DELETION OF GLOTTAL STOP BY PROFESSIONAL SPEAKERS[1]

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REDUKCE RÁZU V PROJEVECH PROFESIONÁLNÍCH MLUVČÍCH

V příspěvku jsou prezentovány výsledky výzkumu, jenž je zaměřen na použití a potenciální redukci rázu v mluvním projevu 37 profesionálních mluvčích – moderátorů studiového televizního zpravodajství. Přestože ráz nebývá běžně zahrnut do sond zaměřených na řečový projev obecně (tj. s přihlédnutím k segmentálním i suprasegmentálním jevům zvukové roviny), na základě některých nedávných studií a poslechových testů (Kopečková 2014; 2020; Štěpánová 2019) lze poukázat na jeho význam při hodnocení kvality řeči. Projev mluvčího, jenž pravidelně ráz redukuje, může na posluchače působit až nedbale.

Dle pravidel spisovné české výslovnosti (Hůrková-Novotná 1995) by měl být ráz pravidelně užíván po nevokalizovaných prepozicích k, v, z, s, ovšem pro zřetelnou a srozumitelnou výslovnost se zejména v případě profesionálních mluvčích doporučuje zachovat realizaci rázu ve všech pozicích před vokálem, a to po pauze i po prefixu.

Prezentovaný výzkum je konkrétně zaměřen na frekvenci užití rázu v řeči televizních moderátorů. Cílem analýzy je zjistit, zda tito mluvčí mají tendenci redukovat ráz před vokály častěji ve specifických fonologických kontextech (např. na začátku slov, po nevokalizovaných prepozicích, po prefixu, před spojkami atd.), či je redukce rázu v projevu náhodná. Dále jsou zjištěná data komparována v rámci tří atributů: pohlaví moderátorů, televizní stanice a typu pořadu. Výsledky analýzy jsou součástí probíhajícího dlouhodobého výzkumu zaměřeného na užívání rázu v řeči profesionálních i neprofesionálních mluvčích na území Čech, Moravy a Slezska.

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Klíčová slova: ráz; hlasivková explozíva; fonetika; ortoepie; moderátor; televizní zpravodajství; mluvní projev

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INTRODUCTION

A glottal stop is a phone of the Czech language that appears at the onset of words and morphemes beginning with vowels and separates them from preceding units. It is a consonantal sound characterized by the occlusion of the vocal tract, more or less regular vibration of vocal chords, and creaky or breathy voice (Palková et al. 2004). Czech native speakers use the glottal stop naturally if a vowel or diphthong is articulated at the beginning of a word after a pause; potential reduction or deletion of this sound usually does not affect the meaning (provided there is sufficient context), but may distinguish, e.g., *věděl a* [vjɛɟɛl ʔa] ("he knew and…") from [vjɛɟɛla] ("she knew"). The phonological rules accentuate the use of the glottal stop after non-syllabic prepositions *v* ("in"), *k* ("to"), *z* ("from"), and *s* ("with"), for example *v Olomouci* ("in Olomouc") pronounced as [f ʔolomoʊ̄tsɪ], but not *[v olomoʊ̄tsɪ] or *[f olomoʊ̄tsɪ].

Recent studies (Kopečková 2014; 2020; Štěpánová 2019) have proven that the standard use of the glottal stop affects the quality of spoken discourse. More detailed analyses, e.g., perception tests, demonstrated that the speakers who delete this sound systematically are ranked lower as the listeners criticize their negligent, careless pronunciation and low comprehensibility. Hence, the guides of standard Czech pronunciation advise those speakers to articulate the glottal stop in all contexts required (Hůrková-Novotná 1995).

Regarding its specific nature, the glottal stop has been a subject of numerous papers and monographs in both phonetics and phonology: these studies focus, besides other things, on terminology, on the varieties and use of the glottal stop (Machač – Skarnitzl 2009; Palková 2016; Skarnitzl – Šturm – Volín 2016), its frequency in spoken discourses and reading (Volín 2012), articulation in various positions inside phonetic units (Pavelková 2001; Dilley et al. 1996), and on non-standard pre-glottalization before consonants (Skarnitzl – Machač 2012). Last but not least, the glottal stop has been analysed as a feature of professionals' pronunciation in public settings.

