questionnaire contains several simple sentences with one word in which [l] is replaced with [ŭ]. For this second type of perceptual style, the attention to the text being listened to should be greater than when listening to a short text of 3 to 4 sentences. According to our hypothesis, it should affect the results, and there should be greater recognition rate of the pronunciation of [ŭ] in place of [l]. Let us analyze the data from the simple sentences batch.

In the first simple sentence, the variant [ŭ] appears before the vowel [ɤ]. The answers collected in the questionnaire can be seen in Figure 8.

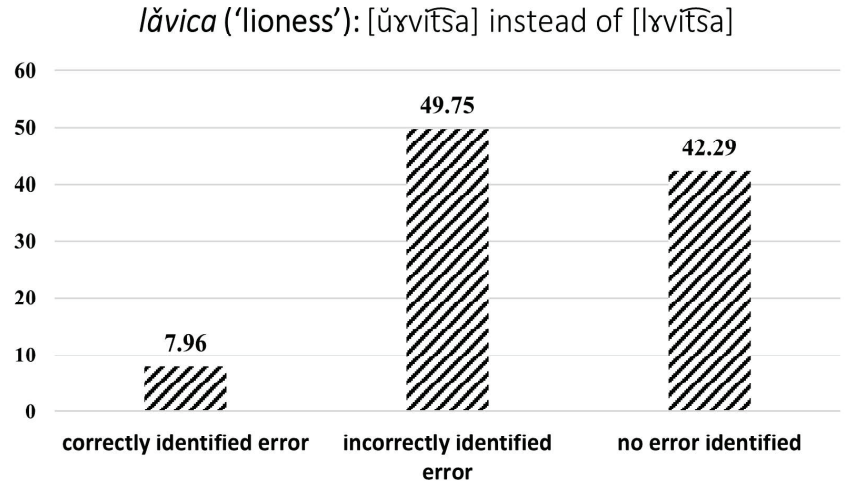

Figure 8. Recognition of [ŭ] in place of [l] in the stimulus sentence: "In the zoo there is a lioness (*lăvica*)" (in %; N = 200).

In comparison to the data from the seven short texts, the percentage of the respondents who have identified the pronunciation of [ŭ] in place of [l] is a bit higher, at 7.96%. Those who indicated another error were 49.75%, and those who said there was no error were 42.29%. A total of 92.04% did not recognize the mispronunciation.

In the second sentence the sound [ŭ] precedes the sonorant [m] (Figure 9).

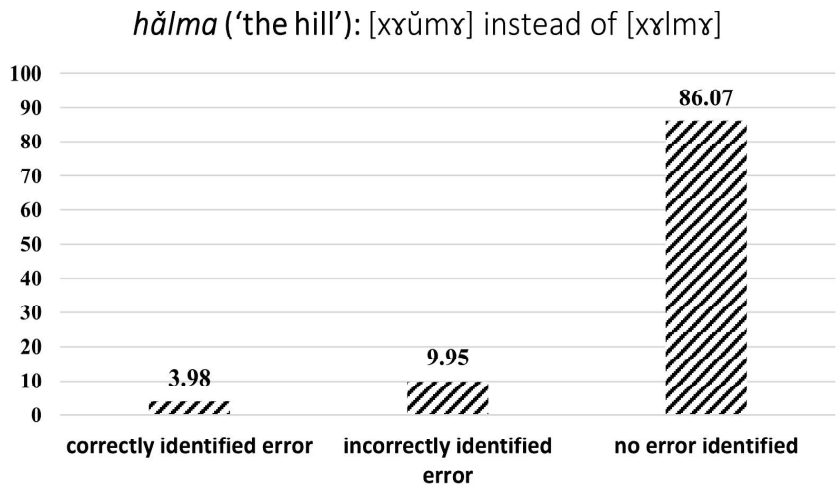

Figure 9. Recognition of [ŭ] in place of [l] in the stimulus sentence: "Ivan is up on the hill (*hălma*)" (in %; N = 200).

It is clear that 3.98% heard the pronunciation of [ŭ] in place of [l] in the word form *hălma* 'the hill'. A total of 96.02% did not recognize this error. Of these, 9.95% indicated some other error (mostly the redundant use of the adverb *gore* 'up'), and 86.07% wrote that there was no error. In the third simple sentence, the variant [ŭ] is pronounced before a labiodental consonant [v] (Figure 10).

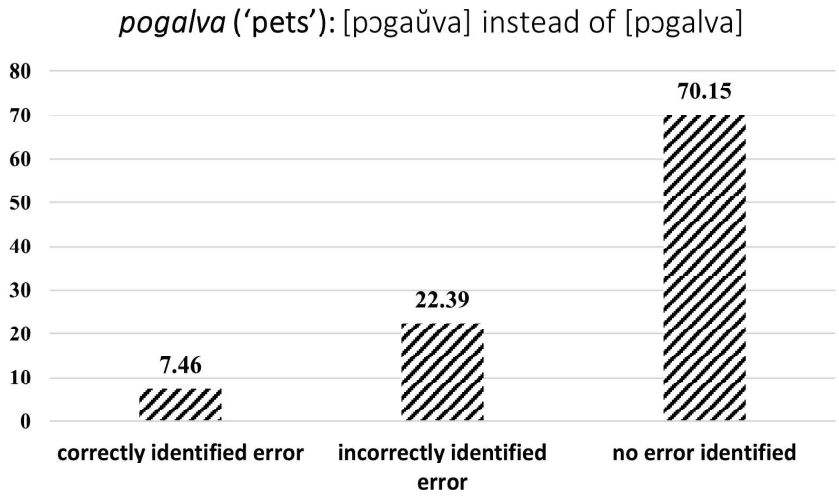

Figure 10. Recognition of [ŭ] in place of [l] in the stimulus sentence: "She often pets (*pogalva*) the child" (in %; N = 200).

Figure 10 shows that 7.46% recognized the mispronunciation of [ŭ] in place of [l] in *pogalva* 'pets'. The overall percentage of those who did not recognize the phenomenon was 97.54%, with 22.39% indicating another error (some have suggested a different verb, *gali*, as a more suitable synonym to *pogalva*) and 70.15% stated that there is no error. Again, although by a small margin, the percentage of those who recognized the error was slightly higher compared to the corresponding percentage for the same triple of words embedded in short texts. There was an error in the coding of the results in the fourth simple sentence, so it will not be commented on here. In the fifth simple sentence, the position of the consonant [l] is before the palatalized nasal sonorant [n] (Figure 11).

