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CONSONANT SOFTENING IN RUSSIAN LOANWORDS

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Summary

This paper focuses on palatalization avoidance in Russian loanwords. In native words, consonants are palatalized (or ‘softened’) when they precede /e/, but they can remain non-palatalized in the same context in loanwords. The survey indicated that palatalization is more likely to be avoided (i) in stressed syllables, (ii) when consonants are coronal, and (iii) when consonants are obstruent. It is argued that the difference in the likelihood of palatalization avoidance results from several phonological factors.

Key Words: Russian, Phonology, Loanword adaptation, Palatalization.

Introduction

Currently, there are many loanwords in Russian. Foreign words are adapted so that they can sound as natural as Russian words but often still show specific behavior that is not observed in native words. This paper focuses on the avoidance of consonant softening or palatalization from a loanword-specific phonological perspective.

Many researchers have suggested a consonantal category called “hardness”/“softness” to describe Russian phonology, (Аванесов, 1984; Касаткин и др., 2001; Князев & Пожарицкая, 2011). In contemporary phonological theory, “hard” consonants are defined as non-palatalized or velarized and “soft” consonants as palatalized (Чекман, 1979; Rubach, 2000). As can be seen in (1), most consonants have either “hardness”/“softness.”^[1] Note that [tʂ, ʂ, zʂ] always emerge as “hard” consonants and [tʃ] as a “soft” consonant.

(1) Contrast between “hard” consonants and “soft” consonants

a. Before vowels

tot ‘that’ vs. tʲotʲə ‘aunt’

sadu ‘yard (dat. sg.)’ vs. sʲadu ‘sit down (1sg)’

rat ‘glad’ vs. rʲat ‘row’

modə ‘mode’ vs. mʲodə ‘hunny(gen. sg.)’

vos ‘cart’ vs. vʲos ‘carried (mas. sg.)’

b. Syllable-final positions

bit ‘daily life’ vs. bitʲ ‘to be’

vʲes ‘weight’ vs. vʲesʲ ‘entire’

dal ‘gave (mas. sg.)’ vs. dalʲ ‘distance’

However, the contrast is restricted when a consonant precedes a front vowel: under this condition, only palatalized consonants can emerge in native words. This can be seen in word conjugation or declension. As (2) illustrates, stem-final consonants undergo palatalization when a morpheme follows a front vowel.

(2) Palatalization

a. Locative singular suffix [-e]

ruk-a ‘hand’ ~ **rukʲ**-e (loc. sg.)

b. Verbal affix [-i-]

atvʲet‘(an) answer’ ~ atvʲetʲ-i-t ‘(s/he) will answer’

c. Verbal affix [-e-]

krasn-ʲ ‘red’ ~ krasnʲ-e-tʲ ‘to become red’

In loanwords, in contrast, this restriction on the consonantal contrast ceases to be effective. It has been found that consonants can remain non-palatalized before [e] in these cases (Гловинская, 1971; Аванесов, 1984; Касаткин, и др., 2001; Князев & Пожарицкая, 2011). Князев & Pozharitskaya (2011) exemplified some loanwords, as shown below.

(3) Non-palatalized consonants preceding [e] in loanwords (Князев & Пожарицкая 2011: 332)

ka[fe] (café); *super*[me]n (superman); *an*[te]nna (antenna); [re]l[gb]i (rugby); [ke]m[pi]ng (camping)

The acceptance of non-palatalized consonants in this position depends on the type of consonant. While dental obstruents and nasals are likely to emerge as non-palatalized, labials and velars rarely do (Аванесов, 1984; Князев & Пожарицкая, 2011). In particular, it is almost impossible for velar consonants to avoid palatalization, even though there are few examples. This suggests that consonants in different areas of articulation have different properties when interacting with the subsequent vowel.

In this paper, a quantitative investigation examines the palatalization avoidance differences between consonants. The results are then discussed in theoretical terms. This paper is organized as follows. Section 2 provides details of the investigation, Section 2.1 describes the methods, and Section 2.2 gives the results. In Section 3 the results are discussed in detail: the stress of the vowel concerned (i.e. /e/) is considered in Section 3.1, the consonant articulation area is examined in Section 3.2, and the consonant articulation is analyzed in Section 3.3. Section 3.4 investigates a new tendency, the adaptation of the English [æ], in which the preceding consonant most often avoids palatalization. Finally, Section 4 concludes the discussion.