The present study discusses the frequency of glottal stop deletion in the speech of TV news presenters. It addresses a question of whether these speakers tend to delete the sound systematically in specific vocalic contexts, or just randomly. All speakers are compared and evaluated with respect to their gender, a TV channel, and a type of a programme.

1 DATA PROCESSING AND METHODOLOGY

This study was conducted as a part of comprehensive research on TV presenters' speech patterns. The use of the glottal stop was examined as a feature of standard pronunciation enhancing comprehensibility and a cultivated style of the public spoken discourse (Kopečková 2020: 111–121).

The study included 37 recordings of TV presenters (19 female, 18 male),[2] each 6 minutes in length, that were gathered from March to May 2017 (i.e., 222 recordings in total). The speakers were selected from four Czech TV channels (Czech Television, a public broadcaster, and commercial channels Nova, Prima, Barrandov)[3] and three programme types for each channel (news broadcasting, sport, weather forecast).[4]

The recordings were downloaded either from TV websites, or made with the use of a voice recorder in real time if the audio was not available online; they were subsequently converted to .mp3 format and cut in length in audio editing software. Complete performances of individual speakers were then compiled and equalized in Audacity. All samples were of sufficient acoustic quality without noises. In order to analyse individual phonetic features, all speeches were transcribed, each of the final recordings containing between 850 and 1,050 words.

Deletion of glottal stops was identified auditorily by the analyst and in case of unclear audio perception verified on the oscillograms in

2 F = female, M = male.

3 CT = Czech Television, Nov = Nova, Pri = Prima, Bar = Barrandov.

4 N = news, S = sport, WF = weather forecast.

Praat software.[5] The analysis focused on glottal stops or their deletion in all positions defined by phonological rules of standard Czech, i.e., not only after non-vocalized prepositions, since the professional speakers should keep the glottal stop articulated wherever it is a norm (see Introduction). Glottal stops used in abbreviations (*NBA*, *ODS*, etc.) and at the beginning of prosodic units were excluded, as all Czech native speakers articulate the sound intuitively in these positions.

The term *deletion* here corresponds to an obvious omission of the glottal stop that leads to the overlap of neighbouring sounds. All deletions were classified into categories according to the phonological contexts where the glottal stop is normative and can thus be expected:

- a boundary between two lexical words (LW), including the combinations of C + V and V + V;[6]
- a boundary between a vocalized preposition/the preposition *od* (“from”) and the following word (VPOD);
- a boundary between a non-vocalized preposition and the following word (NP);
- words preceding or following the conjunctions *a*, *i* (“and”) and the prepositions *o* (“about”) and *u* (“next to”) (AIOU);
- words preceding or following the conjunctions *aby* (“in order to”), *ani* (“neither–nor”), *ale* (“but”) (AAA);
- a boundary between a prefix and a stem or between two stems in a compound (PSC).

Quantitative analysis of data compared the total number of normative vocalic contexts for the glottal stop with the number of deletions in each position. The results hereinbelow are presented in absolute terms and include the average, maximum and minimum values, as well as the standard deviation (SD) and the median (Med). The error ratio (ER) is given in percentages.

5 Online at https://www.fon.hum.uva.nl/praat/.

6 C = consonant, V = vowel.

Analysis of deletions per speaker made it possible to identify the vocalic contexts in which each speaker tends to omit the glottal stop most frequently, and to evaluate the quality of their speaking. The results were further compared with regard to gender (Chapter 3.1), TV channel (Chapter 3.2), and programme type (Chapter 3.3).

2 FINDINGS

Six-minute speeches by 37 speakers provided 4,631 situations in which the glottal stop was supposed to be articulated following the phonological rules, that is 125.16 occurrences per speaker (SD = 27.61). In these vocalic contexts, the speakers deleted the glottal stop 449 times (12 times on average), thus the error ratio of 9.7% can be evaluated as a good result regarding the quality and comprehensibility of TV presenters' speaking.