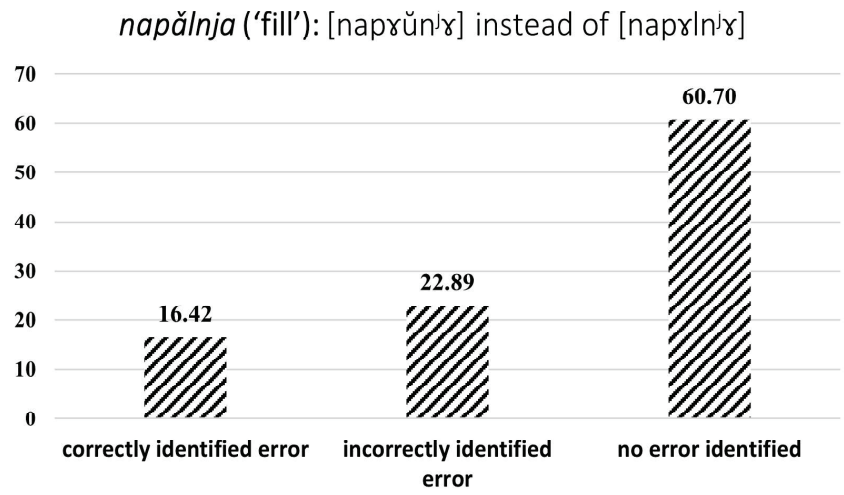

Figure 11. Recognition of [ŭ] in place of [l] in the stimulus sentence: "I will fill (*napălnja*) a glass with water" (in %; N = 200).

A much higher percentage of respondents recognized the substitution of [ŭ] for [l] in *napălnja* 'fill', 16.42%. The remaining 83.56% did not identify the substitution: 22.89% indicated various non-existent errors and 60.70% stated that there was no error. In the sixth sentence [ŭ] is followed by the postalveolar [ʒ]. The results are illustrated in Figure 12.

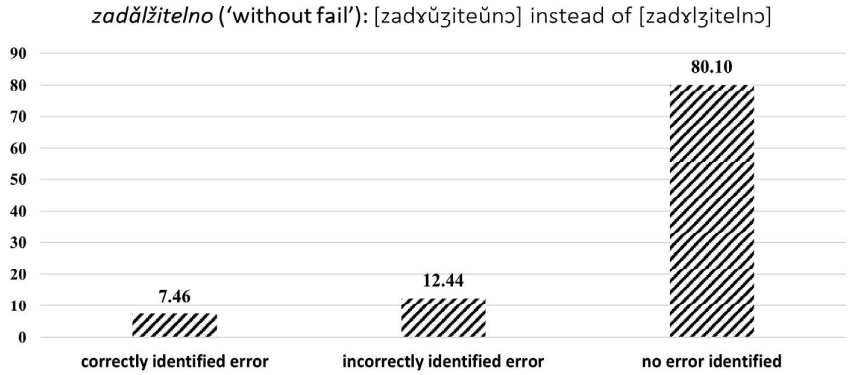

Figure 12. Recognition of [ŭ] in place of [l] in the stimulus sentence: "They will come to the meeting without fail (*zadălžitelno*)" (in %; N = 200).

Compared to the results for the previous simple sentence, the proportion of participants who recognized the [ŭ] variant decreased to 7.46%. An additional 12.44% identified a different, non-existent error, while 80.10% reported no error at all, bringing the total share of those who did not recognize the substitution to 92.54%. In the seventh simple sentence the variant [ŭ] is followed by a hard velar consonant, [x] (Figure 13).

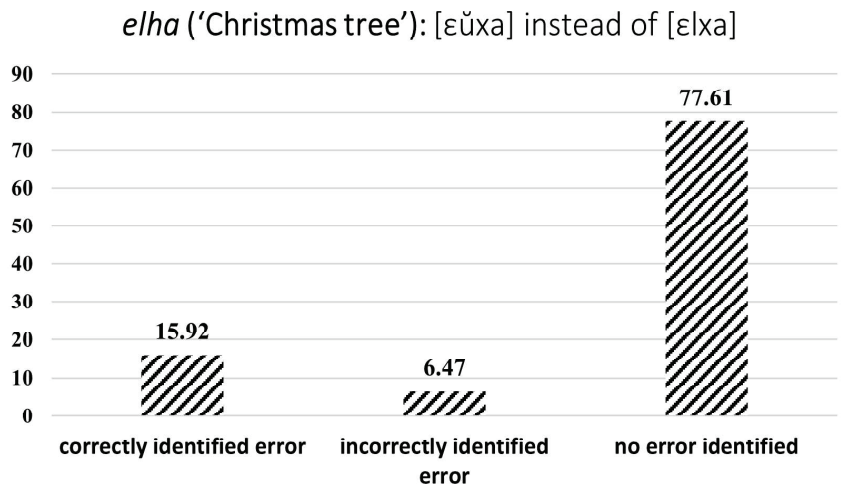

Figure 13. Recognition of [ŭ] in place of [l] in the stimulus sentence: "For New Year, we have a nice Christmas tree (*elha*)" (in %; N = 200).

In this case, the percentage of people who recognized the occurrence of [ŭ] in place of [l] in *elha* 'tree' is 15.92%, higher than for the sixth sentence. A total of 84.08% did not recognize the mispronunciation, with 6.47% of them indicating another error (e.g., the tree is for Christmas, not New Year), and 77.61% wrote that there was no error.

The analysis of mispronunciation perception in simple sentences reveals a slight increase in the rate of correctly recognized [ŭ] variants compared to the results from the previously examined perceptual style (short texts of 3–4 sentences). In the following section, we explore the correlation between the number of true positives and yet another perceptual style: the 3-word list.

3.3 Recognition of [ŭ] in Place of [l] in a List of 3 Words

The first group of 3 words includes *lăk* 'bow', *stălba* 'ladder' and *tulumbička* (a type of deep-fried dessert). The variant [ŭ] occupies the word-initial position and is followed by [ɤ] in the first word, it is between [ɤ] and [b] in the second, and between two [u] in the third. Figure 14 presents the distribution of the answers. A small group of respondents detected the mispronunciation of [ŭ] in place of [l] in all the three words, 3.48%, 0.5% heard this feature in *lăk* and *stălba*, 0.5% noticed [ŭ] in *lăk* and *tulumbička*, 0.5% only in *lăk*, 6.47% in *stălba*, and 0.5% in *tulumbička.* Some respondents wrote down non-existent errors (7.96%), but the majority did not detect any errors at all (80.1%). A total of 11.95% recognized the [l] substitution in at least one word.

