

Vowel-Related Glottalization in Czech Read Speech: Russian vs. Native Speakers

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ABSTRACT:

Glottalization as a significant irregularity of glottal pulsing fulfils a number of linguistic functions and can occur in various contexts. It can also contribute to a foreign accent. This paper examines the rate of vowel-related glottalization in the speech of Russian speakers who are beginning learners of Czech, comparing their reading of Czech with that of native speakers. In Czech, there is a relatively high frequency of glottalization and, according to research from the last decade, glottalization in Russian is more common than is usually assumed, especially at the boundaries of intonational phrases. The purpose of this study is to determine the similarities and differences in the distribution of glottalization among native and non-native speakers of Czech, and to examine the factors that may influence it. The subjects read a short text containing 14 potential positions where glottalization can occur in the standard pronunciation of native speakers. The resulting 322 tokens were then analysed and rated for glottalization. The analysis was primarily based on perception and covered two main categories of glottalization: the glottal stop and creaky voice. The rate of glottalization in individual speakers ranged from 71.4 to 100.0% (native group) and from 25.0 to 72.7% (non-native group). The differences between native and non-native speakers are significant at the level $p < 0.05$, while the differences between males and females (both within and across the groups) are not significant. Three different positions (the intonational phrase boundary, the position after a non-syllabic preposition, and the word-internal boundary) are discussed in detail.

KEY WORDS:

Czech as a foreign language, glottalization, L2, non-syllabic preposition, prefix, pronunciation, prosodic boundary, Russian

1. INTRODUCTION¹

Numerous studies have examined foreign accents in the speech of non-native speakers and their perception by native speakers. This phenomenon affects both the speaker and the listener and has a direct impact on social interaction (cf. e.g. Dering — Munro, 2005). A foreign accent and the degree of deviation from native pronunciation are influenced by both the segmental and the prosodic aspects of speech. At the segmental level, even segments without phonemic status — such as the glottal stop in Czech — may have such an influence.

Adequate use of glottalization, which subsumes the glottal stop and its categories (see below), can not only help a non-native speaker approximate the speech of

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a native speaker, but also enhance communication, since it helps a listener to parcel a continuum of speech by signalling word boundaries.

Glottalization, as a significant irregularity in periodicity, amplitude or shape of glottal pulses, fulfils a number of linguistic functions and can occur in various contexts. For example, in German, it occurs in four distinct environments: onset-related glottalization, plosive-related glottalization, utterance-final glottalization and truncation glottalization² (Kohler, 1994; 1999). Onset-related glottalization signals the boundaries of intonational phrases, words or morphemes beginning with vowels, not only in German (Kohler, 1994; Rodgers, 1999), but also in English (Dilley — Shattuck-Hufnagel, 1995; Bissiri et al., 2011), Czech (Hála, 1967; Palková, 1997) and other languages.

Redi and Shattuck-Hufnagel (2001) have proposed a detailed categorization of glottalization. In addition to the glottal stop, they distinguish the so-called creaky voice³ (irregularity in the periodicity of glottal pulses), the creak (sustained low F₀ with almost complete alleviation), and two further categories.

Similarly, in a study examining the acoustic properties of glottalization in front of the Czech conjunction *a*, Skarnitzl (2004b) distinguishes two main categories: (a) glottal stop and (b) creaky voice and creak (addressed in the study as subcategories).

Other studies have examined influences that support or limit the presence of glottalization and the types of occurrence. They have addressed prosodic structure, prominence, speech rate, speech style and precision of pronunciation, the segmental context (e.g. the quality of surrounding vowels and the voicing of the consonants involved in glottalization), dialectal differences and differences across genders (cf. Priestly, 1976; Kohler, 1994; Dilley — Shattuck-Hufnagel, 1995; for Czech Hála, 1967⁴; Skarnitzl, 2004b; Pavelková, 2001). These studies have confirmed that there is significant inter- and intra-speaker variability in glottalization. For example, in an experiment based on American English, professional newsreaders showed a range of glottalization from 13% to 34%, while non-professional readers ranged “from less than 1% to 29%” (Dilley — Shattuck-Hufnagel, 1995, p. 587).

Hála (1955) was among the first to point out that the use of glottalization in Czech is individual. Volín (2012) presents quantitative data: in his study, glottalization rates for female professional newscasters ranged from 93.5% to 100.0%, and for male speakers from 65.5% to 98.9%. In the semi-spontaneous speech of non-professional speakers it ranged from 45.5% to 79.5% in the female group and from 24.6% to 54.7% in the male group.

Glottalization has also been the subject of cross linguistic studies and studies of second language acquisition. A number of studies have been devoted to glottalization in the speech of non-native speakers of English (e.g. German speakers: Bissiri —

2 It is the tensing of phonation at utterance breaks in medial prosodic phrases “where the vocal folds are adducted and where glottalization, therefore, alternates with a glottal stop” (Kohler, 1999).