Survey

2.1. Methods

The data collection was divided into two steps. First, 4790 loanwords in which a consonant precedes /e/ were collected from Krysin's (2000) foreign word dictionary (Крысин, 2000: *Толковый словарь иноязычных слов*). Next, Eskova et al.'s (2015) orthoepic dictionary was consulted (Еськова, Борунова, & Воронцова, 2015: *Орфоэпический словарь русского языка*) if the precise pronunciation was not mentioned in the previous dictionary. For some words, the pronunciation variation between the non-palatalized and palatalized consonants was noted; therefore, a consonant was classified as "non-palatalized" if the orthoepic dictionary mentioned that such a pronunciation was at least "acceptable."

First, Russian orthography is briefly outlined. Russian has two graphemes for the vowel /e/: *e* and *э*. In principle, the latter indicates that the preceding consonant is non-palatalized; thus the orthoepic dictionary gives no pronunciation information about the cases in which a consonant precedes *э*. According to this orthographic principle, it was judged that a consonant was non-palatalized in such cases.

The focus was on three main factors. The first was the presence of stress. Cases in which the target syllable was under primary or secondary stress were classified as "stressed" and the other cases classified as "unstressed," regardless of the distance from the stressed syllable. Next, cases were compared in which the consonant articulation area was different. It has been noted that coronal consonants are more likely to remain non-palatalized before /e/ than labials and velars. Other factors such as manner of articulation and voicing were controlled, so liquids ([r], [l]) were excluded in this comparison because they have no non-coronal counterparts. Finally, with all other properties being controlled, the given data was compared with the manner of articulation.

2.2. Results

The full results are shown in Appendix 1. In this section, the results for each part of the survey are presented.

First, as Table 1 indicates, non-palatalized consonants were more often observed in stressed syllables. As non-coronals seldom avoid palatalization in unstressed syllables, only the effect of stress on coronal consonants was investigated.

	coronal		labial		velar	
	stressed	unstressed	stressed	unstressed	stressed	unstressed
non-pal.	402 (41.7%)	666 (32.8%)	40 (9.8%)	7 (0.7%)	4 (2.5%)	0 (0%)
pal.	563 (58.3%)	1366 (67.2%)	369 (90.2%)	941 (99.3%)	158 (97.5%)	274 (100%)
sum.	965	2032	409	948	162	274

Figure 1 illustrates the occurrence rates for non-palatalized coronal consonants for stressed

and unstressed positions. The difference between these two cases was significant ($\chi^2(1, N = 2997) = 22.12, p < .001$), which suggests that these consonants are more likely to avoid palatalization in the presence of stress.

Figure 1: Occurrence of non-palatalized coronal consonants preceding /e/

Table 2 and Figure 2 indicate the behavior of consonants articulated in different areas. To control the other factors, obstruents were exclusively targeted. Unstressed syllables were excluded from this examination since non-palatalized non-coronal consonants are extremely rare. The differences between coronals and labials ($\chi^2(1, N = 666) = 173.139, p < .001$), between coronals and velars ($\chi^2(1, N = 588) = 266.44, p < .001$; Fisher’s test, $p < .001$), and between labials and velars ($\chi^2(1, N = 402) = 18.46, p < .001$; Fisher’s test, $p < .001$) were all significant. In other words, coronal consonants were more likely to avoid palatalization than labial and velar consonants, and labials were more likely to do so than velars.

Table 2: Behavior of consonants preceding stressed /e/: for each area of articulation

	coronal	labial	velar
non-pal.	267 (62.7%)	24 (10.0%)	4 (2.5%)
pal.	159 (37.3%)	216 (90.0%)	158 (97.5%)
sum.	426	240	162

Figure 2: Occurrence of non-palatalized consonants preceding stressed /e: for each area of articulation /

Finally, Table 3 illustrates the avoidance/occurrence of palatalization on consonants for each manner of articulation. As noted earlier, the behavior varies depending on the area of articulation, so the behavior for each consonant area was compared. Unstressed syllables were also excluded in this investigation. /l/ emerged as ‘soft’ in most cases, and its behavior was considerably different to that of /r/. The fact that /l/ failed to emerge as a ‘hard’ counterpart is relevant to another factor,^[2] so this was excluded from the investigation and only /r/ was classified into liquid consonants.

