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THE REALIZATION OF PALATO-VELARS IN POLISH

SUMMARY

The paper shows the results of the research of the production of Polish consonants k, g in grapheme clusters kiV, giV (f.eg. kiermasz, nokie, magia, region, bok_ja, smak_jablek) and in front of a soft consonant (f. eg. książki, kwitów, lokcie, kminek, bok_mi, broszek_ci, gwinty, głina, gniecie). The aim of the research is to determine the degree of palatalization as well as contexts in which it occurs. Sentences were read by 90 speakers of the variety of Standard Polish as spoken in the Warsaw area. The recordings were made in a radio-station studio. Auditive-segmental analysis (using Wave Studio 4.6) and electro-acoustic analysis (using ESPS/xwaves i Multi Speech) were performed. Conclusions are as follows:

- 1. There are different degrees of softness in the production of k, g in different contexts (palatal and palatalized, palato-velar) in Polish.*
- 2. Contextual palatalizations tend to weaken. Assimilation is no longer necessary. There is an increasing number of hard articulations (especially palato-velar) in comparison with palatal ones in the speech of the young generation.*
- 3. In grapheme clusters kiV, giV within a morpheme there is a high degree of decomposition of the palatal manner of articulation, even in front of [e], where the j segment is not allowed according to the norm. This decomposition can be accompanied by the hard articulation of stops. The results lead to the conclusion that desinchronization of the pronunciation of kie, gie sequences and dephonologization of /c ʃ/ are currently taking place in the Polish language.*

Key words: *palatalization, consonants, acoustic analysis, the Polish language*

INTRODUCTION

The paper regards the scope and the degree of palatalization of graphic *k*, *g* in graphic clusters *kiV*, *giV* and *kC*, *gC* occurring inside morphemes as well as on various morphemic boundaries (*kiermasz*, *Nokie*, *magia*, *bok ja*, *smak jabłek*, *książki*, *kwitów*, *łokcie*, *kminek*, *bok mi*, *broszek ci*, *gwinty*, *glina*, *gniecie*, etc.). Sentences with these contexts were read by 90 speakers of the north-eastern standard variety of Polish and registered in a radio-studio. The examples were segmented and processed (programs Wave-studio 4.6, ESPS/xwaves and Multi Speech were used).

General conclusions of the investigation are:

- a) various degrees of softness of the sounds investigated occur in Polish which allows to distinguish palatal and palatalized realizations of [c], [j] (see endnote 1).
- b) the weakening of assimilative palatalization is evident; it is no more obligatory: in the pronunciation of the younger generation hard realization begins to appear, whereas the number of palatal realizations diminishes (see endnote 2).
- c) in *kiV*, *giV* inside morphemes decomposition of palatalization is observed also before [c], accompanied sometimes by complete depalatalization of stops (see endnote 3).

1. PALATAL AND PALATALIZED STOPS

On the sonographs of sounds determined auditively as **palatal**, the noise over 2000 Hz is strongly blackened, and no changes in time are observed in it – palatalization is synchronic (see fig. 1 and 4). In the course of segmentation it is not possible to separate a hard segment at all. On the contrary, friction may be often strengthened, especially in the case of [c], where often each minisegment is heard as [c^h].

In the case of sounds interpreted as **palatalized**, the noise is strengthened below 2000Hz at the very beginning. In its second stage lower frequencies weaken and the frequencies between 2000 and 4000 Hz are strengthened (see fig. 2 and 5; tab. 1; fig. 7 and 8). During segmentation a hard minisegment is isolated. The degree of auditive softness of palatalized stops depends on the duration and/or intensity of the stage responsible for palatalization, which is evidently asynchronous. Palatalized stops are usually longer (about 1/3) than their hard or palatal counterparts. Segmental analysis made it possible to distinguish three types of palatalized realizations:

- [kc], [gj] – where the duration of the second stage is about 2/3 of the duration of the consonant,
- [kc], [gj] – where the durations of the hard segment and the soft segment are almost equal,

- [kc], [gʲ] – where the articulation of palatalization lasts about 1/3 of the duration of the consonant.