3 In their terminology, “aperiodicity”.

4 Hála (1955) discussed these factors already in 1955. In the revised edition of this handbook (Hála, 1967) he also examined the enhanced use of glottalization in emotional speech.

Kraljevski — Hoffmann, 2013; Polish speakers: Balas, 2011; Schwartz, 2012); Czech speakers glottalize more often compared to British native speakers and glottalization in Czech is less influenced by phrase boundaries (Bissiri — Volín, 2010).

This paper focuses on speech production, examining the rate of vowel-related glottalization in the speech of Russian speakers who are beginning learners of Czech, comparing their reading of Czech with that of native speakers. An understanding of glottalization tendencies in non-native speakers can further our understanding of the process of L2 acquisition, and in particular the degree to which it is influenced by the sound patterns of the native tongue. Therefore, findings based on the comparison of glottalization in non-native Russian speakers of Czech and native Czech speakers have direct pedagogical applications. The appropriate use of glottalization can weaken a foreign accent and also decrease the impact of errors by Russian speakers that make their speech less comprehensible (Ramasheuskaya, 2008; Romaševská — Veroňková, in print), enhancing their ability to communicate in Czech.

In Czech, glottalization as a boundary signal occurs before a vowel at the beginning of a word, at the (strong) morphological boundary following a prefix, or in the middle of a compound word (Hála, 1967; Palková, 1997). Since glottalization as a boundary signal supports the comprehensibility of speech in Czech, its use is recommended in some specific styles of speech, in particular segmental surroundings, etc. (Palková, 1997; Hůrková, 1995). After an unvoiced non-syllabic preposition, it is only the glottalized vowel-onset that is considered canonical (Hála, 1967; Palková, 1997).

Czech can be classified among languages with relatively frequent glottalization. Compare, for example, the rates of glottalization in the speech of professional speakers of American English (Dilley — Shattuck-Hufnagel, 1995) and of Czech (Volín, 2012), as presented above. It has traditionally been claimed that glottalization is more common in the Bohemian part of the Czech Republic than in Moravia (Hála, 1967; Palková, 1997; Davidová et al., 1997; Bogoczová et al., 2000), though sufficient objective data are not available.

In general, glottalization is not as common in Russian as it is in Czech. However, according to research from the last decade, glottalization is not unusual in Russian, especially at boundaries of intonational phrases (Krivnova, 2002; 2005; Krivnova — Andreeva, 2007). Krivnova offers an overview of various linguists' opinions on the usage of glottalization in Russian (Krivnova, 2005; Krivnova — Andreeva, 2007). Even at the beginning of the 20th century, N. N. Durnovo stated that the glottal stop is “quite typical” for Russian literary pronunciation: “[Glottalization] starts words with an initial vowel at the beginning of speech and after vowels; in the middle of speech after consonants of a previous word a laryngeal stop does not occur” (as cited in Krivnova, 2005, p. 547).

However, this statement is in contradiction with later findings which claim that glottalization is very limited in Russian. According to A. A. Reformatsky, glottalization “may appear only when a preposition ending with a consonant is artificially separated from a noun with initial vowel: *k [ʔ]otcu*”⁵ (as cited in Krivnova, 2005, p. 548). S. S. Vysotsky observed that the glottal stop is often “found when there is

5 κ [ʔ]omuɣ [k ʔetʃu].



sandhi of a hard consonant with the following [i], thanks to which there can appear prosodic variations of such word forms as *vo[ty]menno* and *vo[tʔ]imenno*⁶ (as cited in Krivnova, 2005, p. 548). Krivnova (2005, p. 548) claims that in this case the glottal stop functions as “a word boundary marker and emphatic intensification of a word”. Similarly Kniazev and Moisejeva claim that the glottal stop is “most common after a final hard consonant of the previous word before initial [i] of the following word” (as cited in Krivnova, 2005, p. 548). Krivnova (2005, p. 548) concludes that there are two main functions of the glottal stop in Russian: “[I]t blocks resyllabification of sounds at word boundaries and their coarticulation.” I. G. Dobrodomov points out that the glottal stop at a morpheme juncture “distinguishes some minimal word pairs, such as *suženyj* — *s[ʔ]uženyj*, *podaročnyj* — *pod[ʔ]aročnyj*”⁷ (as cited in Krivnova, 2005, p. 548).

In both of the languages examined in this study, vowel-related glottalization may include not only the canonical glottal stop, but also other phenomena related to glottalization such as creaky voice (Kohler, 1994; Redi — Shattuck-Hufnagel, 2001; for Czech Skarnitzl, 2004b; for Russian Krivnova, 2002; Krivnova — Andreeva, 2007). Krivnova (2005) points out that Kniazev and Moisejeva were the first who stated that apart from the glottal stop, creaky voice can also be a realization of glottalization in Russian.