It is noteworthy, however, that there were considerable differences among the individual speakers: a frequency of deletions was between 0 (Min = 0) and 52 (Max = 52) occurrences, which means that some speakers used the glottal stop accurately and systematically, while others tended to delete it in over 30 % of cases.

Regarding the vocalic context, the most frequent context for normative glottal stops was found at the boundaries between two lexical words in both combinations of C + V and V + V, (2,275 occurrences, i.e., 61 on average), which corresponded to the general hypothesis. The rarest occurrences were, on the other hand, between a prefix and a stem and in compounds (63 occurrences, 2 on average). Figure 1 below gives a complete overview of all positions in which the glottal stop was normative, and shows the frequency of its deletion.

Articulation of the glottal stop with the conjunctions *a*, *i*, and the prepositions *o*, *u* (AIOU) was the second most frequent pattern. The normative glottal stop was expected in 1,562 instances, i.e., 700 fewer than in the LW position. Nevertheless, the number of deletions differs only in 34 instances for these two positions (196:162), so the

error rate becomes higher for AIOU in absolute terms; the 2% variation is insignificant, however.

In contrast to the LW position, the combination with the conjunctions *aby*, *ani*, *ale* (AAA) showed unexpected results: the glottal stop was normative in 335 situations only (9 on average), but was deleted 55 times with the 16% error rate. A similar error rate was found after non-vocalized prepositions (NP), where 12% of glottal stops were deleted.

Glottal stop deletion in particular vocalic context												
	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	2,275	196	233	16	158	19	1,562	162	335	55	63	1
ER %	8.62		6.87		12.03		10.37		16.32		1.59	
Average	61.49	5.3	6.3	0.43	4.27	0.51	42.22	4.38	9.05	1.49	1.7	0.03
SD	21.11	6.19	2.69	0.8	2.5	0.96	9.72	4.9	5.3	1.89	1.54	0.16
Max	131	27	11	3	10	4	82	19	26	7	5	1
Min	34	0	0	0	0	0	25	0	1	0	0	0
Med	61	3	5	0	4	0	42	3	9	1	1	0

Figure 1: Glottal stop deletion in particular positions / vocalic contexts. Each column shows the number of situations in which the glottal stop is normative (SIT) and the number of respective deletions (DEL). The error rate is given in percentages for each position.

It should be noted that the instances of deletion in AAA and NP especially are relatively low and statistically insignificant if given in absolute terms. It is possible that the absence of the glottal stop between a non-vocalized preposition and a vowel, unacceptable in standard pronunciation (Hůrková-Novotná 1995), is just an individual feature of pronunciation of the particular presenters. Moreover, such findings indicate that the absolute terms cannot provide a representative sample in this type of analysis.

The error rate for each position is given in Chart 1:

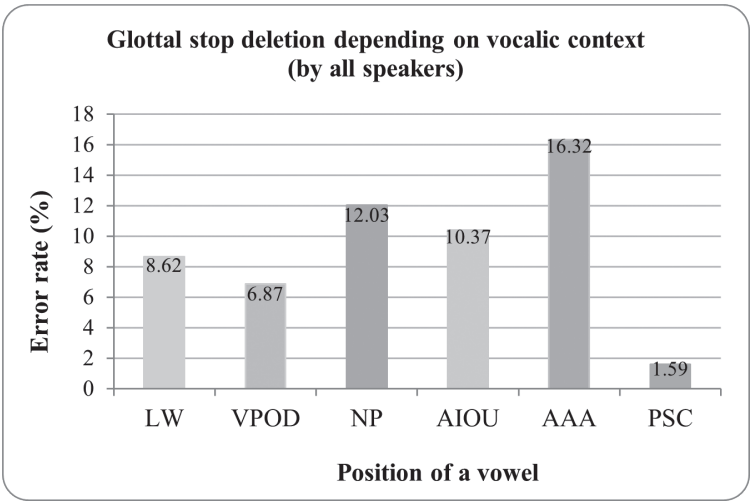


Chart 1: Total error rate (in percentages) in articulation of the glottal stop

Chart 1 suggests that the least frequent type of deletion (with a sole occurrence in the data set) is the one before a vowel in compounds or preceded by a prefix (PSC). Similarly, most speakers tend to keep the glottal stop after vocalized prepositions and before the preposition *od* (VPOD). The average rate of deletions was detected in the LW and AIOU positions. It should be noted that this data might be skewed since the speakers produced the texts of a various content, i.e., with different phonological context that did not contain all positions (only LW, AIOU and AAA were present in all speeches, see Figure 1). The results, therefore, are to be verified in a subsequent study with the same text for all speakers.