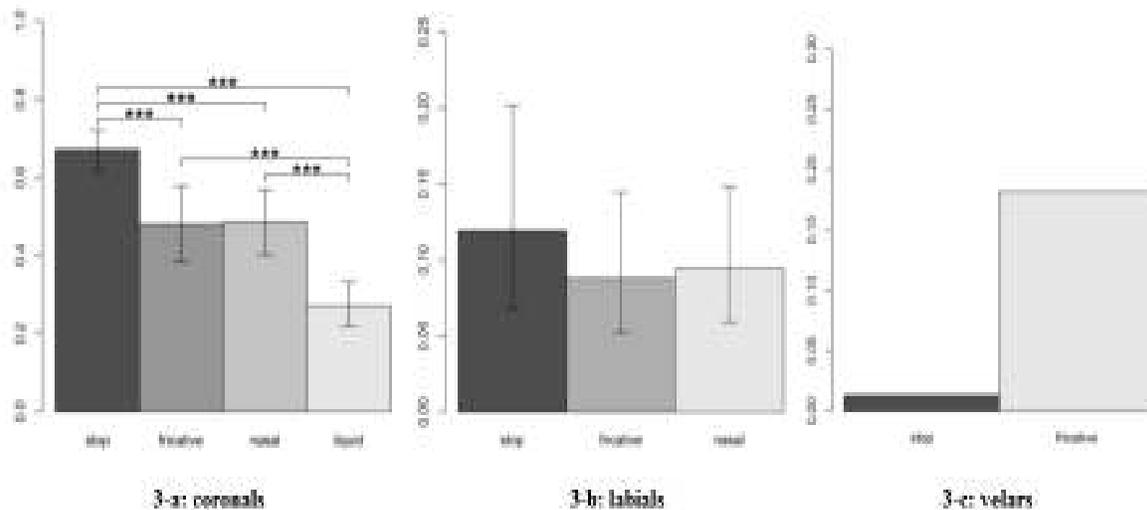
Table 3: Behavior of consonants preceding stressed /e/: for each manner of articulation

	coronal				labial		
	stop	fricative	nasal	liquid	stop	fricative	nasal
non-pal.	220 (67.1%)	47 (48.0%)	66 (48.5%)	63 (27.2%)	11 (12.0%)	13 (8.8%)	16 (9.5%)
pal.	108 (32.9%)	51 (52.0%)	70 (51.5%)	169 (72.8%)	81 (88.0%)	135 (91.2%)	153 (90.5%)
sum.	328	98	136	232	92	148	169

	velar	
	stop	fricative
non-pal.	2 (1.3%)	2 (18.2%)
pal.	149 (98.7%)	9 (81.8%)
sum.	151	11

As can be seen in Figure 3-a, coronal stops were significantly more likely to emerge as non-palatalized than other coronals (stops-fricatives: $\chi^2(1, N = 426) = 11.78, p < .001$; stops-nasals: $\chi^2(1, N = 464) = 13.98, p < .001$; stops-liquids: $\chi^2(1, N = 560) = 86.62, p < .001$). In contrast, as figure 3-b indicates, labial stops were not likely to emerge as non-palatalized (stops-fricatives: $\chi^2(1, N = 240) = .63, p = .43$; stops-nasals: $\chi^2(1, N = 261) = .40, p = .53$).

Figure 3: Occurrence of non-palatalized consonants preceding stressed /e/: for each manner of articulation



Moreover, as shown in Figure 3-c, velar stops were less likely to avoid palatalization than velar fricatives, even though there was little data for the latter^[3] (i.e. /x/). Liquids, which are only coronal, are less likely to avoid palatalization than the others (fricatives-liquids: $\chi^2(1, N = 330) = 13.41, p < .001$; nasals-liquids: $\chi^2(1, N = 368) = 17.21, p < .001$). To summarize, from this investigation, it is surmised that palatalization occurrence may vary depending on the manner of articulation, but this effect is not obvious.