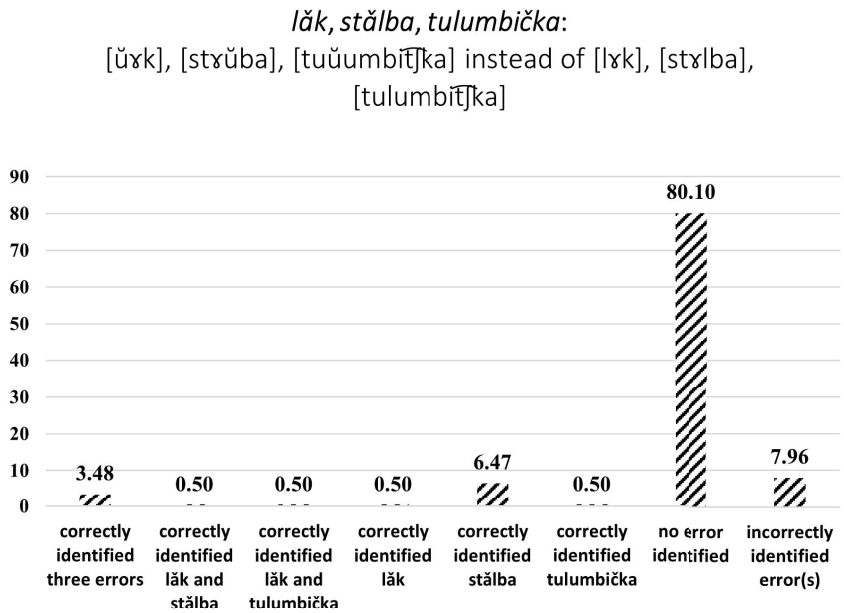

Figure 14. Recognition of [ŭ] in place of [l] in *lăk*, *stălba*, *tulumbička* (in %; N = 200).

The next sequence of 3 words is *kalpak* (a type of hat), *palma* 'palm', *žalba* 'appeal'. The variant [ŭ] is followed by bilabial voiceless consonant [p], sonorant [m], and bilabial voiced [b], respectively (Figure 15). Only 2.49% detected the mispronunciation in each of the three words, 0.5% found it in *kalpak* and *palma*, 17.91% only in *kalpak*, 1.49% in *palma*, 1.99% in *žalba.* A total of 68.16% did not indicate any error and 7.46% did not find the error correctly. Almost a quarter of the respondents, 24.38%, heard [ŭ] in at least one of the words.

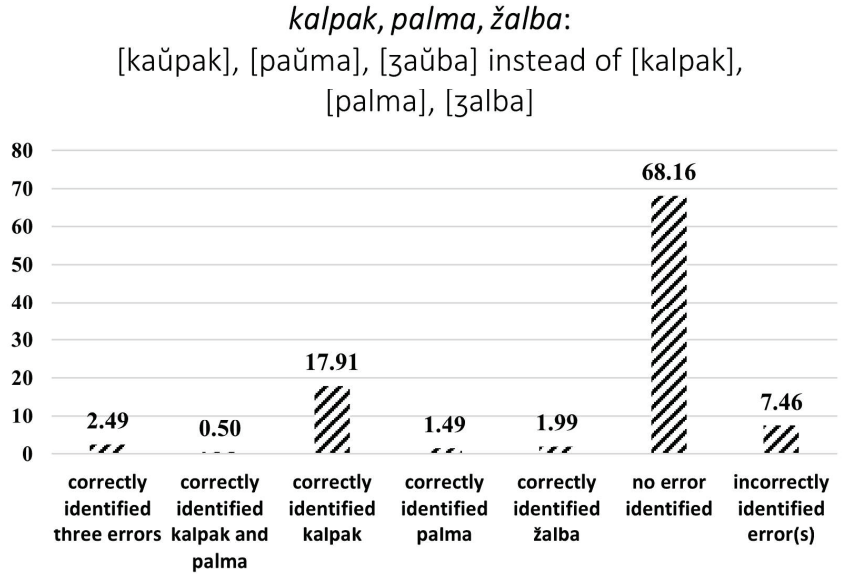

Figure 15. Recognition of [ŭ] in place of [l] in *kalpak*, *palma*, *žalba* (in %; N = 200).

The third sequence of 3 words consists of *kălcam* '(to) mince', *pălzya* '(to) crawl', and *sălza* 'tear'. The variant [ŭ] is followed by hard alveodental [t͡s], palatalized alveodental [z^{j}], and its counterpart [z]. Figure 16 shows that 0.5% of the 200 participants detected the pronunciation of [ŭ] in place of [l], 1.99% recognized it only in *kălcam*, 1% in *pălzya*, 3.98% in *sălza.* A total of 87.56% did not indicate any error, and 4.98% did not correctly indicate which pronunciation errors were present. The data shows that 7.46% recognized [ŭ] in at least one of the three words.

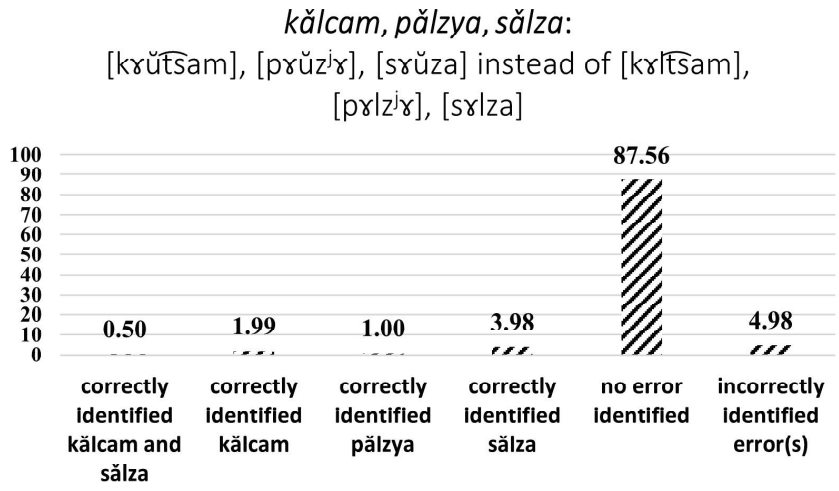

Figure 16. Recognition of [ŭ] in place of [l] in *kălcam*, *pălzya*, *sălza* (in %; N = 200).

The fourth 3-word sequence is *vălna* 'wool', *bolno* 'ill', *kălna* '(to) curse'. In all the words [l] precedes the sonorant [n]. The distribution of the answers can be seen in Figure 17. Only 1.49% detected the pronunciation of [ŭ] in all the three words, 1.99% recognized it in *vălna* and *kălna*, 1.99% in *bolno* and *kălna*, 6.47% only in *bolno*, 5.47% in *kălna*. No error was identified correctly by 5.97%, and 76.62% of the respondents claimed that there was no error. A total of 17.41% heard [ŭ] in at least one of the three words which is the highest rate so far, compared to short texts and simple sentences.

