

AN ANALYSIS OF GENERAL AMERICAN ENGLISH AND RECEIVED PRONUNCIATION IN RELATION TO STANDARD SLOVAK

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Abstract

The present paper's aim is to point out which English accent, out of the two most prestigious ones (Received Pronunciation and General American), is closer correspondent to Standard Slovak on the level of pronunciation as based on the interpretation of measured frequencies of selected vocalic sounds in all three observed accents. The paper's introduction summarizes present state of English as EFL in Slovakia and the research already conducted in the area in question. The research question is being answered by comparing the measured frequencies of selected vocals by means of computer software PRAAT. Data are drawn from official study aids for those willing to learn languages in question, while selected vocals are observed in isolation. This paper is a part of a diploma thesis.

Key words: formant, frequency, spectrogram, vocals, acoustic phonetics, Received Pronunciation, General American English, closer correspondent

Abstrakt

Cieľom predloženého výskumu je na základe interpretácií nameraných frekvencií vybraných vokálov pozorovaných výslovnostných variantov zistiť, ktorý z dvoch prestížnych anglických variantov (Received Pronunciation a General American) je bližším korešpondentom spisovnej slovenčiny na úrovni výslovnosti. Úvodom pojednávame o súčasnom stave angličtiny ako cudzieho jazyka nielen vo svete ale aj na Slovensku a analýzou predpísaných učebníc pre základné školy určujeme, s ktorým anglickým výslovnostným variantom prichádzajú do styku študenti angličtiny ako prvým. K zodpovedaniu výskumnej otázky využívame počítačový softvér PRAAT, pomocou ktorého analyzujeme dáta získané z oficiálnych fonetických pomôcok pre študentov ako angličtiny, tak aj slovenčiny. Na základe interpretácií nameraných frekvencií vybraných vokálov záverom určujeme bližší anglický korešpondujúci variant. Táto práca je čiastkovým výskumom diplomovej práce.

Kľúčové slová: formant, frekvencia, spektrogram, samohlásky, akustická fonetika, Received Pronunciation, General American English, bližší výslovnostný korešpondent

Introduction

This paper presents an analysis of qualitative features of standard Slovak in relation to Received Pronunciation and General American on the level of phonology, with an attempt to point out which of the two English standard varieties might be more appropriate for a Slovak learner of English as a foreign language (EFL).

“There is extraordinary diversity in the ways in which English is taught and learnt around the world, but some orthodoxies have arisen. ... EFL, as we know it today, is a largely 19th century creation” (Graddol, 2006, p. 82). As Graddol (2006) further states, the target variety of a learner of English is a native speaker, usually British or American one.

In Slovakia, it is the British Council, an organization covering English language teaching and learning, which “has been working (here) since 1946, when it was originally called the “British Institute and Professor Brander was the Director. However, the office closed in 1950 due to changing political system” (British Council Slovakia). As British Council further points out at

its website, the office was reopened in 1992. And so, British variety of English, RP, served as a model for EFL teaching and learning in our country.

In the course of several past decades, the difference between Slovak and English phonetic systems was stressed by several authorities who used RP as a key variety of English for their research studies. Ján Lenhardt, for example, in his paper *Kontrastívny rozbor anglických a slovenských hlások*, carried out a research as early as 1977 and stressed the different features of English vocalic and consonantal sounds as compared to Slovak sounds. Based on the r sound categorization in his paper (Table. 4, page 294), the position of which he describes as post-alveolar, one can assume that he was comparing standard Slovak pronunciation and RP. The primal focus of his research was on the number of sounds in both, English and Slovak and in an attempt to put them into the position of equivalents which, however, is due to interlingual proximity of both languages, impossible. Therefore, he suggests that these should be regarded as the closest corresponding sounds, and his claim is essential to this paper.

Kotuličová (2003) and Ološtiak (2004 and 2007) dealt with transfer of English words into Slovak language, using RP, once again, as a model variety for comparison, and also Gregová (2008) used BBC radio recordings to compare the quantity of English and Slovak vocalic system.

Moreover, Trudgill and Hananah (2008) claim that RP is the accent normally taught to students of English.

Even in the list of books for teaching English, as recommended by Ministry of Education, Science, Research and Sport of Slovak Republic for the first grade of elementary schools, thirteen, out of twenty two titles, are published by British publishers, six are published by American publishers, one by Slovak publisher and two are from unknown publisher (Appendix 1).