2.1 GLOTTAL STOP DELETION BY GENDER

Regarding speakers' gender, the number of situations was similar for both female and male speeches in all positions, since female speeches contained 2,500 potential phonological contexts for the glottal stop and the male ones 2,131. The number of deletions, however, indicated male speakers tended to delete the sound almost twice as often (in

296 instances) as the females (153), although their speeches contained fewer positions where the glottal stop was normative (see Chart 2).

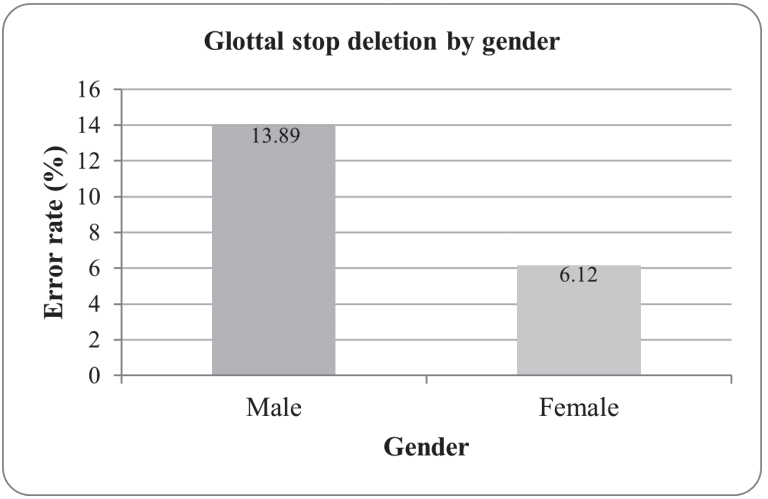


Chart 2: Error rate (in percentages) in articulation of the glottal stop by gender

Similar results were achieved by a more general study on pronunciation standards (Kopečková 2014): out of 11 speakers who gave unsatisfactory performance 8 were male. Higher number of deletions by males is mentioned also in Volín (2012)—females articulated the glottal stop in 97% of cases, males in 88%, but these studies are not fully comparable due to a different number of subjects and different methodology.

It is notable that male speakers got low score also in perception tests by non-expert viewers (Kopečková 2020). The evaluations commented on male's "muttering" and "careless, lax pronunciation" which might be the result of sloppy articulation, including the glottal stop deletion and the subsequent overlap of sounds.

Both males and females deleted the glottal stop in the same positions. More frequent deletion by the males is evident in almost all positions, with the exception of NP and PSC where only 1 female speaker deleted the sound. For more details see Figure 2 and Chart 3.

Glottal stop deletion by gender												
FEMALE	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	1,268	64	120	4	72	9	828	53	177	22	30	1
ER %	5.05		3.33		12.5		6.4		12.43		3.33	
MALE	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	1,007	132	113	12	86	10	734	109	158	33	33	0
ER %	13.11		10.62		11.63		14.85		20.89		0	

Figure 2: Glottal stop deletion in particular positions / vocalic contexts. Each column shows the number of situations in which the glottal stop is normative (SIT) and the number of respective deletions (DEL). The error rate is given in percentages for each position.

