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A comparative study of vowels' F1 and F2 values in frequent English loanwords in Polish and Russian languages

Summary

The paper presents results of an investigation of F1 and F2 formants values in English loanwords uttered by Polish and Russian native speakers during spontaneous speech. Ten participants with an equal level of English language proficiency took part in the experiment. Their stimulated conversation was recorded and English loanwords were extracted from the recordings to investigate the vowels' formants, by means of the Praat software. The F1 and F2 analysis points out that a relationship between the frequency of loanwords' occurrence and the similarity to pronunciation of language of origin exists. Corpus data were used to find the comparable frequencies of English loanwords' occurrence in Polish and Russian.

Key words: F1 and F2 values, loanwords' adaptation, English loanwords, Polish, Russian

1. INTRODUCTION

English loanwords are nowadays among the most frequently occurring loanwords in Polish and Russian languages. However, the adaptation of loanwords from English to Slavic languages differs within the West and East Slavic group of languages.

Among all Slavic languages, Russian contains a considerable proportion of English loanwords. Therefore, it seems interesting to what extent they are phonetically adaptive, and whether they significantly differ from the language of origin and from the other Slavic language, in this case – Polish. The criterion for loanwords' frequency is different in some disciplines where English input is significant, for instance in IT industry where adaptation of English vocabulary is very popular (Volgina, 2003: 119).

English loanwords in Russian are so common that they are noticeable even among people without any knowledge of the English language. However, the phonetic influence of English as L2 on Russian (L1) was stressed as one possible exemplification of loanwords in the late forties by Turbetzkoy (1949).

Currently, there are a few different approaches in the field of loanwords adaptation. For instance, the phonetic adaptation of loanwords according to Silverman (1992) firstly involves the phonetic scansion of the L2 input. Nevertheless, the phonological knowledge of L2 is an important factor in loanwords adaptation, which seems to be neglected in the "phonetic approximation" model proposed by Silverman assuming that: *the input to loanword phonology is merely a superficial non-linguistic acoustic signal* (1992: 282). Another interesting theory is the replacement of L2 segment by the closest L1 segment described in works by LaCharité and Paradis (2005). What was stressed in the study conducted by Horga and Mildner (1997) the vowel formant space in L2 is just one indicator of the foreign accent and vowel characteristics of Croatian speakers of English as L2. The aim of aforementioned study was to find the difference between the English vowel formant space of native speakers and of Croatian students of English, as well as to find the differences between the English vowel formant space of the first and fourth year students from the University of Zagreb.

One of the important factors which should also be taken into consideration is the time of borrowing of the loanword. Longer time of the loanword presence in a

language indicates the assimilation of pronunciation to the borrowing language or more frequent L2 segment being replaced with the closest L1 segment.

2. AIMS

The study attempts to answer two questions: 1) Does the frequency of a loanword in the language into which it is borrowed have an influence on its segmental characteristics such as formant frequencies? 2) Does the English loanwords' phonetic adaptation differ significantly in Polish and Russian? The assumption that the loanwords' frequency in L2 influences the phonetic similarity to L1 is followed by the hypothesis – the more frequent loanword in the borrowing language is phonetically further from the language of origin than the less frequent loanword. Therefore, the study might show that the pronunciation of English loanwords by the Russian native speakers, due to the significant amount of English loanwords, would be more similar to the pronunciation in the source language in comparison to the pronunciation of the Polish native speakers.

3. MATERIAL AND METHOD

Vowel formants in the frequent English loanwords pronounced by either Russian or Polish native speakers were examined in this study. The collected speech samples were spontaneous speech samples which were used for vowel formants analysis.

The analyzed loanwords selected for the study are: 1) *business*, 2) *manager* and 3) *boss* with the following vowels 1) /ɪ/, 2) /æ/ and 3) /ɒ/. The reason why these words were selected for the analysis is the possibility to compare their frequency in the Spoken Corpus of Polish and Russian language. *Business* is the most frequent word followed by *manager*, and finally the least frequent – *boss* (Pęzik, 2012a).

Balanced Corpus driven data proved that the analyzed loanwords appeared in both languages with comparable frequency making them relevant for the analysis in the field of loanwords' adaptation (Pęzik, 2012b).

The orthographic adaptation of the words suggests their complete assimilation into the borrowing language. Two the most frequent loanwords are orthographically adapted to the norms of the Polish language: *biznes* and *menadżer*. The Polish orthography adapted *manager* in two possible forms: *menedżer* and *menadżer*.