All the above mentioned examples demonstrate that RP serves as a model not only for learning and teaching but also as a key variety for researchers in Slovakia; though, none of them deals with the issue presented in this paper, they all offer a rich and highly valuable theoretical background for this paper.

Yet, while conducting this research the fact that in the world of global English, “there is no single variety of English, which provides the target of learning” (Graddol, 2006, p. 82) was kept in mind.

The experiment itself is a part of a diploma thesis of Gabriela Gumanová, 2015.

1 Research question

Based on all the previously mentioned studies it can be assumed that RP serves as a model variety in Slovakia. However, as Gumanová (2013) claims, students of English tend to apply features of Slovak pronunciation when producing English sounds (based on observation of quantity). Therefore, drawing also on Krashen’s “interference theory”(1982), it is hypothesized that Slovak learners of English should focus on the variety, which may have similar phonetic features as their mother tongue. And so, this paper is investigating, whether RP vocalic system is the closer correspondent to Slovak pronunciation than General American.

2 Experiment

Based on the hypothesis, this research focuses primarily on selected vowels observed in isolation (not in words). It is understood that sounds may differ a little in different words, however, as far as this research is representing a part of diploma thesis, it is essential to understand these differences in isolation, and only then apply them into broader context. In total, 87 recordings were observed; one recording per selected vowels of Slovak, English RP, and English GA (ɪ/i, e, ʌ/ɑ, ɒ/o, ʊ/u, æ/ä, i:/í, a:/á, ɔ:/ó, u:/ú).

3 Materials

The material were audio recordings, all recorded by Stereo mix software (created for Realtek soundcard, integrated on ASUS mother board with the latest updates for Windows 8.1) from a pronunciation application created by Oxford University Press, 2012, with examples of both, RP and General American sounds, while sound material of Standard Slovak was recorded from the www.slovak.eu webpage, created for learners of Slovak language as a foreign language. All sounds were further analyzed by PRAAT created by Paul Boersma and David Weenink. All the subjects are anonymous and only one recording per one particular sound was considered and analyzed as both sound sources (an application and a webpage) deal with standard varieties of English and Slovak.

4 Theoretical background

4.1 Phonemic features of observed varieties

This paper is based on the theory of Slovak and foreign scholars dealing with the comparison of English and Slovak phonemic features. The phonemic theoretical background is of great importance for the conducted experiment.

4.1.1 Vocalic differences

“Vocalic systems of L_e (English, E) and L_s (Slovak, S) are more asymmetric than consonantal systems in both, quality and quantity” (Ološtiak, 2004, p. 9). This issue was also researched by Lenhardt (1977), who claims that the two languages are so distant that there are no Slovak equivalents for any English vowel, but rather the closest corresponding sounds.

The theoretical underpinnings of the present experiment are represented by semi bal studies in the area. Based on the observed differences, Lenhardt suggested the closest vocalic corresponding sounds in relation $E \leftrightarrow S$, Ološtiak (2007) focused on places of articulation as presented in quadrilateral diagrams, indicating the place of articulation in RP English (E_{RP}) and standard Slovak (S_s). The findings of these scholars are accompanied by the categorization of General American (E_{GA}) vocalic sounds by Rogers (2000) in relation to E_{RP} (Appendix 2). On analyzing these three studies, with regard to the number of segments, they show the following ratios ($E_{RP}:E_{GA}:S_s$), 7:6:6 for short monophthongs (not all of them having their corresponding

counterpart in any of the observed varieties), 5:5:5 for long monophthongs (not all of them being the exact equivalent), and 8:5:4 for diphthongs (not all of them having the exact equivalents) , in total 20:16:15 (Lenhardt, 1977, Rogers 2000).

Therefore, based on Appendix 2, the present paper's focus has been narrowed down to the sounds having the closest corresponding sound of E_{RP}/E_{GA} to S_S , according to following table (Table 1) .