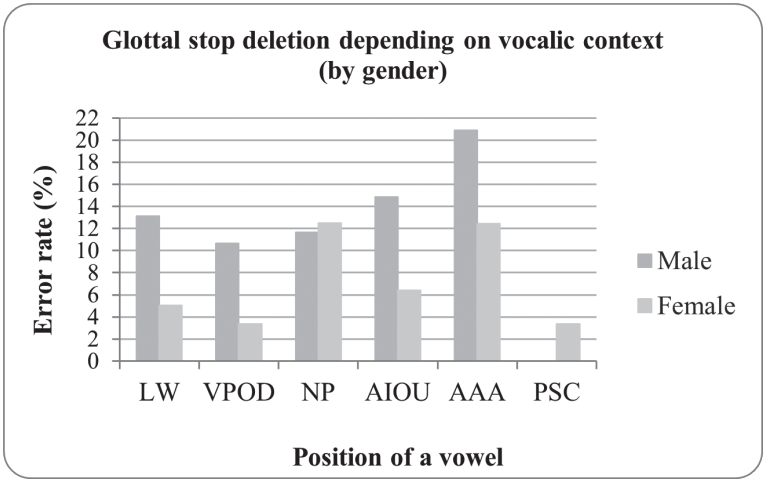
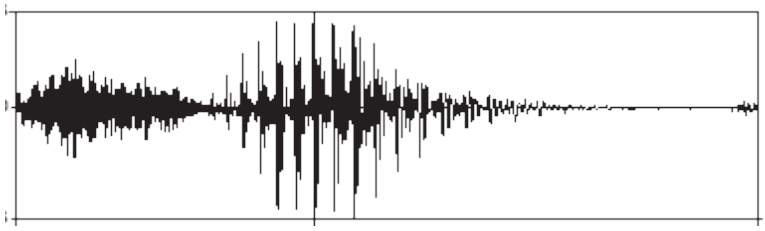


Chart 3: Error rate (in percentages) in articulation of the glottal stop in particular positions by females (light grey) and males (grey)

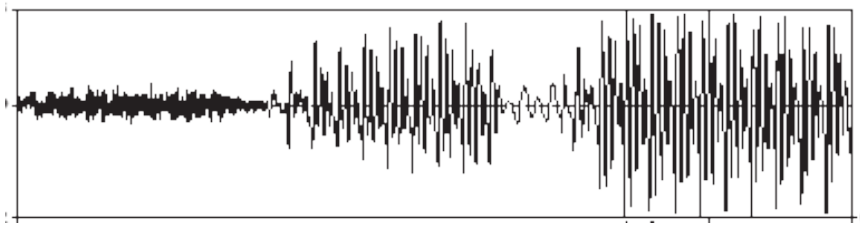
As suggested hereinabove, the error rate in the individual positions mostly corresponds to the total error rate (see Figure 1), i.e., the males deleted the glottal stop more often than the females, with the exception of the NP position which represents a phonological

context problematic for both genders. Moreover, males' error rate in the AIOU position exceeded the total error rate (compare with Chart 1); this can be explained by the occurrence of the phrase *no a* ("and so") which was higher in the males' speeches and where all men deleted the glottal stop systematically.

The specific examples suggest that, in most cases, the TV presenters respect the rule prohibiting voiced prepositions before vowels, pronounced in regional varieties in Moravia, e.g., *v okně* ("at the window") *[v okɲɛ]. The speakers, still, deleted the glottal stop after the devoiced preposition, i.e., *[f okɲɛ]. The authentic examples without the glottal stop included, for instance, the prepositional phrases *z aut* ("from the cars") *[s aʊ̄t] and *v areálu* ("in the grounds") *[f arɛaːlu]. A complete deletion of the glottal stop and devoicing of the fricatives [z] and [v] is captured in Pictures 1, 2.



Picture 1: Glottal stop deletion after devoiced prepositions: [s aʊ̄t]



Picture 2: Glottal stop deletion after devoiced prepositions: [f arɛ], a part of the phrase [f arɛaːlu]

2.2 GLOTTAL STOP DELETION BY TV CHANNEL

The error rate in articulation of the glottal stops analysed with respect to various TV channels is highly variable: it varies from channel to channel and differs from the total error rates in particular phonological contexts. Chart 4 demonstrates a high frequency of glottal stop deletion on Nova (15%) in contrast to a 4% error rate on Barrandov:

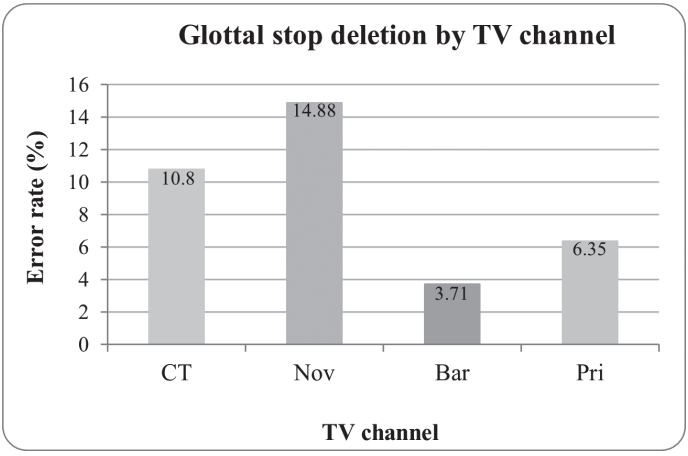


Chart 4: Error rate (in percentages) in articulation of the glottal stop in particular positions by TV channel

A low error rate on Prima might be affected by a lower number of situations in which the glottal stop could occur. Each set of texts recorded from CT 1, Nova and Barrandov included over 1,000 potential instances of the sound (CT 1 = 1,407, Nova = 1,431, Barrandov = 1,132), while the data from Prima only 661 instances. Such discrepancy could bias the results if there was one particular position with a higher error rate. Moreover, the data for Prima include only the speeches from news broadcasting, as other programme types were not available.

In comparison to the total results (the error ratio 9.7%), it was only the public channel CT 1 that reached the average score. It can thus be concluded that the tendency to keep the glottal stops articulated is influenced neither by a type of medium (public vs. commercial), nor by the presenters' education.

It is evident that the number of phonological contexts for the normative glottal stop is similar on all channels apart from Prima. It can be assumed, therefore, that all texts contained similar phrases, in spite of their different content.

The highest error rate was found in the positions AAA, NP, and AIOU (see Figure 3). In the NP position, the worst score was achieved by Nova (23% error rate) in contrast to CT 1; Prima and Barrandov are ranked average. Nova and CT 1 got almost equal score in the AIOU and AAA positions—the glottal stop was deleted in 25% of segments with the conjunctions *ani*, *ale* and *aby*, whereas speakers from Prima and Barrandov mostly followed the phonological rules in these contexts.

The segments with vocalized prepositions (VPOD) were mispronounced by the speakers from Nova most frequently, while the deletions on Prima and CT 1 were only occasional. The speakers from Barrandov observed the standard pronunciation rules in all cases, although the total number of situations in the VPOD position was comparable to other channels.

Glottal stop deletion by TV channel												
CT	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	679	62	68	3	54	1	482	60	102	25	17	1
ER %	9.13		4.41		1.85		12.45		24.51		5.88	
NOV	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	743	99	67	10	52	12	463	70	91	22	15	0
ER %	13.32		14.93		23.08		15.12		24.18		0	
BAR	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	526	13	61	0	29	3	402	20	98	6	16	0
ER %	2.47		0		10.34		4.98		6.12		0	

PRI	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	327	22	37	3	23	3	215	12	44	2	15	0
ER %	6.73		8.11		13.04		5.58		4.55		0	

Figure 3: Glottal stop deletion in particular positions / vocalic contexts. Each column shows the number of situations in which the glottal stop is normative (SIT) and the number of respective deletions (DEL). The error rate is given in percentages for each position.