We may thus conclude that apart from palatal [c], [j] pronounced with front, high configuration of the tongue, there also occur in the contemporary Polish sounds articulated with a sequent palato-velar configuration. The realization of these sounds consists in adding a shorter or longer palatal stage after the hard, velar stage. They are thus palato-velar or rather velo-palatal, realized asynchronously. Palatalized sounds differ markedly both auditively and visually from the palatal ones. In their spectral structure they have one or more hard impulses (see fig. 5). In the case of palatals the noise is high from the very beginning (see fig. 4). The difference may be thus defined as the presence or lack of the “hard” stage.



Figure 1. Palatal [c] in *kiermasz*
Slika 1. Tvrdonepčanik [c] u *kiermasz*

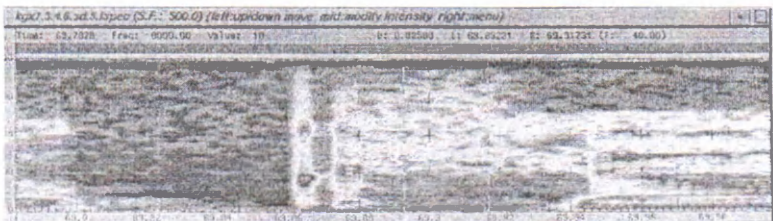


Figure 2. Palato-velar [kʲ] in *kiosku*
Slika 2. Tvrdonepčano-mekonepčanik [kʲ] u *kiosku*

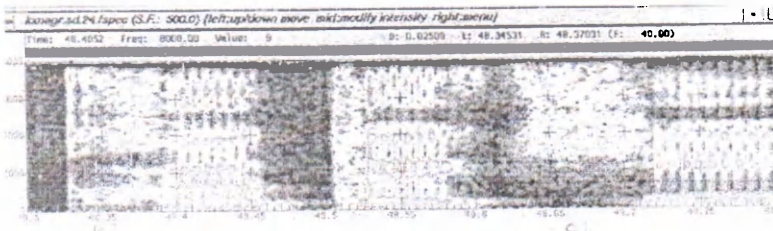


Figure 3. Velar [k] before [o] and palatal [c] before [j] in *kotekej*
Slika 3. Mekonepčanik [k] ispred [o] i tvrdonepčanik [c] ispred [j] u *kotekej*

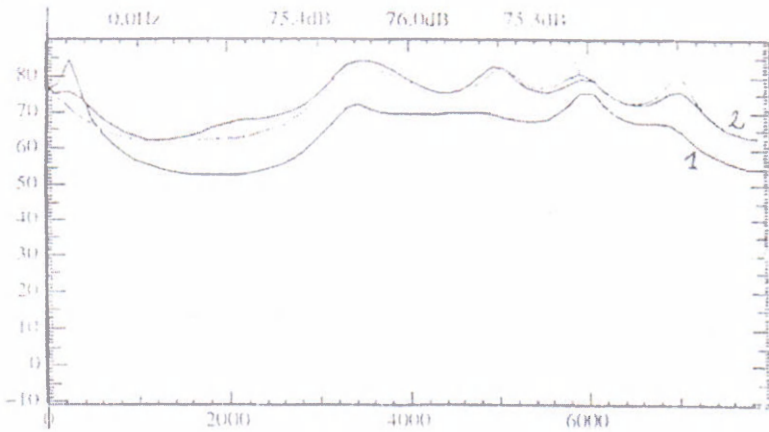


Figure 4. Palatal [c] in *kieras*. 1. measurement of the first stage of articulation; 2. of the final stage
Slika 4. Tvrdonepčanik [c] u *kieras*. 1. mjerenje u prvoj fazi artikulacije; 2. u posljednjoj fazi