Discussion

In this section, the results presented in the previous section are discussed. The following three sections focus on each target in the survey: Section 3.1 discusses the stress of the given vowel, Section 3.2 focuses on the consonant articulation area, and Section 3.3 considers articulatory

manner. Section 3.4 discusses a relatively new tendency, the adaptation of the English /æ/.

3.1. Stress and vowel reduction

The survey indicated that consonants were more likely to avoid palatalization before /e/ in stressed syllables rather than in unstressed syllables. The vowel reduction needs to be considered: /e/ emerges as [i] in unstressed syllables (Аванесов, 1984; Crosswhite, 2000; Касаткин, и др., 2001; Князев & Пожарицкая, 2011). There have been two perspectives on vowel reduction in loanwords. The first states that a reduction does not occur when the preceding consonant remains non-palatalized (Аванесов, 1984; Еськова, Борунова, & Воронцова, 2015). The second view states that the reduction is observed regardless of whether the preceding consonant remains non-palatalized (Гловинская, 1971; Касаткин, и др., 2001; Каленчук, Касаткин, & Касаткина, 2012). When no consonant precedes /e/, i.e., in word-initial positions, it has been noted that this vowel undergoes reduction in loanwords (Crosswhite, 2000; Касаткин, и др., 2001; Князев & Пожарицкая, 2011). This fact suggests that this vowel itself tends to reduce in unstressed syllables.

Now, returning to the behavior of consonants preceding /e/. In unstressed positions, if this vowel avoids reduction when the preceding consonant is non-palatalized, this is contrary to the general tendency towards reduction. On the other hand, if this vowel still undergoes reduction, the preceding consonant remains non-palatalized before [i]. It has not been observed that consonants can remain non-palatalized before [i] in loanwords (cf. Аванесов, 1984; Crosswhite, 2000; Касаткин, и др., 2001; Князев & Пожарицкая, 2011), so it can be said that they tend to be palatalized before [i]. Therefore, when consonants avoid palatalization before [i] derived from /e/, the situation is also contrary to the general tendency in Russian phonology. From this discussion, it can be concluded that consonants are more likely to undergo palatalization in unstressed syllables because the avoidance results in a violation of Russian phonological principles.

3.2. Place of articulation

As can be seen in Section 2.2, an apparent difference in the occurrence of palatalization in consonants at different areas of articulation was observed. In particular, coronals were found to be even more likely to avoid palatalization than other consonants. This hierarchical situation was more obvious when more than one type of consonant preceded /e/ in a word. When cases in which either consonant avoided palatalization in Eskov et al.'s (2015) dictionary were examined, there were very few words in which the hierarchy was violated: only 2 out of 269 cases^[4] were observed, as shown in (4b). In most cases, as can be seen in (4a), a coronal consonant was non-palatalized if a labial or a velar consonant avoided palatalization, and a labial was non-palatalized if the velar was non-palatalized.

(4) Loanwords in which more than one type of consonant precedes /e/

a. [biznesmen] (businessman); [mɪdiabiznes] (media business);

[sekondxend] (second hand); [gɪender] (gender);

[keɪbmen] (cabman, taxi driver); [imɪdzmeɪkɪr] (image maker)

b. [rɪmeɪk] (remake); [xepɪnɪŋ] (happening)

In summary, the hierarchy of consonants in the occurrence of palatalization is absolute.