2. METHODOLOGY

2.1 RECORDINGS

A special text for reading was prepared for the purpose of the experiment (a short story of 40 words, 76 syllables). The text is a slightly emotional fictional story containing both narration and dialogue:⁸

Náš Ivan se s údivem podíval z okna: „Neuvěřitelné! Jsem v Americe.“ Za osm dnů přijede ONA, dívka jeho snů, ale on ještě neudělal nic, nekoupil nábytek, ani neuklidil v garáži. Byl však bez obav. K Aleně cítil velkou lásku.

In English:

[Our] Ivan looked out of the window, thinking. “Unbelievable! I am in America!” SHE, the girl of his dreams, was coming in eight days, but he hadn’t got anything ready. He hadn’t bought any furniture or cleaned up the garage. But he wasn’t worried. He was madly in love with Alena.

The text contained 14 potential positions where onset-related glottalization could oc-

6 *vo[ty]menno* [vetim’eniŋə], *vo[tʔ]imenno* [vetʔim’eniŋə].

7 *суженный* [suzeniŋ] — *с[ʔ]уженый* [sʔuzeniŋ], *подарочный* [pedarəʧniŋ] — *под[ʔ]арочный* [petʔarəʧniŋ].

8 The emotional mode was also supported graphically by the use of capital letters (in one word) and an exclamation mark (in a one-word sentence).

cur in standard Czech pronunciation. It included diverse segmental contexts (vowel, voiced/unvoiced consonant) and took into account the position of stress and the influence of phrasal units.

The text was read by two groups of non-professional speakers: non-native speakers of Czech whose first language is Russian (group RU) and native speakers of Czech (group CZ).

In the RU group there were 12 students (6 males, 6 females) attending a language school in Prague, aged 17–19 years. They had been in the Czech Republic for two months and were beginning speakers of Czech. The recordings of the RU were recorded in the classroom individually and directly to a PC, using an external microphone. (22 500 Hz, 16-bit resolution).

In the CZ group there were 11 students (4 males, 7 females) majoring in phonetics at the Faculty of Arts, Charles University, Prague. Their average age was twenty. All of them either came from the Bohemian part of the Czech Republic or they had lived in Bohemia for almost all of their school years. The recordings of the CZ were made in a recording booth (32 000 Hz, 16-bit resolution).

The speakers were instructed to read the text naturally, adequately to its mode.

2.2 ANALYSIS

The presence of glottalization was determined by perceptual analysis according to which a significantly salient impression of a glottal gesture had to be present, and once this had been established, the degree of glottalization was then rated. The decision regarding the presence of glottalization was based primarily on the authors' perception. Subsequently, the acoustic representation of glottalization was examined with the aid of oscilograms and spectrograms (software Praat 5.3.64; Boersma — Weenink, 2005).

The articulation of a glottal stop is characterized by the complete closure of the vocal folds and a sudden release with one or two irregular pulses in the waveform. This canonical form could be preceded by one or two pulses linked to the previous segment, the so called barbell glottal stop (Skarnitzl, 2004a; 2004b; Palková et al., 2004). Following Skarnitzl (2004a; 2004b) and his detailed description of the subtypes of creak/creaky voice, the period-to-period irregularity and lowering of F0 was checked. Only the presence or absence of glottalization was registered: at this point, further categorization based on acoustic properties was not the objective. Some of the less strident instances and other interesting cases will be discussed in Section 3.2.

3. RESULTS

In total, 322 tokens were analyzed, out of which 23 were excluded because of various dysfluencies and repetitions. Unsurprisingly, many more tokens were excluded from the non-native recordings (18 excluded items): in their speech, six Russian speakers made two or more errors in their reading of the targeted tokens. Some dysfluencies





also occurred in the recordings of the native speakers.

The CZ group did not experience any difficulties pronouncing individual targeted items: their errors were accidental. In the case of the RU group, however, one of the items, with a non-syllabic preposition, caused difficulties to seven speakers. We will return to this matter in Section 3.2.

Altogether, 299 tokens were isolated for further analysis: 150 from the RU group, and 149 from the CZ group.

3.1 RATE OF GLOTTALIZATION: SPEAKERS

With respect to the purpose of the study, two major hypotheses were stated. They focus on two factors: the native language of the speakers and their gender.

(a) Influence of the native language:

H_0 : There is no difference in the frequency of glottalization between the RU and CZ groups.

H_1 : There is a difference in the frequency of glottalization between the RU and CZ groups.

Corollary to H_1 : The frequency of glottalization is higher in the CZ group.

This hypothesis (a) was tested both on the entire RU and CZ groups and also separately for all males and all females.

(b) Influence of gender:

H_0 : There is no difference in the frequency of glottalization between males and females.

H_1 : There is a difference in the frequency of glottalization between males and females.

Corollary to H_1 : The frequency of glottalization is higher in the group of females. According to the findings of Volín (2012), Czech females glottalize significantly more often than males (see the data above in Part 1); similar data have been found for Russian by Krivnova (2002).

This hypothesis (b) was tested for all speakers regardless of their mother tongue and also separately for RU and CZ groups.

The significance of the difference was verified by a t-test at the level $p < 0.05$.