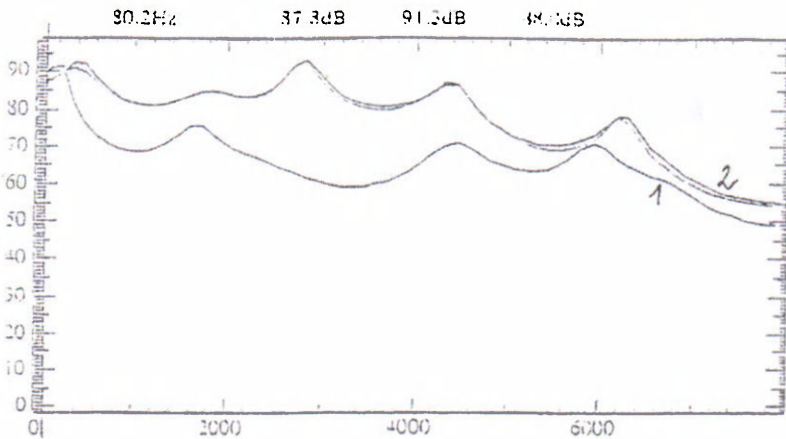


Figure 5. Palato-velar [kj] in *makiawelizm*. 1. measurement of the first stage of articulation; 2. of the final stage
Slika 5. Tvrdonepčano-mekonepčanik [kj] u *makiawelizm*. 1. mjerenje u prvoj fazi artikulacije; 2. u posljednjoj fazi

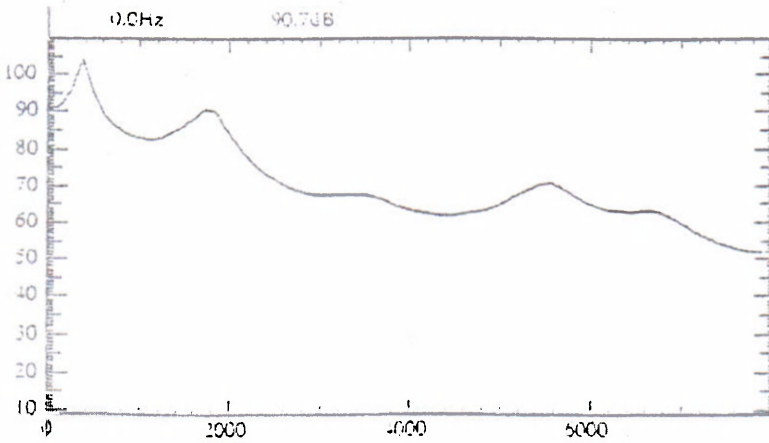


Figure 6. Velar [k] in *krew*
Slika 6. Mekonepčanik [k] u *krew*

Table 1. The formant analysis of *makiawelizm*. 1. measurement of the first stage of articulation; 2. of the final stage

Tablica 1. Formantska analiza riječi *makiawelizm*. 1. mjerenje u prvoj fazi artikulacije; 2. u posljednjoj fazi

1.		2.	
Formant (Hz)	Bandwidth	Formant (Hz)	Bandwidth
Formant (Hz)	Pojasna širina	Formant (Hz)	Pojasna širina
204	101	439	275
1686	356	1779	627
2434	1095	2853	238
4463	476	3816	1786
4549	1878	4434	320
5997	367	6306	2553
6808	915	6311	286