However the first form is seven times more frequent than the second one. Due to the relatively rare and colloquial usage of the word *boss*, it is not orthographically adapted in Polish. If it were, it would be adapted into *bos* form – on the basis of analogy to *bobslej*, orthographically adapted from *bobsleigh*, or many other loanwords fully assimilated to Polish spelling rules. The English loanwords adaptation to Russian might occur as transliteration: slogan – слоган, transcription: office – офис or the mixed type of adaptation: dealer – дилер, leasing – лизинг. The last type according to Giljarevskij and Starostin (1985: 21) is the most common way of adapting loanwords in contemporary Russian. Retaining the original form of Latin alphabet to Russian text is called transplantation. The orthographical adaptation of investigated words in Russian is: бизнес, менеджер and босс and their frequency of occurrence according to National Corpus of Russian language is respectively: 0.00006337676, 0.00000551807 and 0.00000432202.

4. SUBJECTS

Ten Russian and Polish native speakers were chosen to participate in the study. The level of the participants' English language proficiency was equal – B2. During spontaneous speech, five speakers of Russian and five speakers of Polish pronounced the selected English loanwords spontaneously, without paying attention to English pronunciation aspects, which met the aims of this research. None of the participants were living in an English speaking country nor had an English native speaker teacher. All participants were between 21–27 years old. Considering the influence of their experience in English, all of subjects seem to have similar skills. However it is difficult to evaluate the level of subjects' proficiency in detail because, nowadays, the constant exposure to the modern *lingua franca* is inevitable (Thomason, 2001: 10).

5. MATERIAL AND RECORDING

The recordings of conversations between the subjects were conducted for the purposes of the experiment during a stimulated conversation on the topic of economic issues, in which the typical phrases included: *business*, *manager* and *boss*. The participants were not informed about the aim of the study before participation, so as not to

influence their pronunciation of loanwords. The participants were sitting in a quiet room. The conversation took no more than ten minutes.

6. PROCEDURE

Some of the most frequent English loanwords were chosen, based on the National Corpus of Polish and National Corpus of Russian, in order to analyze their prosodic adaptation in Polish and Russian and compare the vowels' characteristics such as F1 and F2 values.

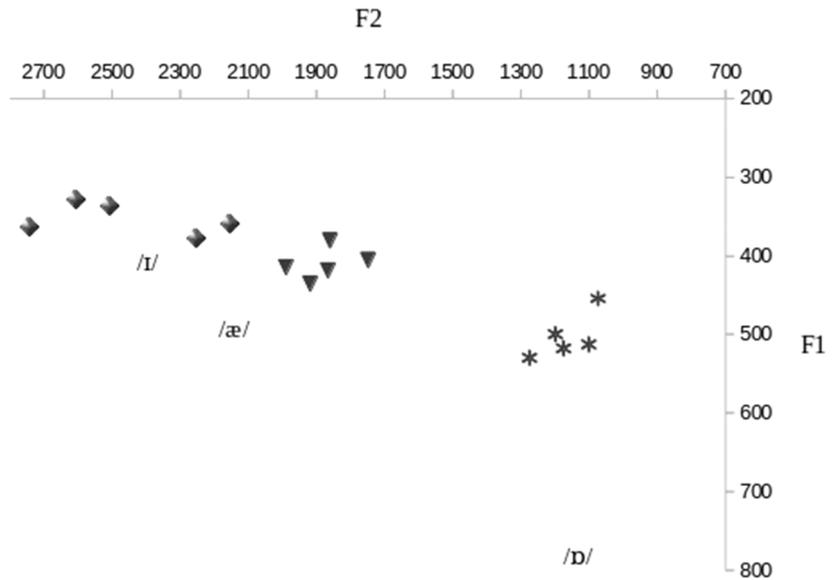
Twenty three samples of each English loanword were extracted from the recordings and F1 and F2 values were analyzed. Praat software (Boersma & Weenink, 2005) was used for the acoustic analysis. The target words were used for the acoustic analysis in order to examine the hypothesis about the occurrence frequency in both languages. The F1 and F2 values of stressed vowels: /ɪ/, /æ/ and /ɒ/ in *business*, *manager* and *boss* phrases were compared to the mean American English formant values (Hillenbrandt et al., 1995: 3103). The aforementioned study reports separate values for speakers who were women, men and children.