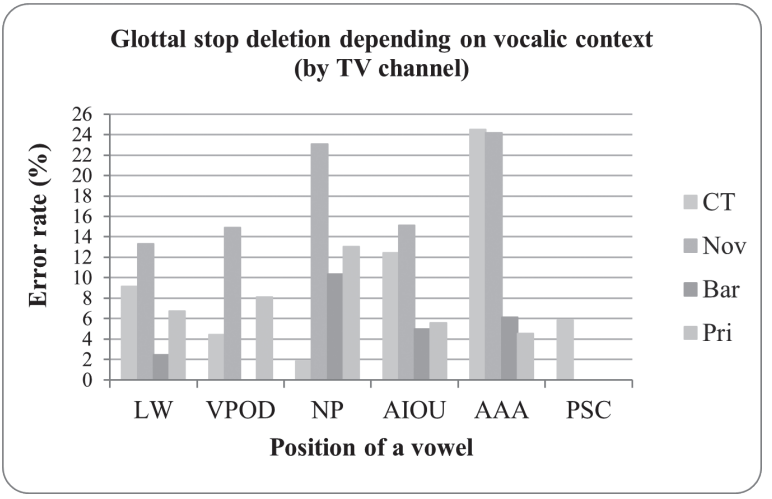


Chart 5: Error rate (in percentages) in articulation of the glottal stop in particular positions on Nova, CT 1, Barrandov, and Prima.

2.3 GLOTTAL STOP DELETION BY PROGRAMME TYPE

The spoken performances assessed by a programme type were rather balanced if compared to other variables (i.e., gender, TV channel): the error rate was about 9% for news and sport presenters (N = 8.6%, S = 8.8%, which corresponds to the average value), and slightly higher (12.1%) for weather presenters, as shown in the Chart 6:

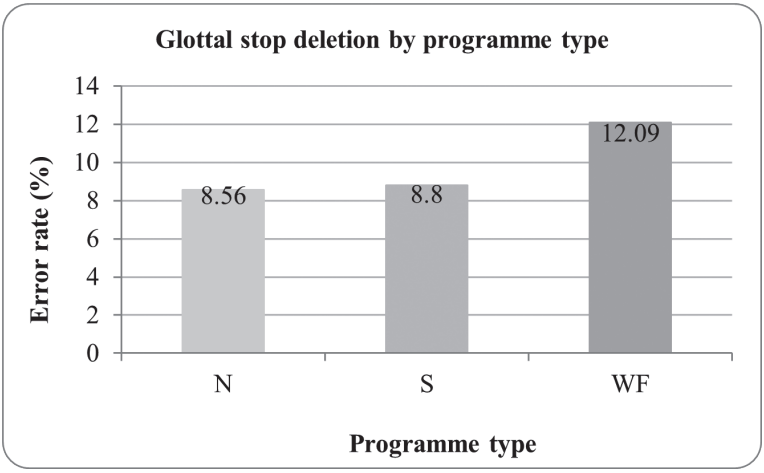


Chart 6: Error rate (in percentages) in articulation of the glottal stop in particular positions by programme type

The results for this variable might be influenced by a total number of vocalic contexts as well as a number of presenters for each broadcast. The distribution of situations shows more significant differences than with gender and TV channel (i.e., N = 2,627, S = 557, WF = 1,447). Still, it is presumed that the programme type, as well as the TV channel, does not affect the quality of pronunciation.

The higher occurrence of glottal stop deletion in weather forecasts might arise from a specific format of this broadcast. TV news and sport presenters' speeches are approximately 10–30 seconds long (except for CT 1 where they can last up to 60 s), whereas a weather presenter is the only speaker in the studio and their speech is thus not interrupted by any reports. Consequently, these monologues take longer and can be more demanding; additionally, their content is rather monotonous (except for the information on exact time, degrees, etc.), so the speakers may acquire wrong pronunciation habits more easily. Neither of these factors, however, was taken into account in the analysis.

The results for all vocalic contexts (see Figure 4) did not deviate from the total results presented in Figure 1, i.e., the LW position was the most frequent for all programme types while the PSC the rarest, etc. The different programme types did not show any fundamental differences (see Figure 4 and Chart 7):