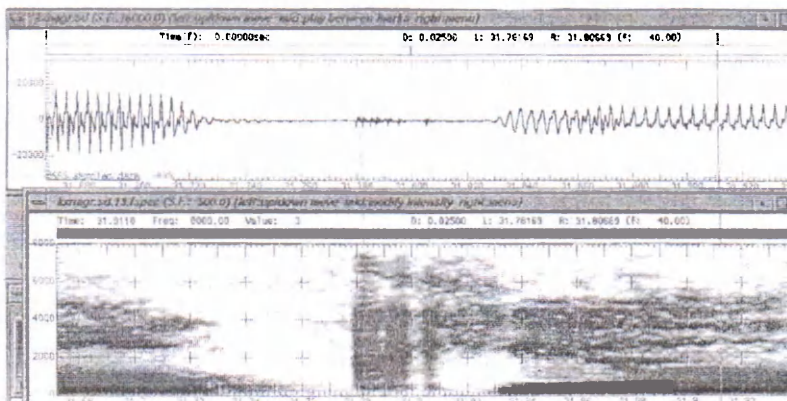


Figure 7. Palato-velar [kj] in bok ja (speaker 1)
Slika 7. Tvrdonepčano-mekonepčanik [kj] u bok ja (govornik 1)

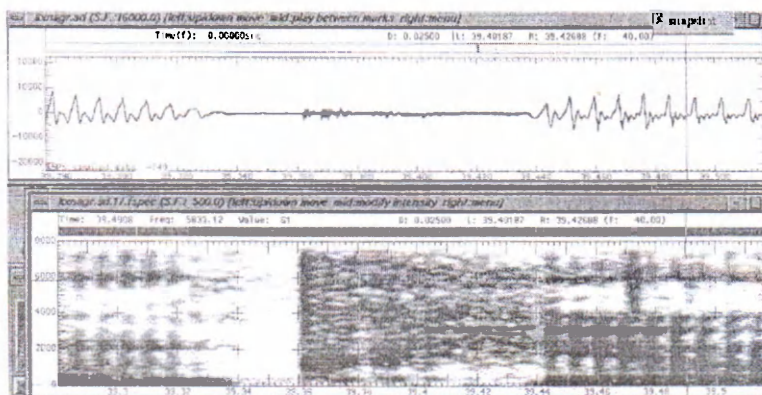


Figure 8. Palato-velar [kj] in bok ja (speaker 2)
Slika 8. Tvrdonepčano-mekonepčanik [kj] u bok ja (govornik 2)

2. THE FREQUENCY OF THE OCCURRENCE OF PALATAL, PALATO-VELAR AND VELAR REALIZATIONS BEFORE SOFT CONSONANTS

The palatal and palato-velar realizations as well as the velar ones appeared in all the contexts investigated: before /j/ and before various soft consonants, inside morphemes and on morphemic boundaries. However, the frequency of particular realizations in different contexts is not comparable.

Before a consonant (see tab. 2) velar articulations prevail, especially in the pronunciation of younger generation (younger generation - age of speakers between 20-30, the average age – 25, symbol M; older generation - age of

speakers between 48 and 62 years, the average age – 54, symbol S). The only context before C where palatal realizations are the most frequent is when the stop examined occurs between two soft sounds (cf. *zlikwidować*, see tab. 3, more detailed results see eg. Osowicka-Kondratowicz 2002).

Inside morphemes, before /j/, palatal realizations are predominant (see table 4). Depalatalization in this position is very rare, but it happens. In the pronunciation of younger generation, the number of palatal realization decreases in favor of palato-velar ones. Morphemic boundaries (before an enclitic, between prosodic units) hamper assimilation. In this position hard realizations are much more frequent. The younger age of speakers and the position on a morphemic boundary are the main factors diminishing the number of palatalizations (more on this problem, see Osowicka-Kondratowicz, A. Serowik, forthcoming).

Table 2. The assimilation of stops before a soft consonant (inside morpheme or on the suffixal boundary)

Tablica 2. Asimilacija okluziva ispred mekog konsonanta (unutar morfema ili na sufiksnoj granici)