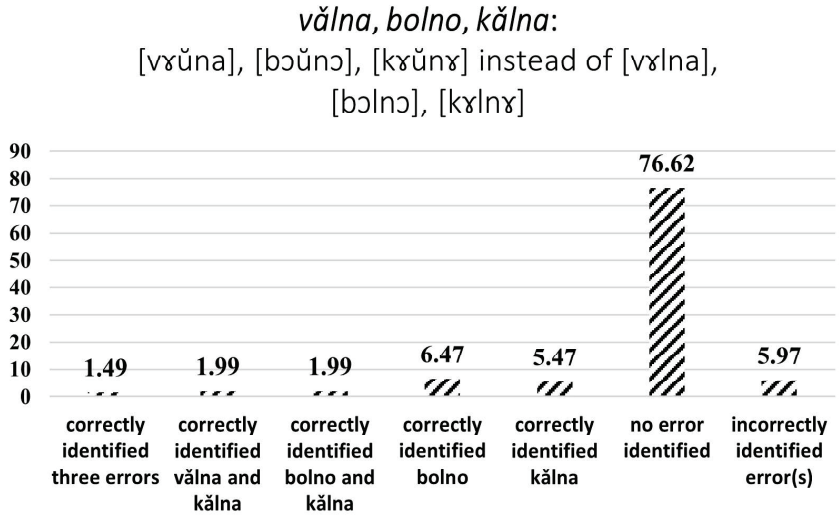

Figure 17. Recognition of [ŭ] in place of [l] in *vălna*, *bolno*, *kălna* (in %; N = 200).

The fifth string of 3 words is *fałšiv* 'fake', *dălža* '(to) owe', *mălča* '(to) be silent'. Here [ŭ] is followed by a postalveolar consonant. It is clear from Figure 18 that only 1% indicated pronunciation [ŭ] instead of [l] in all of the three words, 1.49% heard it in *fałšiv* and *dălža*, 0.5% recognized it in *dălža* and *mălča*, 4.98% only in *fałšiv*, 3.98% only in *dălža*, 3.98% only in *mălča*. No error was indicated by 73.13% of the respondents and 10.98% of them did not indicate the errors correctly. A total of 15.93% recognized the mispronunciation of [ŭ] in at least one of the three words.

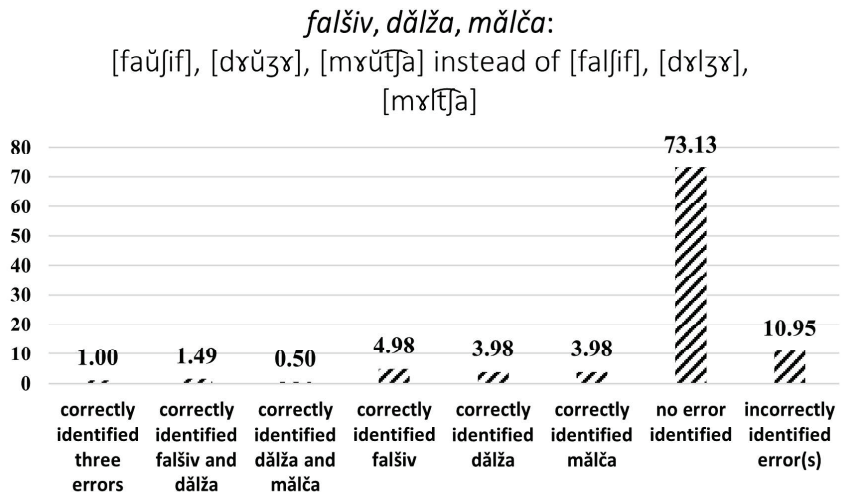

Figure 18. Recognition of [ŭ] in place of [l] in *falšiv*, *dălža*, *mălča* (in %; N = 200).

The sixth sequence of 3 words is *bolka* 'pain', *dălgo* 'long', *bălgarski* 'Bulgarian'. In these words, [ŭ] is followed by a velar consonant, voiceless or voiced. As shown in Figure 19, only 1% heard the pronunciation of [ŭ], 2.49% found it in *bolka* and *dălgo*, 2.99% only in *bolka*, 4.98% in *dălgo*, 0.5% in *bălgarski*. No error was indicated by 84.58% of the participants, no error was correctly indicated by 3.48%. A total of 11.96% found the occurrence of [ŭ] in place of [l] in at least one of the three words.

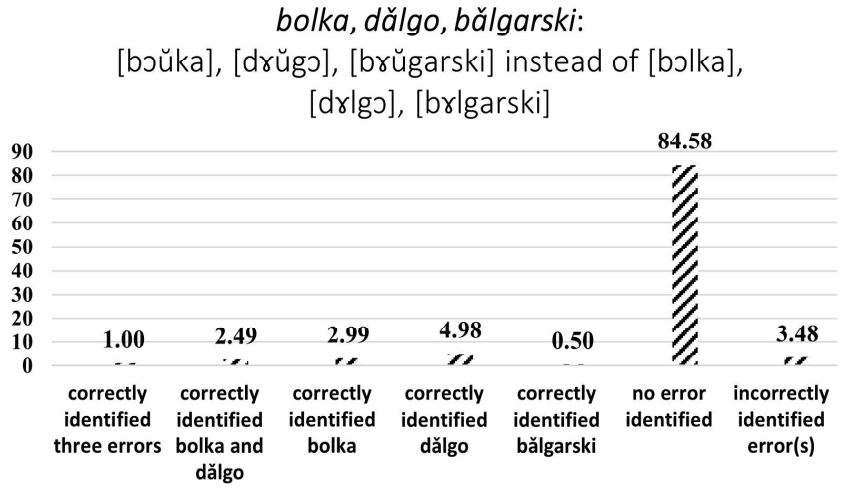

Figure 19. Recognition of [ŭ] in place of [l] in *bolka*, *dălgo*, *bălgarski* (in %; N = 200).

In conclusion, the analysis of the results shows that the percentage of respondents who recognize the pronunciation of [ŭ] in place of [l] in all three words is relatively small although in all of the sequences all of the words are mispronounced. Between 7.46% and 17.41% recognize the variant [ŭ] in at least one of the three words. These percentages indicate a slightly higher recognition rate in the case of a 3-word sequence perception compared to the one in a simple sentence or in short text of 3–4 sentences.

3.4 Recognition of [ŭ] in Place of [l] in a Single Word

This section of the questionnaire includes six single-word recordings, pertaining to the last perceptual style characterized by the highest level of attention.

The first word is *lak* 'varnish', in which [l] is followed by [a]. Figure 20 shows that 43.28% of the respondents correctly detected the occurrence of [ŭ] in place of [l], which is the highest percentage so far. Of all respondents, 7.96% incorrectly indicated another type of error, 48.76% wrote that there was no error.