E	i	e	ʌ	ɒ	ʊ	æ	ɪ	ɑ	ɔ	u
RP							:	:	:	:
E	i	e	ʌ		ʊ	æ	ɪ	ɑ	ɔ	u
GA							:	:	:	:
S	ɪ	e	ɑ	o	u	ä	í	á	ó	ú
S										

Table 1 Selected sounds

4.1.1.1 Brief description of articulatory features – short monophthongs

i_{RP} ; i_{GA} ; i_S → E vowel [ɪ] is pronounced with a tongue nearer to the centre raised in half-close position while lips are loosely spread (Bilá, 2004) and S correspondent, [i] sound, is more open and more central vowel (Bilá, 2004) with “lips in neutral position and soft palate closing a passage to the nasal cavity (Sabol, Král’, 1989, p. 207, own translation). When it comes to the difference between RP and GA equivalents, some words, such as *very* seem to have final sound [i] (which is closer to i_S) instead of i_{RP} (Trudgill, Hannah, 2008).

e_{RP} ; e_{GA} ; e_S → according to Bilá (2004) there is almost no difference when producing e_S and e_{RP} . In both cases “the front of the tongue is raised between the half-open and half-close positions; the lips are loosely spread, the side rims making a light contact with the upper molars” (Bilá, 2004, p. 75), though e_S is little bit more central. As to e_{GA} , comparing diagrams 1 and 2 in Appendix 2, there seems to be only a little difference in the place of articulation between e_{GA} and e_{RP} .

$ʌ_{RP}$; $ʌ_{GA}$; $ʌ_S$ → “although the English and Slovak counterparts are very similar in their quality, it is the Slovak *á* that can be regarded as the counterpart of the relatively short English vocalic phoneme because it is more front and perhaps also closer than the English” (Bilá, 2004, p. 76). Yet, both, $ʌ_{RP}$ and $ʌ_S$ are articulated with the lips neutrally open and the centre of the tongue is raised (Bilá, 2004) while “passage to nasal cavity is closed by soft palate ... and the highest point of tongue is under soft palate” (Sabol, Král’, 1989, p. 203, own translation). $ʌ_{GA}$, however, is more mid vowel with the centre of the tongue raised in mid position more to back, as diagram 1 in Appendix 2 suggests.

$ɒ_{RP}$; $ɒ_S$ → $ɒ_{RP}$ “is articulated with wide-open jaws and slight, open lip rounding; the back of the tongue being in fully open position. There is no contact between the tongue and the upper molars” (Bilá, Eddy, 2013, p. 36); Sičáková (2002) defines $ɒ_S$ as more back and mid

vowel. However, GA does not recognize such a sound, as words “which have [ɒ] in RP are pronounced (with) [ɑ:] in GA” (Cruttenden, 1994, p. 84).

ʊ_{RP}; ʊ_{GA}; u_S → u_S is according to Sabol and Král’ (1989) pronounced with the tongue in high position at the back of the oral cavity and as the tip of the tongue is pulled back, the tongue takes the egg-like shape, moreover, “labialization is noticeable” (Sabol, Král’, 1989, p. 209). ʊ_{RP} “is pronounced with a part of the tongue nearer to centre than to back, raised just above the half-close position; the tongue is lax (compared with the tensor u:), there is no firm contact between the tongue and the upper molars. The lips are closely but loosely rounded” (Bilá, 2004, p. 77), and so is ʊ_{GA}.

æ_{RP}; æ_{GA}; ä_S → these two sound are sometimes considered equivalents by Slovak students, yet there is a crucial difference in their production. æ_{RP} is produced, as if a speaker is about to say [e], but the lips are neutrally open as for [ʌ] (Bilá, 2004), while ä_S can be according to Sabol and Král’ (1989) in its quality produced rather as glide than a monophthong, yet the changing position is not so significant as with diphthongs. Moreover, Ološtiak (2007) claims that “even if there is a separate vowel ä similar to English æ, put them into relation as phonetic equivalents would not reflect real state as æ is usually transformed into e or a by Slovak speakers”.

4.1.1.2 Brief description of articulatory features – long monophthongs

i_{RP}; i_{GA}; í_S → to both, i_{RP} and i_{GA} applies that “the front of the tongue is raised to a height slightly below and behind the close front position; the lips are spread; the tongue is tense, with the side rims making a firm contact with the upper molars” (Bilá, 2004, p. 74), and she further stresses that “it is closer and tenser than Slovak long í and there is no diphthongization and no reduction of the length before voiceless/fortis consonants in Slovak” (Bilá, 2004, p. 74).