Context Glasovno okruženje	Realization (%) Ostvarenje (%)		
	palatal tvrdonepčanik	palato-velar tvrdonepčano- mekonepčanik	velar mekonepčanik
<i>k, g</i> before prepalatals [ɕ, ʦ, ʧ, ɲ] (100%=810real.)	11,85 ¹	12,35	75,80
<i>k, g</i> ispred prednjotvrdonepčanika [ɕ, ʦ, ʧ, ɲ] (100%=810 ostvarenja)	S-16,30; M-7,41	S-12,84; M-11,85	S-70,86; M-80,74
<i>k, g</i> before labials [f _j v _j p _j b _j m _j] (100%=540real.) ²	11,11	10,56	78,33
<i>k, g</i> ispred usnenika [f _j v _j p _j b _j m _j] (100%=540 ostvarenja)	S-17,04; M-5,19	S-11,48; M-9,63	S-71,48; M-85,19
<i>k, g</i> before [t _j l _j r _j] (100%=630real.)	2,86	5,24	91,90
<i>k, g</i> ispred [t _j l _j r _j] (100%=630 ostvarenja)	S-3,17; M-2,54	S-6,03; M-4,44	S-90,79; M-93,02

Table 3. The influence of the preceding vowel on the realization of examined stops

Tablica 3. Utjecaj prethodnog vokala na ostvarenje istraživanih okluziva

Preceding V Prethodni V	Studied cluster Istraživana skupina	Realization (%) Ostvarenje (%)		
		palatal tvrdonepčanik	palato-velar tvrdonepčano- mekonepčanik	velar mekonepčanik
[i]/[e]	-ksi-, -kwi-, -gni- (100%=450real.) (100%=450 ostvarenja)	55,33	15,56	29,11
		S-57,33; M-53,33	S-15,56; M-15,56	S-27,11; M-31,11
≠ [i]/[e]	-ksi-, -kwi-, -gni- (100%=450real.) (100%=450 ostvarenja)	12,22	10,00	77,78
		S-19,26; M-5,19	S-10,37; M-9,63	S-70,37; M-85,19

Table 4. The assimilations of stops before iota

Tablica 4. Asimilacija okluziva ispred j

Morphemic position Položaj u morfemu	Realization (%) Ostvarenje (%)		
	palatal tvrdonepčanik	palato-velar tvrdonepčano- mekonepčanik	velar mekonepčanik
inside morpheme (100%=720real.) unutar morfema (100%=720 ostvarenja)	60,27	26,80	12,93
	S-69,16; M-51,38	S-17,77; M-35,83	S-13,07; M-12,79
enclitic boundary (100%=180real.) enklitička granica (100%=180 ostvarenja)	29,44	25,55	45,01
	S-46,66; M-12,22	S-20,01; M-31,11	S-33,33; M-56,67
between prosodic units (100%=180real.) između prozodijskih jedinica (100%=180 ostvarenja)	21,11	28,88	50,01
	S-32,22; M-10,01	S-30,01; M-27,77	S-37,77; M-62,22

3. THE DECOMPOSITION OF PALATALIZATION IN KIV, GIV (WHERE V≠/I/) INSIDE MORPHEMES

Clusters *ki*, *gi* before back vowels (*kiosku*, *makiawelizm*, *giaur*, *region*), as well as before [e], but only in loans (*Nokie*, *biologie*), are always pronounced with a distinct iota, see fig. 13 and 14.

According to a number of the descriptions of the Polish phonetics (see e.g. Sawicka 1995, Wiśniewski 1997, Ostaszewska & Tambor 2000), in words such as *kiermasz*, *kieszzeń*, *okien*, *giermek*, etc., iota should not be heard, however, the decomposition of palatalization has been observed in this position too apart from, less frequent, synchronic realizations of [c], [j]:

- synchronic realizations (iota is neither heard nor seen) amount to 17% in the case of *kie*, and 20% of *gie*³, (see fig. 9);
- realizations with a weak iota (iota is not heard, but it is seen on spectrograms) amount to 22,5% of *kie* realizations, and 28% of *gie* (see fig. 10);
- a distinct iota occurred in 60,5% of *kie* and 52% of *gie* (see fig. 11 and 12.).

Before iota the consonant is pronounced as palatal or palato-velar, and even hard pronunciation occurs, whereas before [e] only palatal realizations were noted (more detailed results see Serowik, 2004).