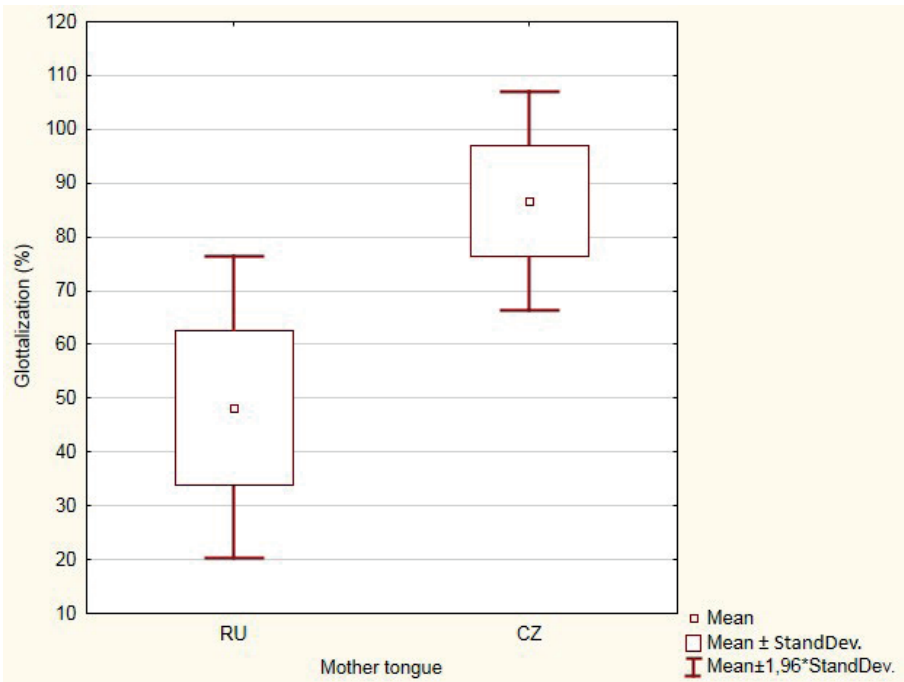
Table 1 shows the rate of glottalization for individual speakers with regard to their native language and gender.

Ad (a): The frequency of glottalization ranged from 25.0% to 72.7% within the RU group (the mean is 48.2%, with a standard deviation of 14.3%) and from 71.4% to 100.0% within the CZ group (the mean is 86.6%, with a standard deviation of 10.3%), see Table 1. The greater degree of inter-speaker variability conforms to previous studies (see Part 1). The difference between the RU and CZ group is significant at the level $p < 0.05$ ($p = 0.00$) (see Graph 1). The differences are also significant for groups homogenous in gender: the significance was confirmed for the difference between Russian

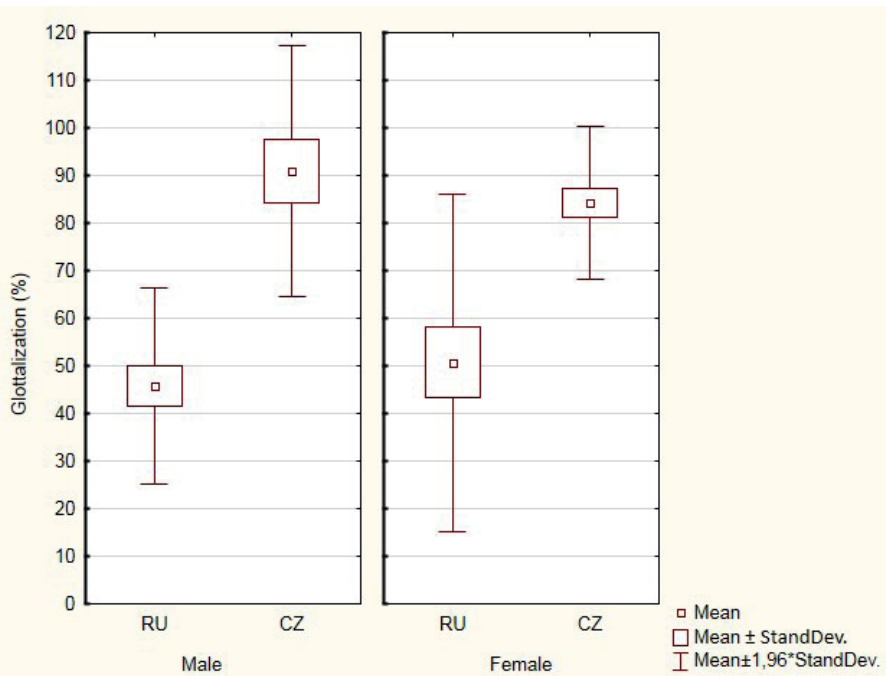


	Russian				Czech			
	Speaker	N	g	g in %	Speaker	N	g	g in %
male	M1	12	3	25.0	M1	14	10	71.4
	M2	13	6	46.2	M2	13	12	92.3
	M3	12	6	50.0	M3	14	14	100.0
	M4	14	7	50.0	M4	14	14	100.0
	M5	14	7	50.0				
	M6	13	7	53.8				
female	F1	12	3	25.0	F1	12	9	75.0
	F2	14	5	35.7	F2	14	11	78.6
	F3	10	5	50.0	F3	14	11	78.6
	F4	13	7	53.8	F4	14	12	85.7
	F5	12	8	66.7	F5	14	12	85.7
	F6	11	8	72.7	F6	14	12	85.7
					F7	12	12	100.0
	Sum	150	72			149	129	
	Mean			48.2				86.6
	SD			14.3				10.3

TABLE 1: Rate of glottalization according to the speakers’ native language and gender. N — number of potential positions of glottalization, g — rate of glottalization, SD — standard deviation.