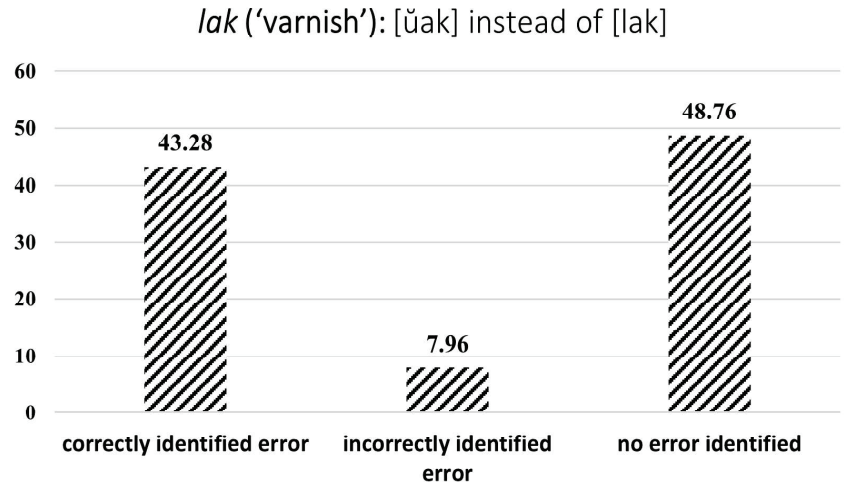

Figure 20. Recognition of [ŭ] in place of [l] in *lak* (in %; N = 200).

The next individual word tested in the perceptual task is *kălbo* 'orb', where the substituted [ŭ] precedes the hard bilabial [b]. As shown in Figure 21, only 13.43% of respondents recognized the [l] substitution, a considerably lower percentage compared to the 43.28% recognition rate for *lak*. An additional 0.50% reported a different, non-existent error, while 86.07% indicated that they perceived no error.

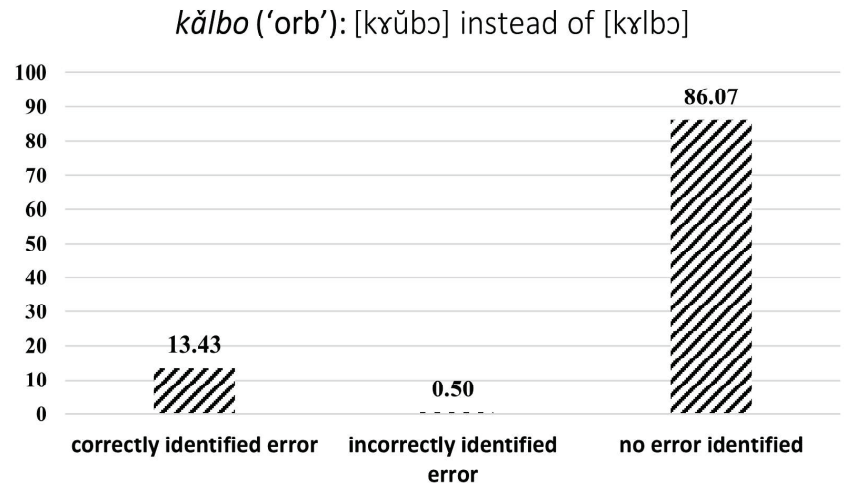

Figure 21. Recognition of [ŭ] in place of [l] in *kălbo* (in %; N = 200).

The third word is *alfa* 'alpha' and [ŭ] precedes a labiodental hard consonant. The [l] substitution is detected by 12.44% of all 200 respondents (see Figure 22). Those who incorrectly indicated another error were 1.00%. A total of 86.57% claimed that there was no error.

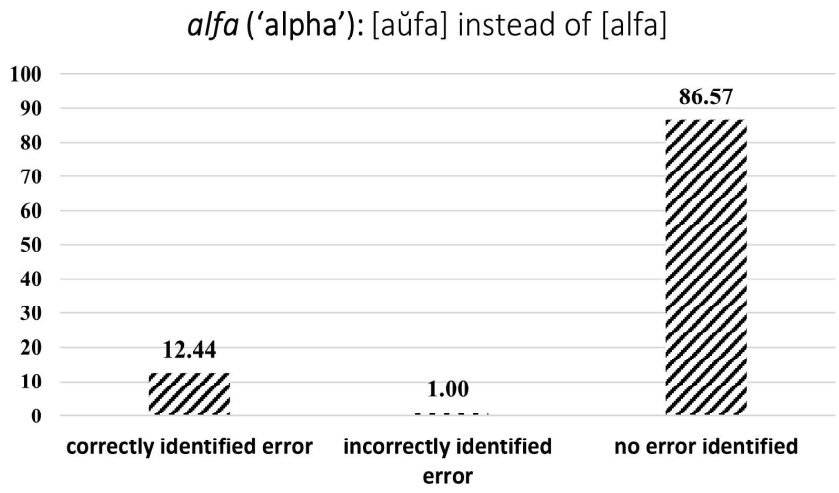

Figure 22. Recognition of [ŭ] in place of [l] in *alfa* (in %; N = 200).

The occurrence of [ŭ] in *peralnja* ‘washing machine’ was detected by 17.41% of respondents. Another error was indicated by 2.49%, and 80.10% wrote that there was no error. The data is illustrated in Figure 23.

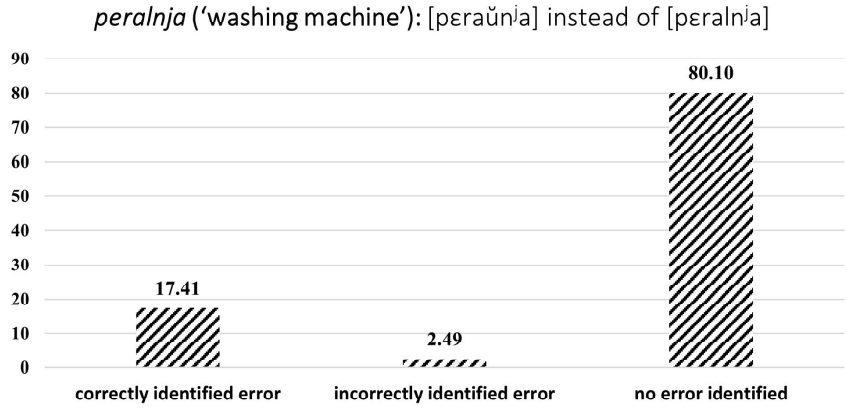

Figure 23. Recognition of [ŭ] in place of [l] in *peralnja* (in %; N = 200).