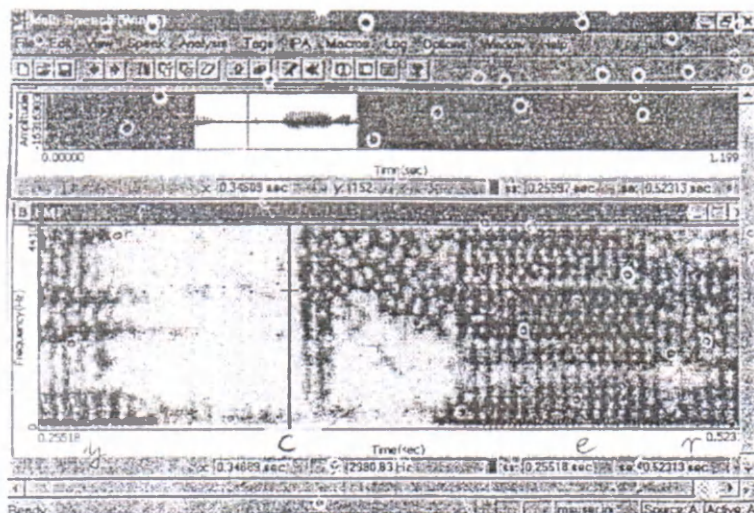


Figure 9. Palatal [c] before [e] in *kiermasz*
Slika 9. Tvrdonepčanik [c] ispred [e] u *kiermasz*

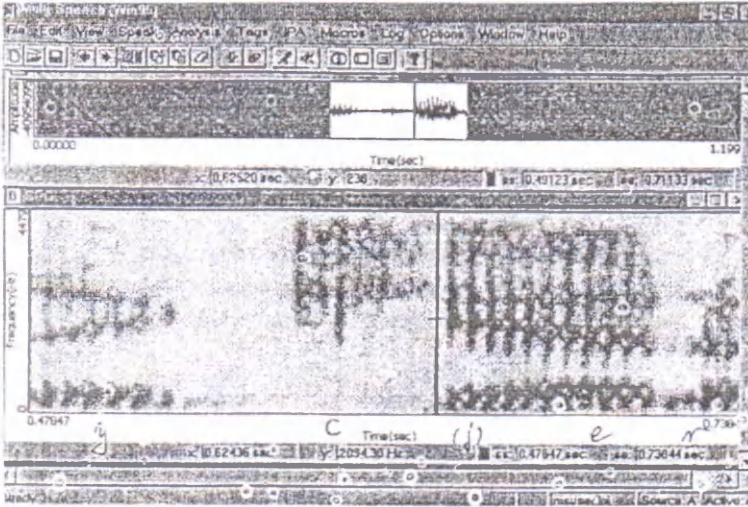


Figure 10. Palatal [c] before [j]e in *kiermasz*
Slika 10. Tvrdonepčanik [c] ispred [j]e u *kiermasz*

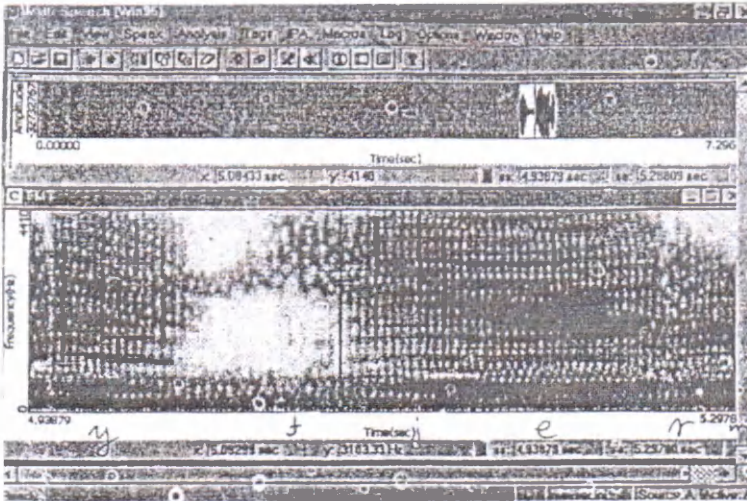


Figure 11. Palatal [j] before [j] in *giermek*
Slika 11. Tvrdonepčanik [j] ispred [j] u *giermek*