GRAPH 1: Rate of glottalization: Native language. RU — Russian group, CZ — Czech group.



GRAPH 2: Rate of glottalization: Native language for groups homogenous in gender. RU — Russian group, CZ — Czech group.

and Czech males ($p = 0.00$) and between Russian and Czech females ($p = 0.00$) (see Graph 2).

Our data confirm H_1 for both factors: the rate of glottalization is higher in Czech speakers regardless of gender, and also when gender is taken into account. This finding is in accordance with our expectations.

Ad (b): The frequency of glottalization ranged from 25.0% to 100.0% in the speech of both males and females (the difference between males and females is not significant ($p = 0.63$; see Graph 3)). There is also no significant difference between males and females within the RU and CZ groups taken separately ($p = 0.58$ and 0.32 respectively; see Graph 2). These results indicate that it is not possible to refuse H_0 , in which case these findings do not correspond with those of previous studies (see Part 1).

This could perhaps be explained by the limited size of the corpus. However, the Czech data correspond with the findings of a parallel experiment analysing the reading of a text by native Czech students: in this experiment, the frequency of glottalization was very high regardless of gender (Veroňková, unpublished). We can hypothesize that the most important factors influencing the rate of glottalization in this type of text are the high degree of preparedness (read text) and the effort of speakers to employ higher style and precise pronunciation that, in a such short text, can be easily kept under control throughout the course of the reading.

3.2 RATE OF GLOTTALIZATION: INFLUENCE OF POSITION

The global results can cover the inner variability and therefore the usage of glottalization in three different positions was further inspected: (a) intonational phrase boundary, (b) non-syllabic preposition + onset-vowel word and (c) word-internal boundary. These positions were chosen deliberately, because the instances that we studied were on a different level of the phonological hierarchy and therefore the relations between the units displayed varying degrees of closeness in each case (see Table 2).

	Russian			Czech		
	g+	g-	N	g+	g-	N
IP (pause+)	12	6	18	7	1	8
IP (pause-)	4	0	4	12	1	13
PREP*	11 + 2	10 + 14	37	42 + 0	0 + 0	42
W	0	32	32	17	15	32
Sum	29	30	91	78	17	95
%	31.9	68.1	100.0	82.1	17.9	100.0

TABLE 2: Rate of glottalization in various positions. IP — intonational phrase (with/without previous pause), PREP — non-syllabic preposition and vowel-onset noun, W — word-internal boundary, g+/- presence of glottalization, g- — absence of glottalization, N — number of occurrences. * The sum in the cells shows the number of realizations according to the voicing of the prepositions: unvoiced consonant + voiced consonant pronunciation.

Even the data from the three selected positions confirm the higher overall frequency of glottalization in Czech speakers in comparison to Russian speakers that was found in the whole set (cf. Table 1). In the RU group, glottalization is present at a rate of 31.9%, whereas in the CZ group the rate is 82.1%. The data confirm that glottalization occurs in various ways depending on the type of position.

Ad (a): A prosodic boundary can be signalled by a pause (both silent and filled), a specific melodic contour and a significant change in speech rate (Daneš, 1957; Palková, 1997; 2006; Janoušková, 2008). There are two such examples in the text: (1)⁹ ... *dívka jeho snů // ale on ještě neudělal nic* (in English: ... the girl of his dreams, but he has not done anything) (5 occurrences); (2) ... *nekoupil nábytek // ani neuklidil v garáži* (in English: ... he has not bought any furniture, nor has he cleaned up the garage).

The realizations with and without a previous pause (IP pause+ / pause-) were distinguished (see Table 2); in general, glottalization prevailed at the intonational phrase boundary in both languages. In the RU group the rate is 16/22 (72.7%), and in the CZ group it is 19/21 (90.5%). The data confirm that the tendency to glottalize at the intonational phrase boundary is strong and that glottalization can function as a prosodic boundary marker. With the exception of one Czech speaker, none of the sub-

⁹ The intonation phrase boundary is marked with //.



jects directly linked the neighbouring segments: they used either glottalization (with or without a pause) or a pause without glottalization. The latter case appeared more often in our material than expected. In the Russian group, one third of realizations after a preceding pause were not glottalized, with the duration of pauses exceeding 290 ms. In the Czech data there was only one occurrence of this type of pronunciation. Although glottalization after a pause is supposed to be natural, literature also shows evidence of the absence of glottalization. For example, Kohler (1994) detected 15% of non-glottalized pronunciation in reading by Germans. In an experiment on French conducted by C. Fougeron (2001), one speaker (S1) glottalized in 100% of all instances after a pause, but another one (S2) did so in only 20% of cases, although the latter had a 75% glottalization rate in initial-phrase boundaries, nevertheless without previous pausing.