The next single word is *Polša* ‘Poland’, where the pronunciation of [ŭ] instead of [l] was recognized by 24.88%, a significant number compared to the other examples examined so far, except *lak* (Figure 20). Another type of error was indicated by 3.48%, and those who decided that there was no error were 71.64%.

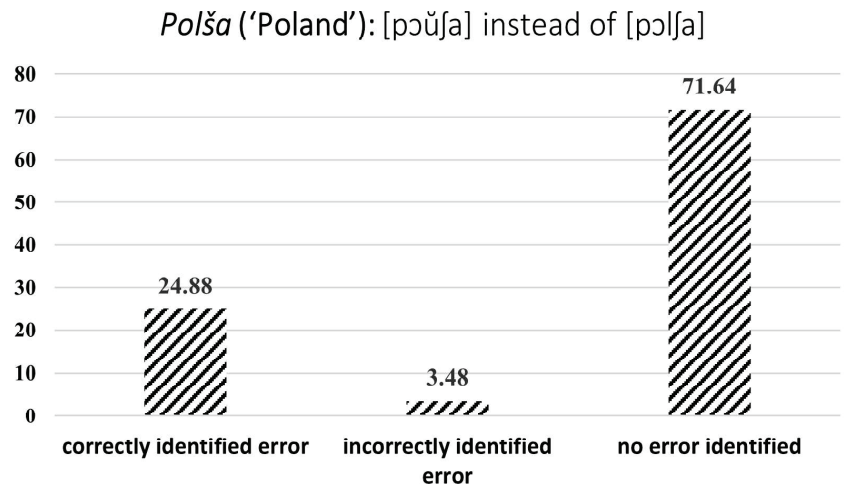

Figure 24. Recognition of [ŭ] in place of [l] in *Polša* (in %; N = 200).

The last single word is *bălha* 'flea'. The variant [ŭ] is adjacent to the hard velar consonant [x]. Figure 25 shows that 29.35% of the 200 participants in the survey indicated the replacement of [l] with [ŭ], 1.49% heard another type of error, and 69.15% decided that there was no error.

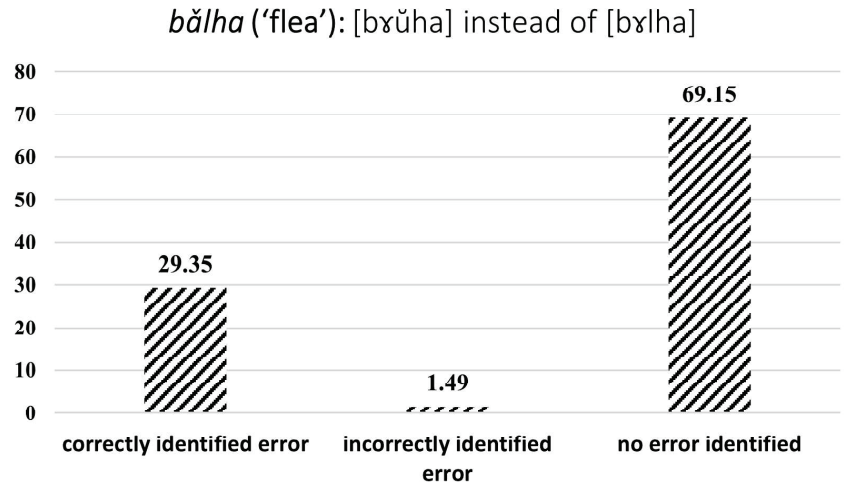

Figure 25. Recognition of [ŭ] in place of [l] in *bălha* (in %; N = 200).

Summarizing the analyses of [ŭ] recognition in single words, there were slightly more respondents who detected the [l] substitution in this perceptual style, which is associated with the most significant concentration of attention in the context of spoken utterances compared to the other three perceptual styles.

3.5 Comparison of the Recognition of [ŭ] in Place of [l] across the Four Perceptual Styles

In this section, we compare the data for successful recognition of [ŭ] in place of [l] across the four perceptual styles. Figure 26 shows the data from the four perceptual styles for each of the tasks. With respect to the recognition of the [l] substitution in a sequence of three words, the percentage of those who recognized at least one of the three words as containing [ŭ] is taken to be representative.

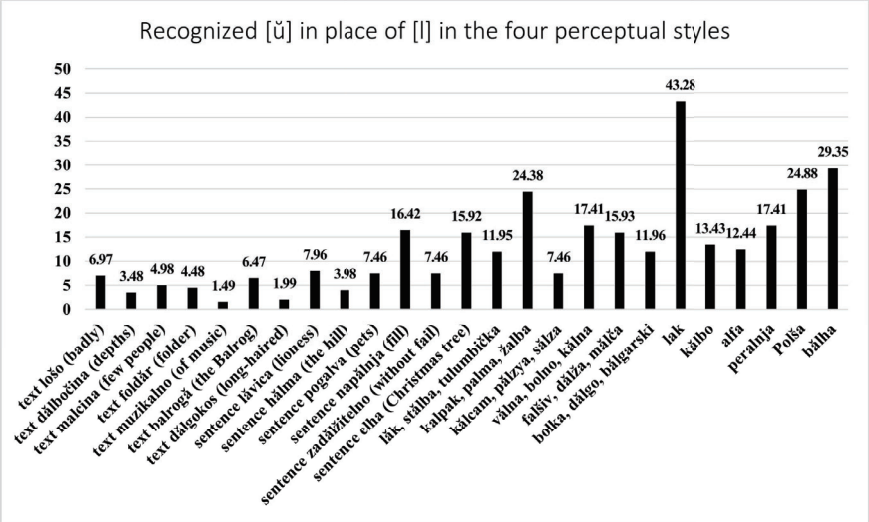

Figure 26. Recognized [ŭ] in place of [l] in the four perceptual styles (in %; N = 200).

Figure 26 shows that there is some variation in the recognition of [ŭ] in place of [l] among the four perceptual styles. The percentages are lowest for the perceptual style of short text consisting of 3-4 sentences, slightly more participants recognized the phenomenon in simple sentences, there is an increase in recognition with respect to the lists of 3 words, and the highest percentages of those who recognized the variant [ŭ] were found in the perceptual style of single words. Averaging the percentages for each perceptual style confirms the validity of this observation: the average percentage of [ŭ] recognition in short texts of 3-4 sentences is 3.68%, for simple sentences the average percentage is 8.52%, the average recognition in a list of three words with at least one of them recognized as containing [ŭ] is 14.10%, and the average percentage of those who recognized the phenomenon in individual words is 20.07% (Table 2). This suggests that our hypothesis regarding the dependence of recognition on the perceptual style can be considered valid.