ɑ_{RP}; ɑ_{GA}; ǎ_S → to both counterparts ɑ_{RP} and ǎ_S applies that jaws are considerably separated (Bilá, 2004) and oral cavity is fully open (Sabol, Král’, 1989). ɑ_{GA}, is pronounced, according to diagram 3 in Appendix 2, in almost the same manner as its RP counterpart. However, in some words, in which “RP have [ɑ:] ... GA have [æ]” (Cruttenden, 1994, p. 84).

ɔ_{RP}; ɔ_{GA}; ó_S → based on the quadrilateral diagrams in Appendix 2, ɔ_{GA} seems to have almost the same place of articulation as ó_S, and so drawing on the theory, it can be assumed that they both are “relatively long vowel; articulated with medium lip rounding; the back of the tongue – raised between the half-open and half-close positions, there is no contact between the tongue and the upper molars” (Bilá, 2004, p. 77), while ɔ_{RP} appears to be even more back.

u_{RP}; u_{GA}; ú_S → it is necessary to mention that the difference among all three of them is in their isolated form negligible. All of them are “back vowels, the tongue raising – relaxed from the closest position and is somewhat advanced from true back; tense with no contact between the tongue and the upper molars. The lips are closely rounded” (Bilá, 2004, p. 78).

4.2 Acoustics terminology in a nutshell

It is essential to acquaint the reader with crucial terms of acoustics of speech which are necessary to be recognized and understood due to the conducted research.

Waveform → is a two-dimensional representation on x-axis and y-axis, while “the horizontal dimension shows time going from left to right, and the vertical dimension shows the displacement of the molecule of air from its resting place, which is indicated by the horizontal line” (Rogers, 2000, p. 132), the result of these molecule movements are called *sine waves*. (Appendix 3)

Amplitude → is an “extent to which and air particle moves to and fro around its rest points in a sound wave. The greater the amplitude the greater the *intensity* of a sound” (Crystal, 2001, p. 18), the top part is called a *peak* and represents the maximal compression, while the bottom part is *trough* and shows the minimal point of rarefaction. (Picture 1, Appendix 3)

Periodic waveform → waveforms showing “a repeated pattern of vibration” (Crystal, 2008, p. 357), the opposite of periodic waveforms are *aperiodic waveforms*. (Picture 1, Appendix 3)

Simple Wave → wave representing only one frequency (Rogers, 2000) (Picture 1, Appendix 3)

Frequency → “the number of occurrences of a sound wave in a unit of time (usually a second)” (Crystal, 2008, p.199), measured in *Hertz (HZ)* (Picture 2, Appendix 3)

Complex waves → sound creates complex waves; multiple frequencies appearing in the sound wave (Rogers, 2000) (Picture 3, Appendix 3)

Fundamental frequency (F0) → “the lowest frequency component in a complex sound wave ... F_0 (f nought), sometimes called the first harmonic” (Crystal, 2008, p. 204)

First formant (F1) → one of the most significant for linguistic analysis; the lowest one, (Crystal, 2008); defined how low or high the tongue is in relation to the roof of the mouth (Picture 4, Appendix 3)

Second formant (F2) → defines the 'frontness or backness' of the highest part of the tongue (Picture 4, Appendix 3)

Third formant (F3) → very sensitive to the tip of the tongue movement; defines roundness (Picture 4, Appendix 3)

Aperiodic noise → is “a complex sound wave with irregular vibrations” (Crystal, 2008, p. 328)

Spectrogram → a visual representation of sound (Rogers, 2008) (Picture 4, Appendix 3)

Spectrum → “a display showing the frequency and the intensity of the harmonic components of a wave” (Rogers, 2000) (Picture 4, Appendix 3)

5 Methods and findings

The experiment was conducted on the collected data by the means of spectrograms, with the focus on formants (Appendix 4). Every recorded sample demonstrated visually by spectrograms was analyzed from the point of view of formants, as far as these suggest their articulatory features. All measured values were measured in hertz (Hz) and recorded into Table 2:

Phone me	Variety								
	SS			ERP			EGA		
	F1	F2	F3	F1	F2	F3	F1	F2	F3
ɪ/i	549	2909	3261	523	2819	3219	642	2383	2792
e	575	2233	3021	982	2268	2821	843	2108	2871
ʌ/ɑ	1001	1643	2832	989	1421	3122	926	1492	3002
ɔ/o	759	1166	2742	744	1113	3266	-	-	-
ʊ/u	568	1058	2657	508	1194	2947	738	1223	3061
æ/ä	670	2260	2470	1101	1857	3429	1046	1963	2895