It is possible that the pronunciation could have been influenced by the tested samples themselves e.g. their syntactic structure, prosodic properties, the segmental level, and so on. The absence of glottalization was detected namely in the expression (1). The speech habits of the individual speakers in connection with the tendency or non-tendency for glottalization in their mother tongue can also play a role.

Ad (b): The combination of a non-syllabic preposition and a vowel-initial word does graphically look like two words, but their relationship is very close in sound. In Czech language there are 4 such prepositions, in written form: *k* (in English 'to'), *s* ('with'), *v* ('in') and *z* ('from'). They can be pronounced voiced or unvoiced depending on the following sound context. In a sequence with a following glottal stop (an unvoiced segment), the voiced prepositions lose their voicing and change to the unvoiced counterparts: *v* > [f] and *z* > [s]. In casual speech, an unvoiced consonant followed by a vowel without glottalization can also occur (Hála, 1967) and especially in the Moravian part of the Czech Republic we often find pronunciation without glottalization, but with a voiced realization of the consonant *k* > [g] and *s* > [z] (Palková, 1997; Davidová et al., 1997; Bogoczová et al., 2000; Balhar et al., 2005, pp. 406–409). The fourth variant, which is the combination of voiced obstruent + glottal stop + vowel, e.g. [z ʔvowel] is not discussed in Czech handbooks on account of being unnatural to Czech speakers, but it is a pronunciation we can find in the speech of non-native speakers. There was only one example for each preposition in the recorded text. Table 2 shows the rate of glottalization with regard to the voicing of the preposition and Table 3 shows the glottalization separately for each tested preposition.

In this combination a substantial difference between RU and CZ groups may be observed. The Czechs pronounced it quite uniformly (42/42, 100.0%) with glottalization and an unvoiced preceding consonant (e.g. canonically). In the Russian group glottalization appeared only in 13/37 samples (35.1%) (11× also with an unvoiced consonant, but 2× with a voiced consonant). This finding corresponds with the observations of A. A. Reformatsky (see Part 1) about the unnaturalness of glottalization in this combination in Russian, and illustrates the transfer of sound patterns from the mother tongue to the target language.

	Expres- sion	unvoiced g+ (canonical)	unvoiced g-	voiced g-	voiced g-	Sum	in Russian	in English	
(3)	k Aleně	[k ʔaleɲɛ]	2 [k a]	10 [g a]	0 [g ʔa]	0	12	k <u>Alēne</u>	to <i>Alena</i>
(4)	s údivem	[s ʔu:ɟvɛm]	5 [s u:]	0 [z u:]	0 [z ʔu:]	0	5	s <u>udivlɛniɛm</u>	with <i>astor- nishment</i>
(5)	v Americe	[f ʔamerice]	0 [f a]	0 [v a]	9 [v ʔa]	0	9	v <u>Amerike</u>	in <i>America</i>
(6)	z okna	[s ʔokna]	4 [s o]	0 [z o]	5 [z ʔo]	2	11	iz <u>okna</u>	from a window
	Sum		11	10	14	2	37		

TABLE 3: Non-syllabic preposition + onset related vowel: variants of pronunciation and number of occurrences in Russian speakers. g+/- presence of glottalization, g- — absence of glottalization. In the Russian translation the canonical word stress is underlined.

The individual samples share some common properties, but partly also demonstrate a certain variability.

The expression (5) *v Americe* was pronounced with the voiced consonant followed directly by vowel [v a-], i.e. without glottalization, in all the occurrences. The expression (3) *k Aleně* was pronounced almost consistently without glottalization with the unvoiced consonant preserved [k a-]. In two instances the realization corresponded to the Czech group [k ʔa-], however in one of the samples the glottalization was perceptually weak. In the pronunciation of these two expressions, the preservation of a voiced consonant (*v Americe*) and a voiceless consonant (*k Aleně*) probably influenced by the orthographic form and the pronunciation in mother tongue. The expression (4) *s údivem* is one which contained a high number of dysfluencies (of various types) so that more than half of the samples (7/12) had to be excluded. The rest of the samples were realized consistently, same as in the Czech group: unvoiced consonant and glottalization. The expression (6) *z okna* showed the highest variability: it was pronounced in three different ways in the RU group. Two of the variants were represented by a similar number of occurrences: a voiced consonant linked directly to the next vowel [z o-] (5 occurrences from 11) and the realization with glottalization and the preceding unvoiced consonant (the canonical one) [s ʔo-] (4 occurrences). The non-native realization, namely the combination of a voiced consonant followed by glottalization, as mentioned above, was found twice and in both instances it was the case of this expression [z ʔo-].¹⁰

Glottalization is not the only phenomenon functioning as a boundary marker in Czech. Another one is word stress, which is –contrary to free word stress in Russian — fixed on the first syllable of a word. The incorrect position of word stress, quantity of vowels and their full pronunciation are among the most prevalent errors produced by Russians speaking Czech (Ramasheuskaya, 2008). We were interested in the question of whether there could be some relationship between glottalization and the position of word stress in the analysed samples.