Table 2. Average [ŭ] recognition by perceptual style.

Perceptual Style	**Average [%]**
Short texts (3–4 sentences)	3.68
Simple one-word sentences	8.52
Three-word list (at least one recognized)	14.10
Individual words	20.07

However, one of the other hypotheses is rejected, namely, the assumption that the recognition of [ŭ] in place of [l] depends on the sound that follows [l]. The comparison of the data from Figure 31 provides no consistent support for this claim. It seemed to us that the position at the absolute beginning of the word was important – the highest percentage of respondents recognized *lak* – 43.28%, but a low percentage recognized *lošo* – 6.97%. Thus, this hypothesis is rejected too.

3.6 Analysis of the Relationships between Socio-Demographic Characteristics and Recognition of [ŭ] in Place of [l]

Chi-square calculations were done (Goev, Boshnakov, Tosheva, Haralampiev & Bozev, 2019, pp. 116–127; Aleksova & Tisheva, 2019) to investigate the relationships between socio-demographic characteristics of respondents and the recognition of [ŭ] in place of [l]. If the coefficient p at the analysis of relationships is smaller than $\alpha < 0.05$, it is assumed that a relationship exists between the respective socio-demographic characteristic and the recognition of [ŭ].

3.7 Correlation between Gender and Recognition of [ŭ] in Place of [l]

In this subsection, we present and analyze the data from the statistical analysis of the relationships between the variable of gender of the respondents (with two levels: female, male), understood as an independent variable, and

the recognition of [ŭ] in place of [l] as a dependent variable. Here we comment only on cases where the presence of a relationship has been proven.

The analysis shows a relationship between the gender variable and the recognition of [l] substitution in the short text "Few people (*malcina*) know that the school renovation starts today. Harmless paints will be delivered. The renovation will be completed before September 15". The coefficient p = 0.004, indicating the presence of a relationship. Specifically, more male respondents accurately identified the mistake, 12.5% compared to 2.1% female respondents, while among female respondents, more of them responded that there is no mistake, 77.2%, unlike male respondents, 60.7% of them.

In another case where a correlation was found, it was between the gender of the respondents and the recognition of [ŭ] in place of [l] in the simple sentence She often pets (*pogalva*) the child, p = 0.043. The relationship is moderate. Its specific expression is found in the fact that again, among men, there are more who correctly identified the error, 12.5% compared to 5.5% among women, and among women, there are fewer who claimed that all the words in the sentence are pronounced correctly, 68.3.2%, unlike men, 75%.

According to p = 0.030, a relationship exists between the gender feature and the recognition of [ŭ] in place of [l] in the simple sentence "I will fill (*napălnja*) a glass with water". The relationship is specifically expressed in the fact that almost the same percentage of women and men accurately identify the presence of [ŭ] in place of [l], 16.6% of women and 16.1% of men. More women, however, have found some other type of error (which does not actually exist), 27.6% compared to men, 10.7%. Accordingly, more men state that there is no error, 73.2%, compared to women, 55.9%.

As can be seen, there are only three cases where there is a relationship between gender and the recognition of [l] substitution. Moreover, no stable trend can be inferred as to whether women or men recognize this phenomenon more often. It is clear that the gender factor is not a strong determinant of the recognition of [ŭ] in place of [l].

3.8 Correlations between Age and Recognition of [ŭ] in Place of [l]

As explained in the Method section, the age feature has the following 7 levels: up to 19 years, from 20 to 30 years, from 31 to 40 years, from 41 to 50 years, from 51 to 60 years, from 61 to 70 years, and 71 years and over. Analyses of the relationships show that only between age and recognition of [ŭ] in place of [l] in the simple sentence "I will fill (*napălnja*) a glass with water" there is a moderately strong connection, as p = 0.005. It is specifically expressed in the fact that with increasing age, the percentage of those who correctly identified the phenomenon also increases, for example, up to 19 years only 5.9% have correctly recognized it, between 31 and 40 years, 10.3%, between 61 and 70 years, 40%. The age factor is therefore an even weaker determinant of the recognition of [ŭ] in place of [l] compared to the gender factor.

3.9 Correlations between Education and the Recognition of [ŭ] in Place of [l]

The feature educational level has three levels: primary, secondary or vocational education, and higher education. Here, we only comment on cases where there is a correlation between this feature and the recognition of [ŭ] in place of [l].

According to p = 0.003, there is a correlation between the educational level and the recognition of [ŭ] in place of [l] in the short text "The Balrog (*balrogă*) appears in the most iconic fantasy work by Tolkien. They were thought to be fire spirits, most of whom were slain at the end of the First Age of Middle-earth". Specifically, this moderate relationship is expressed in the facts that as the educational level increases, the percentage of those who correctly recognize [ŭ] also increases, 0% for primary education, 4.3% for secondary or vocational education, and 7.8% for higher education, as well as that with the increase of the obtained educational level, the percentage of those who claim that there is no mistake decreases, 92.9% for primary education, 50% for secondary or vocational education, and 39% for higher education.

There is a moderate relationship between the educational level and the recognition of [ŭ] in the simple sentence "There is a lioness (*lăvica*) in the zoo". This is evidenced by p = 0.024. This is expressed in the fact that as the educational level increases, the percentage of respondents who answered that there is no error decreases, 71.4% of those with basic education, 47.8% among those with secondary and vocational education, and 37.6% among those with higher education.

There is a moderate relationship between the educational level and the recognition of [ŭ] in place of [l] in the simple sentence "I will fill (*napălnja*) a glass with water". This is demonstrated by p = 0.000. This relationship is expressed in the fact that the three education groups are arranged in the following order according to the percentage of respondents who answered that there is no error, the lowest percentage is among respondents with

higher education, 51.8%, followed by those with primary education (undergraduate students), 57.1%, and the highest percentage is among respondents with secondary and vocational education, 89.1%.

Only three cases of a relationship between educational level and the [l] substitution were found, which means that this feature is also a weak determinant of recognition in the perception of the phenomenon of interest.

3.10 Correlations between the Feature 'Academic Major' and the Recognition of [ŭ] in Place of [l]

Academic major is a feature with two levels, philological and non-philological. We included this feature because according to our preliminary hypothesis, it should be the most significant determinant of successful recognition of [ŭ] instead of [l]. We made this decision based on the assumption that it is the members of the intelligentsia with philological background that are the natural bearers of the national standard language norms.

According to p = 0.019, there is a moderate relationship between the major attribute and the recognition of [ŭ] in place of [l] in the short text "Today you will hear a new piece of music (*muzikalno*). It can hardly be considered as belonging to a single genre". Its specific expression is the fact that among philologists there are more who correctly (2.8%) or incorrectly (44%) identified some errors than among non-philologists (0% and 29.3%, respectively).