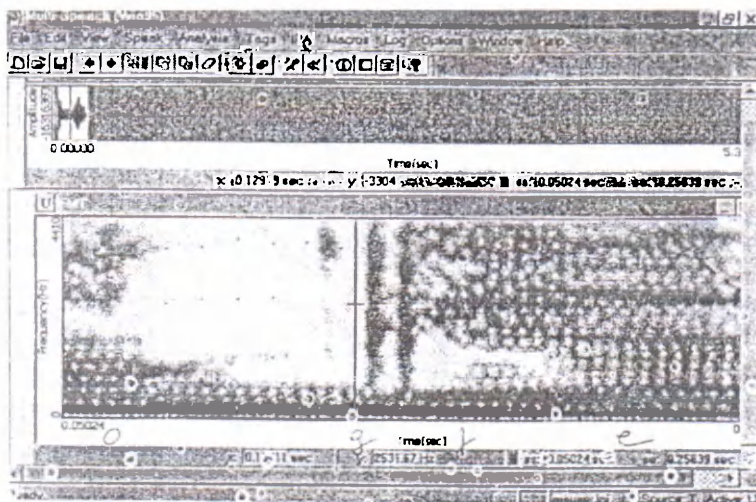


Figure 12. Velar [g] before [j] in *ogier*
Slika 12. Mekonepčanik [g] ispred [j] u *ogier*

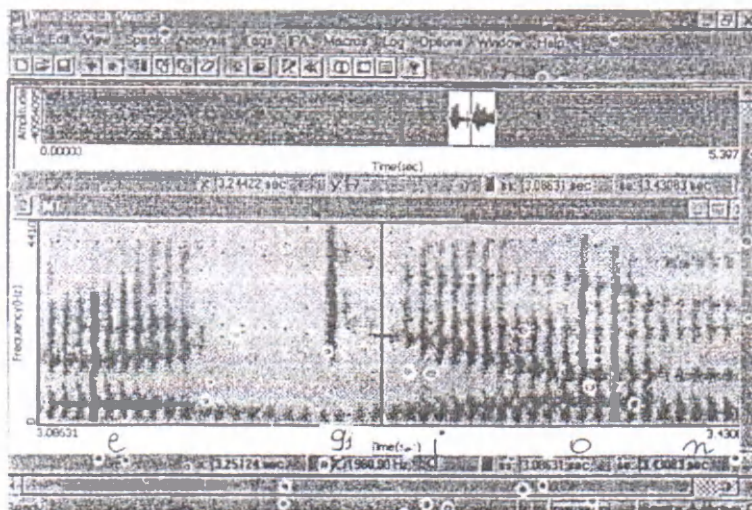


Figure 13. Palato-velar [g_j] before [j] in *region*
Slika 13. Tvrdonepčano-mekonepčanik [g_j] ispred [j] u *region*

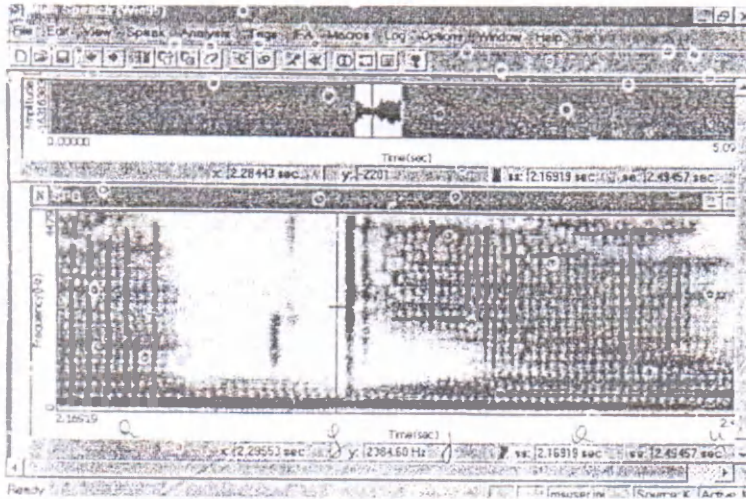


Figure 14. Velar [g] before [j] in *giaur*
Slika 14. Mekonepčanik [g] ispred [j] u *giaur*