7. RESULTS AND DISCUSSION

F1 and F2 average values in Polish and Russian do not differ as much in comparison to average English values. It seems interesting how Polish and Russian vowel systems adapted the units of English in common loanwords. Towards which of Slavic segments does the pronunciation of loanwords gravitate? Russian vowel system consists of the following stressed vowels: open-central /a/, near-open, near-front /æ/, open-mid, near-front /ɛ/, close-mid, near-front /e/, close, near-front /i/, close-front /i/, open-mid, back /o/, close-mid, central /ə/, near-close, back /u/, near-close, central /ʊ/ and unstressed: /ɐ/, /ə/, /o/, /i/, /ɪ/, /ʊ/, /ʉ/. Polish vowel system consists of: open-central /a/, mid-front /ɛ/, close-front /i/, close-central /i/, mid-back /ɔ/ and close-back /u/ and two nasals /ẽ/ and /ĩ/.

According to the F1 and F2 measures figures 1 and 2 point out some interesting similarities between F1 and F2 in Slavic languages such as /ɪ/ and /æ/ are much closer to the English target in both Slavic languages than /ɒ/.

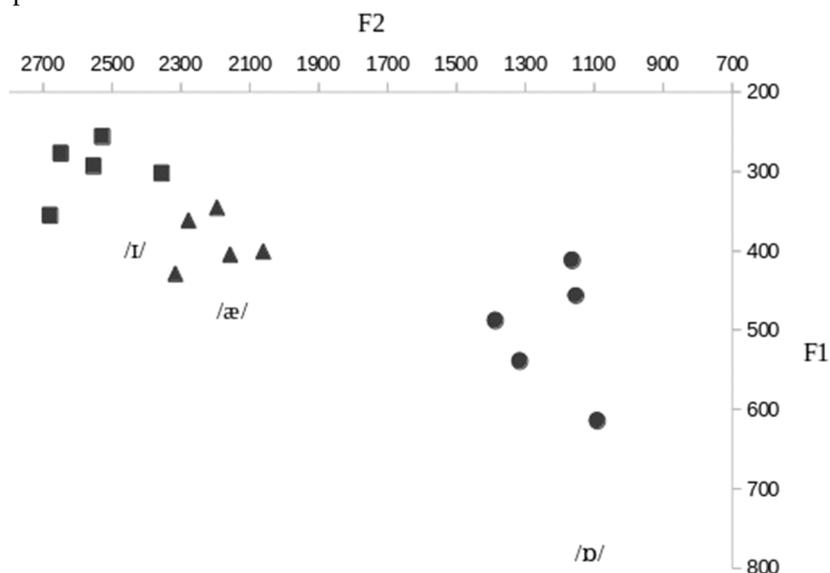
Figure 1. Formant values of Polish native speakers when pronouncing loanwords
Slika 1. Vrijednosti formanata poljskih izvornih govornika prilikom izgovaranja posuđenica



- ◆ /ɪ/ Formant values from realization of segment by Polish native speakers pronouncing loanword *business*
- ▼ /æ/ Formant values from realization of segment by Polish native speakers pronouncing loanword *manager*
- * /ɒ/ Formant values from realization of segment by Polish native speakers pronouncing loanword *boss*

/ɪ/ /æ/ /ɒ/ Average English formant values uttered by female subjects
 (from Hillenbrandt et al., 1995)

Figure 2. Formant values of Russian native speakers when pronouncing loanwords
Slika 2. Vrijednosti formanata ruskih izvornih govornika prilikom izgovaranja posuđenica



- /ɪ/ Formant values from realization of segment by Russian native speakers pronouncing loanword *business*
- ▲ /æ/ Formant values from realization of segment by Russian native speakers pronouncing loanword *manager*
- /ɒ/ Formant values from realization of segment by Russian native speakers pronouncing loanword *boss*

/ɪ/ /æ/ /ɒ/ Average English formant values uttered by female subjects (from Hillenbrandt et al., 1995)

At the less frequent loanword with vowel /ɒ/ there is more variation than among other vowels. Possible explanation of this phenomenon is the low frequency of the loanword in Russian. The lack of stimuli, according to the aforementioned theory of replacing L2 segment with the closest L1 segment /o/, might have an influence on a variety of /ɒ/ articulation patterns.