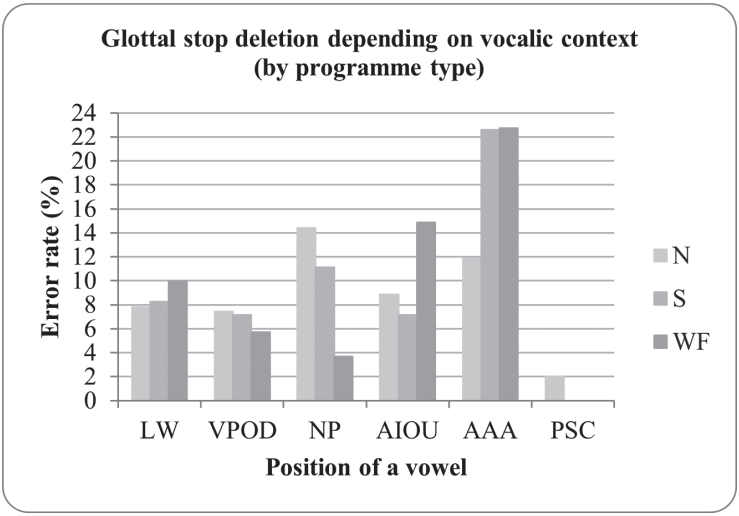


Chart 7: Error rate (in percentages) in articulation of the glottal stop in particular positions in news broadcasting, sport, and weather forecast

Glottal stop deletion by programme type												
News	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	1,245	97	135	10	104	15	894	79	194	23	50	1
ER %	7.79		7.41		14.42		8.84		11.86		2	
Sport	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	257	22	28	3	27	3	210	15	31	7	4	0
ER %	8.26		7.14		11.11		7.14		22.58		0	

Weather Forecast	LW		VPOD		NP		AIOU		AAA		PSC	
	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL	SIT	DEL
Total	773	77	70	4	27	1	458	68	110	25	9	0
ER %	9.96		5.71		3.7		14.85		22.73		0	

Figure 4: Glottal stop deletion in particular positions / vocalic contexts. Each column shows the number of situations in which the glottal stop is normative (SIT) and the number of respective deletions (DEL). The error rate is given in percentages for each position.

The differences in the error rate are the most prominent in the NP, AIOU and AAA positions which have proven to be the most problematic. The number of deletions by the news presenters is similar in all positions and corresponds to the average values. These speakers made most deletions in the NP position, but they followed the rules of standard pronunciation in the AAA position where their error rare was about 50 % lower if compared to sport and weather presenters.

The sport presenters, on the contrary, deleted the glottal stop in the AAA position in 25 % of cases. Such result differs from the remaining positions in which their error rates are mostly below average.

The most fluctuating values were detected in the weather forecasts. The LW and VPOD positions are on average, while the NP, AIOU and AAA positions show more differences. Glottal stop deletions are rare in the NP, but they occur in 23 % of cases in the segments with the conjunctions *ale*, *ani*, *aby* (almost as often as in sport presenters' speeches). The error rate in the AIOU position is almost twice as high compared to other speakers, thus affecting the total results substantially.

CONCLUSIONS

The present study on glottal stop deletion in various vocalic contexts suggests some valuable findings. First, the data showed that some segments pose more problems to standard articulation than the others: this concerns the segments with the conjunctions *ale*, *ani*, *aby*,

and between a non-vocalized preposition and a vocalic onset. In the latter case, however, the speakers, in spite of deleting the glottal stop, did maintain a standardized voiceless character of prepositions (*v autě*, "in the car", *[f a͡ʊ̯cɛ], cf. standard Czech [f ʔa͡ʊ̯cɛ]), and did not use a regional variety with a voiced preposition *[v a͡ʊ̯cɛ].

Second, the glottal stop deletion is related to gender: the male speakers were twice as likely as females to the deletion, notably in the AAA position.

Third, the glottal stop deletion differed on various TV channels. The analysis indicated fundamental differences in the error rate between the individual broadcasters in all vocalic contexts.

The deletions analysed by a programme type were, on the contrary, the least variable. The error rate is almost equal for news and sport presenters, slightly higher values were detected in the speeches by weather presenters. The differences could be observed only in some of the vocalic contexts, namely in NP, AAA and AIOU positions.

It is essential to point out some factors that could influence the study results: some programme types were under-represented in the study and the ratio of both male and female speakers was different for each TV station; the spoken texts were comparable in the number of words, but differed in content; the frequency of deletion was directly related to each speaker's speech rate (Kopečková 2020: 156). Also, the study included only the speakers with professional experience in public speaking whose performance is not fully comparable to a general spoken discourse. Notwithstanding these drawbacks, its results make it possible to propose further hypotheses on pronunciation quality in relation to articulation of the glottal stop.

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