There is a moderately strong relationship between the major and the recognition of [ŭ] in place of [l] in the word *alfa*. This correlation has a specific expression in the fact that there are more philologists who recognized the phenomenon under study, 17.4%, while among non-philologists the percentage is 6.5%. Accordingly, those who indicated that there is no error among philologists are fewer: 80.7% compared to 93.5% among non-philologists.

As it becomes clear, only two analyses have shown the existence of relationships. This refutes our hypothesis that the major in philology will be the most significant determinant of the recognition of [ŭ] in place of [l].

3.11 Correlations between the Feature 'Place of Residence' and the Recognition of [ŭ] in Place of [l]

The attribute 'place of residence' has the following levels: the capital Sofia, regional city, non-regional city, village, and outside Bulgaria (abroad). We included it because in the study on the perception of 12 non-standard variants of speech phenomena, it turned out to be one of the significant determinants of the respondents' evaluations and attitudes (Aleksova, 2016).

According to p = 0.043, there is a moderate relationship between the 'place of residence' feature and the perception of [ŭ] in place of [l] in the short text "Yesterday morning, he was searching for a file on his computer. He needed it for an important article. Finally, he found it incorrectly saved in another folder (*foldăr*)". It is expressed in the following ordering of the groups by residence: the highest percentage of respondents who indicated that there was no error were those living outside Bulgaria, 61.5%, followed by those living in regional cities, 60.7%. Close behind them are those living in rural areas, 60%, next are those living in non-regional cities, 50%. The smallest group of respondents who live in the capital indicated that there was no error, 37%.

There is a moderately strong correlation between the 'place of residence' feature and the sequence *lăk*, *stălba*, *tulumbička*, with p = 0.011. Specifically, this correlation is expressed in the following ordering of the groups by residence, with respect to those who did not find an error: the highest percentage is among those living in regional cities, 85.7%, followed by those living outside Bulgaria, 80.8%, very close to them are those living in villages, 80%, followed by those living in Sofia, 77.8%, and the lowest percentage is among those living in non-regional cities, 66.7%.

There is also a moderately strong correlation between the 'place of residence' feature and the 3-word list *kălcam*, *pălzya*, and *sălza* with p = 0.016. Specifically, it is expressed in the following ordering of groups by residence, according to those who did not recognize the mispronunciation: the highest percentage is among those living outside Bulgaria, 92.3%, followed by those living in regional cities, 91.1%, then those living in Sofia, 87%, followed by those living in non-regional cities, 66%, and the lowest percentage is among those living in villages, 60%.

A moderately strong correlation was also found between the 'place of residence' attribute and the sequence *vălna*, *bolno*, *kălna*, with p = 0.009. Specifically, it finds expression in the following arrangement of groups by residence according to those who did not find an error: the highest percentage is among those living in regional cities, 80.4%, followed by those living in Sofia, 78.7%, outside Bulgaria, 79.6%, in villages, 60%, and the smallest percentage is among those living in non-regional cities, 16.7%.

There is a moderately strong relationship between the 'place of residence' feature and the sequence *bolka*, *dălgo*, *bălgarski*, with p = 0.03. More specifically, it is expressed in the following arrangement of groups by residence according with respect to those who did not recognize the [l] substitution as an error: almost equal percentages of those living in non-regional cities, 87.5%, outside Bulgaria, 84.6%, in Sofia, 84.3%, and in regional cities, 83.3%. The lowest percentage of people who did not recognize the mispronunciation is among village residents, 60%.

According to p = 0.01, there is a moderately strong relationship between the variable 'place of residence' and the recognition of [ŭ] in place of [l] in the word *alfa*. The correlation is expressed in the following way: the highest percentage of people who recognized the phenomenon we are interested in was in the non-regional cities, 33.3%, followed by those living in Sofia, 15.7%, and then by those living outside Bulgaria, 15.4%. Fewer people recognized the phenomenon in the regional cities, 3.6%. No village residents recognized the pronunciation of [ŭ] in place of [l] in the word *alfa*.

There is a moderately strong relationship between the feature 'place of residence' and the recognition of the substitution of [l] substitution in the word *peralnja* with a correlation coefficient of p = 0.049. Specifically, the relationship is expressed in the following order of groups by 'place of residence', based on the 'no-error' response: the highest percentage was among residents of regional cities, 89.3%, followed by residents of non-regional cities, 83.3%, then those living outside Bulgaria, 80.8%. Next were those living in Sofia, 75.9%, and finally those living in villages, 60%.

In 7 cases, there is a relationship between the 'place or residence' feature and the recognition of the [ŭ] pronunciation. This is the largest number of correlations so far. However, no clear trend can be identified among the groups regarding which one has the highest percentage of people who perceive the substitution of [l] with [ŭ].

4. Conclusion

As it became clear from the analyses of the relationships in the previous sections, all selected socio-demographic characteristics of the respondents turned out to be weak determinants of the recognition of [ŭ] in place of [l]. Our hypothesis regarding their determining power was rejected, and the hypothesis that the recognition of the appearance of [ŭ] in place of [l] would depend heavily on the factor of specialization was not supported.

The hypothesis that the recognition of [ŭ] in place of [l] would be dependent on the sound following [l] was also refuted by the results. No difference in recognition was observed when there was a vowel or a consonant of a different kind following [l].

It turned out that only one of our hypotheses was proven valid: only perceptual style affects the degree of recognizability of the substitution of [l] with [ŭ]. The success of recognizing [ŭ] in place of [l] decreases with the decrease in attention to the spoken text, from the perception of a single word, through the perception of a list of 3 words, to the perception of a simple sentence and finally of a coherent text of 3–4 sentences.

The present survey is not representative, so the conclusions apply only to the group of 200 respondents we interviewed. However, it is a good starting point for conducting other studies, and it also serves as a stimulus for the realization of a representative national survey, which we consider necessary due to the emerging trend of more and more members of each successive generation pronouncing [ŭ] in place of [l].

As far as we know, this is the first perceptual study in Bulgaria to examine the recognition of [ŭ] in place of [l], using four distinct perceptual styles and analyzing the relationship between socio-demographic characteristics and the recognition of [ŭ] in place of [l]. The results suggest that perceptual style influences the recognition of [ŭ] in place of [l], with the highest recognition rates observed in isolated words and the lowest in extended texts. By contrast, socio-demographic factors such as age, education, gender, and academic background appear to have only a limited impact on perception. This, in turn, suggests that the substitution of [l] with [ŭ] may be broadly internalized across different social groups. It may no longer be marked as a socially or regionally restricted feature but rather as a development that is gradually becoming a general characteristic of contemporary spoken Bulgarian.

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