Table 1. Average values of F1 and F2 of Polish and Russian native speakers when pronouncing loanwords compared to average English formant values

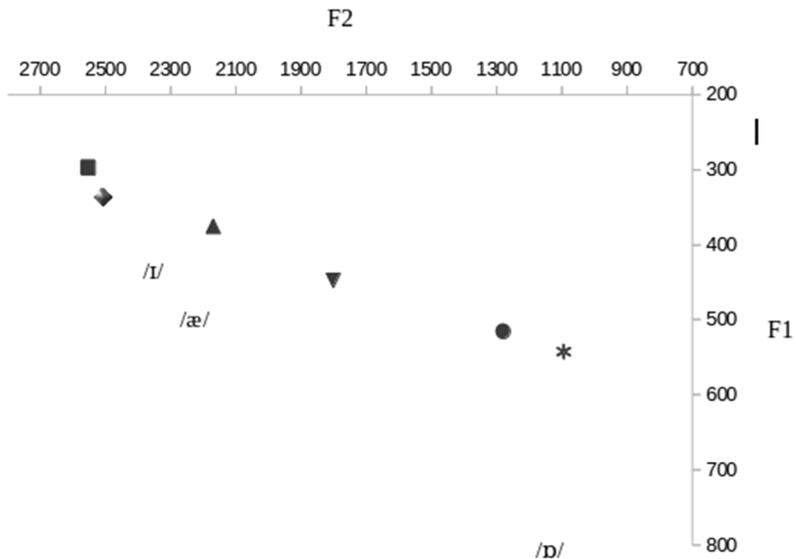
Tablica 1. Srednje vrijednosti F1 i F2 poljskih i ruskih izvornih govornika prilikom izgovaranja posuđenica u usporedbi sa srednjim vrijednostima engleskih formanata

Polish		English target	Russian	
F1	F2		F1	F2
354	2451	/ɪ/ F1: 483, F2: 2365	297	2553
447	1801	/æ/ F1: 669, F2: 2349	375	2169
543	1094	/ɒ/ F1: 850, F2: 1220	516	1208

Mean F1 and F2 values of American English (from Hillenbrandt et al., 1995):
 /ɪ/ – F1: 483, F2: 2365; /æ/ – F1: 669, F2: 2349; /ɒ/ – F1: 850, F2: 1220.

Figure 3. Averaged F1 and F2 values of loanwords vowels uttered by subjects compared to English

Slika 3. Srednje vrijednosti F1 i F2 ispitanika prilikom izgovaranja samoglasnika u posuđenicama u usporedbi s engleskim



- Russian average formant values from realization segment /ɪ/ when pronouncing loanword *business*
- ◆ Polish average formant values from realization segment /ɪ/ when pronouncing loanword *business*
- ▲ Russian average formant values from realization segment /æ/ when pronouncing loanword *manager*
- ▼ Polish average formant values from realization segment /æ/ when pronouncing loanword *manager*
- Russian average formant values from realization segment /ɒ/ when pronouncing loanword *boss*
- * Polish average formant values from realization segment /ɒ/ when pronouncing loanword *boss*

/ɪ/ /æ/ /ɒ/ Average English formant values uttered by female subjects (from Hillenbrandt et al., 1995)

The figure 3 summarizes the investigation of F1 and F2 values. Symbols refer to subjects' productions.

It appears that F1 and F2 values in the most frequent loanwords are relatively close to English origin. A great difference is visible in the pronunciation of the word *manager*. In both languages English vowel /æ/ seems to be adapted into a central /ə/. Apart from that, Russian (R2) vowels are more near-front than Polish ones (P2). Closer pronunciation of the vowels in loanwords, both in Polish and Russian appears in the most frequent loanword i.e. word *business*. It is significant that the front/back category is more comparable in Slavic languages and English than the open/close category. During vowel articulation in the languages included in this study, the tongue position on a horizontal axis is also comparable. The closest L1 and L2 segments are visible on the basis of the most frequent loanword. The subjects' pronunciation gravitate towards L1 segments in less frequent loanwords. The vowel formant-defined coordinates among less frequent words differ more.

In the field of Polish-Russian comparison of the adaptation of English loanwords, naturally based just on vowel F1 and F2 values, it seems possible to assume that in the current experiment, the articulation of Polish and Russian native speakers

is more similar to each other than to the language of a loanwords' origin. It is noticeable that the Russian equivalent of /æ/ is more front and open than the Polish one. The similarity of /ɒ/ adaptation in Polish and Russian is noticeable as well. Segments gravitate towards Russian /o/ and Polish /ɔ/.