Next, the reason why the coronals tend to avoid palatalization in comparison with other consonants is examined. From a typological view, no research has found that labials and velars are more likely to undergo palatalization than coronals (cf. Bhat, 1978). In phonological theory, on the other hand, palatalization has been considered to be an assimilation of consonants to the adjacent front vowel (Clements & Hume, 1995; Zubritskaya, 1997; Rubach, 2000; Halle, 2005; Kochetov,

2011). Considering that front vowels are articulated on the front part of the tongue, non-coronal consonants do not agree with front vowels at the articulation points, so they may assimilate to the following front vowel. Note that the idea that palatalization is caused by an adjacent front vowel is not new. Bhat (1978) noted that palatalization was triggered by front vowels or glide in many languages. In Slavic historical phonology, it has been noted that velar consonants changed to postalveolar before front vowels and /j/ (Мейе, 1934; Хабураев, 1974; Колесов, 1980). Velars have a special status also in contemporary Slavic languages. In Polish, velar stops cannot be non-palatalized before suffixes beginning with /e/ that do not cause other consonants to be palatalized. In Russian loanwords, as noted in Section 2.2, it was observed that it was quite rare for velars to avoid palatalization in comparison with other consonants. In phonetic terms, as noted earlier, labials are also different from front vowels, but their articulation point, i.e., the lips, can move independently of the tongue. In other words, non-palatalized labials are more easily articulated before front vowels than non-palatalized velars. That is why velars, especially, undergo palatalization. However, the results for the Russian loanwords suggested that labials are still differentiated from coronals.

Previous typological research has not suggested that labials are active participants in palatalization (cf. Bhat, 1978; Kochetov, 2011). What is to be noted is that previous studies on palatalization have focused not only on secondary palatalization ('softening' in Slavic languages), but also on changes in primary articulation (e.g. velar softening or fronting). However, labials rarely change in primary articulation. (cf. Bhat, 1978; Kochetov, 2011). On the other hand, when changes in secondary articulation were exclusively focused on, as in the study by Kochetov (2011), the palatalization of the labials was as common as with other consonants. In other words, as far as the secondary palatalization is concerned, it is not strange that both labials and velars are more likely to undergo palatalization than coronals.

3.3. Manner of articulation

It has not been reported that manner of articulation affects the likelihood of a consonant undergoing palatalization (cf. Bhat, 1978; Kochetov, 2011). From the survey, in which variation was observed in the coronals, it is not possible to suggest a significant articulation manner effect for other consonants. In theoretical terms, nevertheless, the manner of articulation should be considered to discuss the consonant-vowel interaction.

The manner of consonant formation can be defined by the degree of constriction in articulatory terms, or by sonority in acoustic terms (For Russian: see Касаткин, и др., 2001; Князев & Пожарицкая, 2011). Sonorants (liquids and nasals) are articulated with weak constriction and have high sonority, so are similar to vowels. Stops or plosives are the opposite and the most 'consonantal.' Fricatives can be regarded as in the middle between sonorants and stops. Note that nasals have a plosive-like aspect in oral articulation as well as a sonorant aspect in nasal articulation.

Given that palatalization is assimilation to an adjacent vowel, it can be assumed that the more similar consonants are to vowels, the more likely they are to undergo this process. This hypothesis partially holds true. As can be seen in Figure 3-a, liquids are more likely to be palatalized than other consonants. As nasals more often avoid palatalization than liquids and almost as often as fricatives, it is suggested that the plosive property (or lack of "continuance") is relevant in this situation. On the other hand, as mentioned above, the difference between stops and fricatives is quite unclear. Here, the question is left open, but the possibility is suggested that the articulation manner of consonants affects palatalization participation.

3.4. New tendency: vowel originating from English [æ]

As observed in the survey, velar consonants quite rarely remained non-palatalized before /e/. Previous research (Аванесов, 1984; Касаткин, и др., 2001; Князев & Пожарицкая, 2011) has indicated that the palatalization avoidance of velars is a new tendency. Looking at such examples more closely, it can be found that the vowel /e/ in most of the given words originates from the English [æ]. Since [æ] is not permitted in Russian, this vowel has often been adapted as /a/ due to the effect of the English orthography, and the transformation to /e/ is relatively rare (Holden, 1980). However, in recent loanwords, many cases have been observed in which an /e/ originates from an /æ/. The given vowel, is often transcribed as э, not as е, which indicates that the preceding consonant is ‘hard.’ This observation suggests that the /e/ from an English [æ] has a particular property that fails to trigger palatalization on the preceding consonant.