10 Apart from the situation when the speaker makes a (short) pause after the preposition, we hypothesize that this pronunciation appears in informed speakers who are aware of glottalization in Czech, but at the same time do not apply devoicing to the preposition.



In the analysed samples of the expression *v Americe*, the word stress occurred predominantly on the first syllable (in 7/9). In the Russian counterpart of this expression, the word stress is canonically on the second syllable; this pronunciation occurred twice (in 2/9) in our material. It would be possible to conclude that although the Russians did not acquire the segmental pattern of this expression, they acquired its prosodic pattern. Contrary to this, in the occurrences of the expression *k Aleně*, the word stress most often occurred on the second syllable (in 11/12), analogically to the canonical Russian pronunciation. (The one speaker who used glottalization did put the word stress to the first syllable.) The fluent pronunciation of the expression *s údivem* was consistent not only concerning glottalization but also with word stress on the first syllable as in the Czech samples (in 5/5). Similarly, the samples of the expression *z okna* were stressed on the first syllable regardless of glottalization (in 11/11). Although the canonical Russian counterparts of the later two expressions do not have stress on the initial syllable, the speakers placed word stress on the first syllable in Czech.

It seems that the position of the word stress was learnt either earlier or simultaneously with glottalization.¹¹ Conversely, we can say that if pronunciation with glottalization was employed, the form was also pronounced correctly with regard to the position of word stress.¹²

Ad (c): The third potential position of glottalization lies on a word-internal boundary, i.e. within a word. Three examples were tested and all of them contain a strong morphological boundary due to the presence of the negative prefix *ne-* (English: 'un-' or 'non-') (see the Table 2, row W).

For this combination there is once again a significant difference between the RU and CZ groups, but there is a certain tendency towards lower rates of glottalization in both groups in comparison to the sequence with the non-syllabic preposition. While approximately one third of the latter combination was glottalized in the RU group, none of the Russian speakers used glottalization on the internal word boundary (0/32). The CZ group shifts from consistent glottalization after the non-syllabic preposition to a word-internal glottalization rate of 53.1% (17/32).

Three expressions were tested: an adjective (7) *neuvěřitelné*, and two verb forms (8) *neudělal*, (9) *neuklidil* (see Table 4).¹³ In our material there is no difference in the rate of glottalization among the analysed expressions.

In future experiments it would be worth using a larger, expanded sample and evaluating the consistency of individual speakers. In our material on the one hand there were two speakers who did not glottalize in any of the items, and on the other hand four speakers used glottalization in at least two words.

11 We deliberately speak only of the position, i.e. the quantity and quality of vowels aside.

12 Exercises to practice glottalization in vowel-onset (e.g. after non-syllabic preposition) in L2 students could support the correct position of word stress in Czech, because both are focused on the first syllable of a word.

13 In all of the tested samples, the following word root begins with a vowel [u], so the same combination of vowels *eu* is present.

	Expression	g+	g-	Sum	in Russian	in English
(7)	neuvěřitelné	7	4	11	<u>neverojatno</u>	unbelievable
(8)	neudělal	6	5	11	ne <u>sdelal</u>	he has not done
(9)	neuklidil	4	6	10	ne <u>ubral</u>	he has not cleaned

TABLE 4: Rate of glottalization on the internal boundary after the prefix *ne-* in the Czech group. g — glottalization, V — vowel. In the Russian translation word stress is underlined.

4. CONCLUSION

Results from the experiment measuring the rate of onset-vowel glottalization show that the difference between beginner Russian learners of Czech and the native speakers was significant in that the native speakers glottalized more. Conversely, the differences in rate of glottalization between men and women were not significant; neither in the whole sample, nor within the homogeneous language groups. Both groups tend to glottalize in the phrase-initial position, although there were samples without glottalization after a pause in the RU group. In general, it was confirmed that glottalization functions as the initial phrase boundary marker. In the Russian group, the rate of glottalization corresponds to the strength of the phrase boundary — the deeper the boundary, the higher the rate of glottalization: phrase boundary > non-syllabic preposition + onset-vowel > word-internal boundary. For the Czech group it rose in this sequence: phrase boundary / non-syllabic preposition + onset-vowel > internal word boundary. While the Czechs glottalized all the onset-vowels after non-syllabic prepositions, in the Russian group it was just one third. The glottalization rate on the word-internal boundary was lower than in the previous context. In the Czech group, glottalization occurred in about a half of the samples, in the Russian group glottalization was not detected at all. For the position of word stress in combination with a non-syllabic preposition in Russian speakers, the data show that the position of word stress is learnt earlier than glottalization or together with glottalization.