The less frequent loanword was adapted in the most different way, what seems to confirm the theory of influence of frequency to loanwords' adaptation. The closest segment for English target /ɒ/ in Russian was /o/ and Polish /ɔ/. The similarity is visible only on vertical axis shown on figure 3. However Polish /ẽ/ segment is closer to English target /æ/ on the horizontal axis of the same figure.

8. CONCLUSION

The study examined only one of the important parameters of the vowel comparison. It is necessary to include other aspects of vowel characteristics in research, such as vowels' duration.

However, considering F1 and F2 formant values, the study confirms that the less frequent loanwords are pronounced differently from the language of origin. On the other hand, it is impossible to conclude whether Polish or Russian native speakers' pronunciation was closer to English basing just on the formant values. To conclude which language group had a more accurate pronunciation of English loanwords, some other aspects of phonetic analysis should be taken into consideration such as vowels duration.

Subjects' L2 skills should also be controlled during recruitment in the similar studies, as well as other criteria such as age, education or sex. Nevertheless, it is possible to conclude, that the pronunciation of more frequent loanwords differs from the pronunciation of less frequent loanwords in Polish and Russian. Further research including a wider variety of investigated vowels pronounced by larger number of subjects should be conducted.

To summarize, a relation was found between frequency of English loanwords and its similarity to the language of origin in phrases uttered by native speakers of Polish and Russian. The less frequent loanwords are more assimilated into phonological system of the borrowing language. There was no significant difference between Russian and Polish in the process of phonological adaptation of selected English loanwords.

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Usporedba vrijednosti F1 i F2 vokala u izgovoru čestih posuđenica iz engleskog jezika kod izvornih govornika poljskog i ruskog

Sažetak

Engleske su posuđenice trenutačno među najčešće korištenim posuđenicama u poljskom i ruskom. Međutim, njihov stupanj fonetske adaptacije nije isti, a na njega utječe nekoliko činjenica: učestalost posuđenice, stupanj poznavanja engleskoga jezika, vrijeme adaptacije i jezična kompetencija govornika. Uzimajući u obzir niz spomenutih faktora, u članku su istražene vrijednosti prvih dvaju formanta naglašanih samoglasnika u engleskim posuđenicama *business*, *manager* i *boss*. Njihova je učestalost relativno slična na osnovu *Nacionalnog korpusa poljskog jezika* (NKJP – *Narodowy Korpus Języka Polskiego*) i *Nacionalnog korpusa ruskog jezika* (Ruscorpora – *Национальный корпус русского языка*). Da bi se uspješno moglo istražiti vrijednosti F1 i F2 u spontanome govoru, u istraživanju je sudjelovalo deset ispitanika – izvornih govornika ruskog i poljskog jezika. Cilj istraživanja nije bio poznat ispitanicima zbog mogućeg utjecaja na namjernu pažnju te neprirodne artikulacije posuđenica. Ispitanici su imali isti stupanj poznavanja engleskoga jezika, tj. B2 prema Europskom referentnom okviru. Stimulirani razgovori na temu ekonomije bili su snimljeni u akustički izoliranoj sobi. Iz snimaka su izdvojene posuđenice te su uz pomoć programa *Praat* istražene vrijednosti formanta F1 i F2 u naglašenim slogovima. Istraživani su samoglasnici bili: /ɪ/, /æ/ i /ɒ/. Pretpostavljeno je da se fonetska adaptacija može razlikovati na razini slavenskih jezika te da stupanj učestalosti posuđenica utječe na njihovu artikulaciju. Na prikazanim slikama vidljive su tendencije prema kojima su neki suglasnici bliži ciljanome engleskom suglasniku, a neki znatno dalji od izvornog primjera. Međutim, na temelju triju posuđenica nije moguće doći do zaključaka o općim tendencijama fonetske adaptacije engleskih posuđenica u ruskom i poljskom jeziku. U članku su navedeni i primjeri drugih hrvatskih istraživanja artikulacije engleskih riječi od strane studenata Sveučilišta u Zagrebu. Naglašeno je da treba uzeti u obzir nekoliko drugih obilježja, kao na primjer usporedbu trajanja samoglasničkih segmenata, što može biti polazište za buduća istraživanja.

Ključne riječi: vrijednosti F1 i F2, adaptacija posuđenica, engleske posuđenice, poljski, ruski