4. SUMMARY

Various degrees of softness of the examined sounds were observed in the contemporary Polish which allow to distinguish palatal and palatalized (palato-velars) realizations of [c], [ɟ]. The weakening of palatalization is evident. The hard (velar) realizations appeared in all the contexts investigated. In *kie*, *gie* inside morphemes the decomposition of softness is often observed, which is accompanied sometimes by complete depalatalization of stops. This is an argument for dephonologization of phonemes /c ɟ/ in Polish language.

ENDNOTES

- ¹ The first line not marked with symbols (S M) always contains the results of research for both groups of informants in total, which means that the sum of the results for a given type of articulation (palatal + palato-velar + velar) will amount to 100 % for all the speakers. The second line (below), marked with symbols (S, M), contains the research results for each group of informants, where S - older generation (between 48 and 62 years, the average age of whose was 54) equals 100% and M - younger generation ((between 20-30, the average age - 25) equals 100%, which means that by summing up the research results for each type of realization (palatal + palato-velar + velar) for S, we will obtain 100 % of pronunciation for the older group, by summing up the results of the type of articulation for M, we will obtain 100 % of the realization of the younger group. The notation is applied in all the tables in this paper.
- ² Only the number of realizations for the percentage unmarked with letters was indicated here, because for the percentage with S and M, the sum of realizations (that is 100%) always equals half of the realization sum for the percentage unmarked with letters (real.= realization).
- ³ 100 % = 360 realization.

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REALIZACIJA PALATO-VELARNIH OKLUZIVA U POLJSKOM

SAŽETAK

U članku su prikazani rezultati istraživanja realizacije poljskih suglasnika *k*, *g* u grafemskim skupinama *kiV*, *giV* (npr. *kiermasz*, *nokie*, *magia*, *region*, *bok ja*, *smak jabtek*) i ispred mekog suglasnika (npr. *książki*, *kwitów*, *łokcie*, *kminek*, *bok mi*, *broszek ci*, *gwinty*, *glina*, *gniecie*). Cilj je istraživanja bio utvrditi stupanj i kontekstualni opseg palatalizacije. Rečenice je pročitao 90 govornika varšavske varijante poljskoga književnog izgovora. Rečenice su snimljene u radijskom-studiju. Napravljena je auditivno-segmentalna analiza (u programu Wave Studio 4.6) i elektroakustična analiza (u programima ESPS/xwaves i Multi Speech).

Zaključci:

1. U poljskom jeziku postoje različiti stupnjevi mekoće kontekstualne realizacije grafema *k*, *g* –palatalni i palatalizirani (palato-velarni);
2. Primjećuje se slabljenje kontekstualnih palatalizacija. Asimilacija nije više obvezatna. U izgovoru mlađe generacije raste broj tvrdih i, osobito, palato-velarnih realizacija u odnosu na palatalne;
3. U grafemskim skupinama *kiV*, *giV* unutar morfema prisutna je izrazita dekompozicija palatalnosti, čak i ispred [e], gdje se u skladu s normom jota i ne smije pojaviti. Dekompoziciju može pratiti tvrd izgovor okluziva. Rezultati upućuju na zaključak da se u poljskom jeziku provodi desinkronizacija izgovora sekvenca *kie*, *gie* i defonologizacija /c ʎ/.

Ključne riječi: palatalizacija, suglasnici, akustička analiza, poljski jezik