Watabe (2015) suggested that the /æ/ should still be distinguished from the /e/ in underlying forms of Russian and adapted as “non-palatalizing” [e]. In fact, the front mid vowel varies slightly depending on whether the preceding consonant is palatalized: it is more retracted (and lowered) after a non-palatalized consonant than after a palatalized consonant (Аванесов, 1984; Касаткин, и др., 2001; Князев & Пожарицкая, 2011). In other words, /æ/ is originally adapted as a front mid vowel that does not cause the preceding consonant to be palatalized. In contrast, other /e/-like vowels^[5] are considered the same vowel as the Russian /e/, but they sometimes fail to trigger palatalization and consequently emerge as “non-palatalizing” [e].

Note that the cases in which the English [æ] is adapted as an [e] have not been observed often. Moreover, the transcription is not stable, i.e., the variation between э and е is often observed, so the actual pronunciation is unclear. This adaptation process thus requires further investigation.

Concluding remarks

Regarding consonants preceding /e/ in Russian loanwords, as can be seen in Section 2.2, the survey indicated that (i) they were more likely to avoid palatalization in stressed positions than in unstressed positions, (ii) coronals avoid palatalization more often than others, and velars quite rarely avoid palatalization, (iii) the lower the sonority of the consonants, the more likely they are to avoid palatalization, but it is not possible to say that stops are more likely to avoid palatalization than fricatives. In Section 3.1–3.3, it was argued that these results could be explained in phonological terms; even though loanwords are to some extent free from the phonological restriction on native words, they are still controlled by a certain phonological principle. It was also suggested that the given palatalization-blocking process is not homogeneous. Section 3.4 argued that the adaptation of the English [æ] should be differentiated from that of other /e/-like vowels as the former is more likely to block palatalization.

The absence of palatalization has been observed in “non-nativized” loanwords (Аванесов, 1984; Касаткин, и др., 2001; Князев & Пожарицкая, 2011). In other words, foreign-origin words undergo more of the phonological processes observed in native words, so it appears difficult to clearly define “loanwords.” Clearly, “loanwords” originate from a foreign language, so it is natural that native speakers do not know the etymology of all loanwords and can only recognize the certain peculiarity that results from the occurrence of sound patterns not observed in native words. Ito and Mester (1995, 1999) proposed the lexicon model, in which words are classified according to the occurrence of the phonological processes. In their “onion” lexicon model, native words are located in the core of the lexicon. Loanwords enter the lexicon from the outside and approach the core through a nativization process in which the phonological restriction gradually becomes stricter.

The palatalization avoidance discussed in this paper also fits such a lexicon model. The variations in the occurrences suggest that loanword adaptation is not just a simple sound pattern that allows loanwords to be categorically distinguished from native words but a dynamic and complicated process.

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^[1] With regard to velar consonants, “soft” consonants are exclusively observed before front vowels in native words because “soft” velar consonants were disfavored and transformed to postalveolar consonants in the past (see also Институт русского языка, 2013).

^[2] Avanesov (1984) noted that /l/ often emerged as “European,” which is different from both the “hard” (velarized) and the “soft” (palatalized) counterparts. In other words, it is difficult for this consonant to emerge as “hard” before /e/, but it still avoids palatalization.

^[3] What Russian had adapted as /x/ was mainly *ch* in English orthography that is not pronounced [ʃ] (e.g. [sxʲema] < *scheme*), so such cases were relatively rare. Recently, English /h/, which was often transformed to /g/, has also been adapted as /x/ (e.g. [xepʲɪnɪŋ] < *happening*).

^[4] The targeted words were counted for each *pair* of consonants that had different areas of articulation, so this is not the number of the *words*.

^[5] What Russian adapts as /e/ are the vowels that are transcribed as *e* in English orthography.

Bibliography

Аванесов Р. И. Русское литературное произношение. М., 1984.

Clements, G. N., & Hume, E. V. “The Internal Organization of Speech Sounds”. In J. A. Goldsmith (ed.), *The Handbook of Phonological Theory* (pp. 245-306). Oxford: Blackwell, 1995.