The results proved that glottalization is a principal topic of research and it is worth studying further, in the context of both learner and native Czech. Current research is focused on beginner Russian learners of Czech and their glottalization after non-syllabic prepositions (Tolkunova, 2015). More insights into the learning process of glottalization patterns could be gained by analysis of glottalization in groups of speakers with different language proficiency levels and first languages. It would be advisable to obtain and analyze a balanced sample for the native group as well, concentrating on the dialect of speakers.

The tendencies suggested by these results certainly need to be verified on a larger sample of speakers as well as on spontaneous speech (not read); it is also crucial to bear in mind factors both of linguistic (sound context, prosodic and morphologic boundary, etc.) and non-linguistic (gender, dialect, communication situation) nature.





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SUMMARY:

Výskyt rázu před vokálem v českých čtených textech: ruskojazyční vs. rodilí mluvčí. Příspěvek přináší výsledky dílčí sondy, která zkoumala výskyt rázu před vokálem v českých projevech ruskojazyčných mluvčích ve srovnání s rodilými mluvčími. Termín ráz je zde použit jako souhrnné pojmenování pro základní glotalizační jevy (Palková et al., 2004). Ráz bývá v češtině realizován nejčastěji jako hlasivková explozíva (*glottal stop*) a jako tzv. třepená fonace (*creaky voice*) (Skarnitzl, 2004b). Výzkumným materiálem byly nahrávky krátkého čteného textu (40 slov, 76 slabik), který obsahoval 14 potenciálních pozic pro výskyt rázu před vokálem. Skupinu respondentů tvořilo 12 nerodilých mluvčích češtiny na úrovni začátečníků s mateřštinou ruštinou (RU; 6 mužů a 6 žen) a 11 rodilých mluvčích (CZ; 4 muži a 7 žen). Po vyloučení vzorků s neplnulostmi bylo celkem analyzováno 299 vzorků. Základem byla poslechová analýza s následným ověřením akustické reprezentace. Z pohledu individuálních mluvčích se výskyt rázu pohybuje v ruské skupině od 25,0 % do 72,7 %, v české skupině od 71,4 % do 100,0 %. Rozdíl mezi skupinou nerodilých a rodilých mluvčích je statisticky významný na hladině 0,05 ($p = 0,00$), v souladu s očekáváním rodilí mluvčí užívají rázu více. Z hlediska pohlaví se oproti předchozímu výzkumu (Volín, 2012) neprokázal rozdíl mezi skupinou mužů a skupinou žen, a to ani celkově, ani v rámci jazykově homogenní skupiny. Domníváme se, že mezi hlavní příčiny patří typ textu a jeho délka (krátký čtený text) a snaha mluvčích (bez ohledu na pohlaví) o vyšší styl a přesnou výslovnost. Četnost rázu vykazuje u jednotlivých pozic velkou variabilitu. Podrobněji byly analyzovány tři typy pozic: (a) v iniciální pozici promluvového úseku, tj. na prozodickém předělu, (b) ve spojení jednoslabičné předložky a následujícího substantiva a (c) na morfolgickém švu uvnitř slova. Ad (a): Na hranici promluvového úseku převažuje realizace s rázem (skupina RU 16 případů z 22, tj. 72,7 %, skupina CZ 19 případů z 21, tj. 90,5 %) a potvrzuje se tak, že ráz funguje jako signál prozodické hranice. Při rozlišení realizace s předchozí pauzou a bez ní se ukázalo, že ve skupině RU byla u jedné ze dvou analyzovaných pozic třetina výskytů po pauze realizována bez glotalizace (6 z 18) (srov. Kohler, 1994; Fougeron, 2001). Ad (b): Realizace kombinace s neslabičnou předložkou se mezi rodilými a nerodilými mluvčími lišily. U českých mluvčích byla realizace konzistentní, ve všech případech (42 ze 42, tj. 100,0 %) šlo o kanonickou podobu s rázem a s předchozí neznělou souhláskou. U ruských mluvčích se glotalizace vyskytovala jen ve 13 případech z 37 (35,1 %), z toho v 11 případech také s předchozím neznělým konsonantem, ve 2 případech se znělým konsonantem; četnost rázu byla u čtyř analyzovaných pozic/kontextů dosti variabilní. Další šetření sledovalo možnou spojitost rázu a pozice slovního přízvuku. Ad (c): Glotalizace uvnitř slova je v obou skupinách nejslabší, její četnost se však liší. U ruských mluvčích se v této pozici nevyskytla glotalizace ani jednou (0/32). U českých mluvčích se objevila přibližně v polovině případů (17/32, tj. 53,1 %). Výzkum v této oblasti bude užitečné dále rozšiřovat a prohlubovat; navazujícím experimentem je analýza výskytu rázu po neslabičných předložkách u ruskojazyčných mluvčích v češtině (viz Tolkunova, 2015).

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