Crosswhite, K. M. “Vowel Reduction in Russian: A Unified Account of Standard, Dialectal, and ‘Dissimilative’ Patterns”. *University of Rochester Working Papers in the Language Sciences*, Spring 2000(1), 107-172, 2000.

Еськова Н. А., Борунова С. Н., Воронцова В. Л. Орфоэпический словарь русского языка: произношение, ударение, грамматические формы: свыше 70000 слов / Под ред. Н. А. Еськовой. М., 2015.

Halle, M. “Palatalization/Velar Softening: What It Is and What It Tells Us about the Nature of Language”, *Linguistic Inquiry* 36:1, 23-41, 2005.

Ito, J. & Mester, A. “Japanese Phonology”. In J. A. Goldsmith (ed.), *The Handbook of Phonological Theory* (pp. 817-838). Oxford: Blackwell, 1995.

Ito, J. & Mester, A. “The Phonological Lexicon”. In N. Tsujimura (ed.), *The Handbook of Japanese Linguistics* (pp. 62-100). Oxford: Blackwell, 1999.

Каленчук М. Л., Касаткин Л. Л., Касаткина Р. Ф. Большой орфоэпический словарь русского

- языка: литературное произношение и ударение начала XXI века: норма и её варианты. М., 2012.
- Касаткин Л. Л., Клобуков Е. В., Крысин Л. П., Львов М. Р., Ставская Г. М., Федосюк М. Ю. Русский язык / Под ред. Л. Л. Касаткина. М., 2001.
- Князев С. В., Пожарицкая С. К. Современный русский литературный язык: Фонетика, орфоэпия, графика и орфография: Учебное пособие для вузов. М., 2011.
- Колесов В. В. Историческая фонетика русского языка. М., 1980.
- Kochetov, A. "Palatalisation". In: C. Ewen, E. Hume, M. Oostendorp, and K. Rice (eds.) *Companion to Phonology* (pp. 1666-1690). Chichester: Wiley-Blackwell, 2011.
- Крысин Л. П. Толковый словарь иноязычных слов. - 2-е изд., доп. - М., 2000.
- Мейе А. Общеславянский язык. / Перевод П. С. Кузнецов. М., 2001.
- Padgett, J. "Contrast Dispersion and Russian Palatalization". In E. Johnson, & K. Johnson (eds.), *The role of speech perception in phonology* (pp. 187-218). Academic Press. 105, 2001.
- Rubach, J. "Backness switch in Russian", *Phonology*, 17(1), 39-64, 2000.
- Townsend, C. E., & Janda, L. A. *Common and Comparative Slavic: Phonology and Inflection*. Columbus: Slavica Publishers, 1996.
- Гловинская М. Я. Об одной фонологической подсистеме в современном русском литературном языке. // Развитие фонетики современного русского языка (фонологические подсистемы) / Под ред. Л. М. Гаврилова. М., 1971.
- Институт русского языка им. В. В. Виноградова РАН Русская фонетика в развитии. Фонетические «отцы» и «дети» начала XXI века. М., 2013.
- Watabe, N. "Adaptation of English [æ] in Russian loanwords". Oral presentation in "Phonology Forum 2015" at Osaka University, Toyonaka Campus, on August 20, 2015.
- Хабургаев, Г. А. Старославянский язык. М., 1974.
- Чекман В. Н. Исследование по исторической фонетике праславянского языка. Минск, 1979.
- Zubritskaya, K. "Mechanism of sound change in Optimality Theory", *Language Variation and Change*, 9, 121-148, 1997.

Appendix: Full data of the results

consonant	t		d		s		z		r		l		n	
stress	+	-	+	-	+	-	+	-	+	-	+	-	+	-
non-pal.	140	281	80	237	40	45	7	20	63	38	6	1	66	44
pal.	85	185	23	123	32	144	19	36	169	454	165	274	70	150

consonant	m		p		b		f		v	
stress	+	-	+	-	+	-	+	-	+	-
non-pal.	16	4	5	0	6	2	2	0	11	1
pal.	153	325	55	264	26	108	62	116	73	128

consonant	k		g		x	
stress	+	-	+	-	+	-
non-pal.	2	0	0	0	2	0
pal.	70	83	79	171	9	20

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