Table 2 Measured values in Hz; short monophthongs

Data recorded in Table 2 are interpreted as follows:

ɪ_{RP}; ɪ_{GA}; ɪ_S → in terms of the height, the highest [i] sound, with F1 value 523Hz is $\mathbf{I_{RP}}$ and the lowest [i] sound, with F1 value 642Hz is $\mathbf{I_{GA}}$. When looking at F2 of [i] sound, it is obvious that in the case of $\mathbf{i_S}$ the F2 of 2909Hz shows it to be the most front, then there is $\mathbf{I_{RP}}$ with F2 value of 2819 Hz and the most “back” from all three of them is $\mathbf{I_{GA}}$ with F2 of 2383Hz. From these two frequencies, it can be assumed that $\mathbf{i_S}$ is pronounced in similar position like $\mathbf{I_{RP}}$, and F3 suggests, that the corners of the lips while producing $\mathbf{i_S}$, are similarly spread like when producing $\mathbf{I_{RP}}$ (with values of F3 $\mathbf{i_S:I_{RP}}$ of 3261Hz:3219Hz).

e_{RP}; e_{GA}; e_S → with the values of F1 ($\mathbf{e_S: e_{RP}: e_{GA}}$) 575Hz:982Hz:843Hz, $\mathbf{e_S}$ seems to be higher than the two other sounds, while $\mathbf{e_{RP}}$ and $\mathbf{e_{GA}}$ are pronounced in the similar position; however $\mathbf{e_S}$ and $\mathbf{e_{RP}}$ are similarly front sounds (F2=2233Hz:2268Hz), $\mathbf{e_{GA}}$ (F2=2108Hz) is closer to the centre of the mouth. In terms of roundness, with frequency F3 3021Hz, $\mathbf{e_S}$ is pronounced with more spread corners of the mouth (however, not as spread as $\mathbf{i_S}$) as the $\mathbf{e_{RP}}$ and $\mathbf{e_{GA}}$.

ʌ_{RP}; ʌ_{GA}; ʌ_S → $\mathbf{a_S}$ is pronounced with the tongue lower than $\mathbf{ʌ_{RP}}$ and $\mathbf{ʌ_{GA}}$ with the F1 ($\mathbf{a_S: ʌ_{RP}: ʌ_{GA}}$) 1001Hz:989Hz:926Hz, and based on the F2 (1643Hz) it is also the most front of the three sounds and lips are in the most neutral position (note F3 – 2831Hz.) Besides the roundness, the articulatory features of $\mathbf{a_S}$ seem to be closer to $\mathbf{ʌ_{RP}}$.

ɒ_{RP}; ɒ_S → both sounds are produced similarly, as there is only a little difference in how high and how back they are produced (F1=759Hz:744Hz; ɒ_S:ɒ_{RP}). They both are produced around mid close position (tongue in the relation to the hard palate) and they both are quite back and close to each other (F2=1166Hz:1113Hz; ɒ_S:ɒ_{RP}). The most noticeable difference is the roundness, as ɒ_{RP} is less rounded than ɒ_S.

ʊ_{RP}; ʊ_{GA}; ʊ_S → [u] sound is in all three cases produced with the tongue raised quite close to hard palate, and the closest is ʊ_{GA} with F1 value of 738Hz, while ʊ_{RP} is the lowest with the value 508Hz. From the measured values it seems that ʊ_{GA} is the highest, the most back and the least rounded vowel with values (F1:F2:F3) 738Hz:1223Hz:3061Hz. Therefore, ʊ_{RP} seems to be closer correspondent of ʊ_S.

æ_{RP}; æ_{GA}; ä_S → as Ološtiak (2007) claims: “even if there is a separate vowel ä similar to English æ, put them into relation as phonetic equivalents would not reflect real state as æ is usually transformed into e or a by Slovak speakers”. This is also demonstrated in these findings as ä_S is produced with the tongue placed higher than æ_{RP} and æ_{GA}. Moreover, the tongue, when producing ä_S, is raised a little in the centre and is produced with the jaws more spread than its English correspondents. æ_{RP} is pronounced with the lips almost in neutral position, when comparing F3 of ʌ_{RP} (3122Hz) and F3 of æ_{RP} (3429Hz).

Articulatory features were also recorded in Chart 1, demonstrating their approximate position.

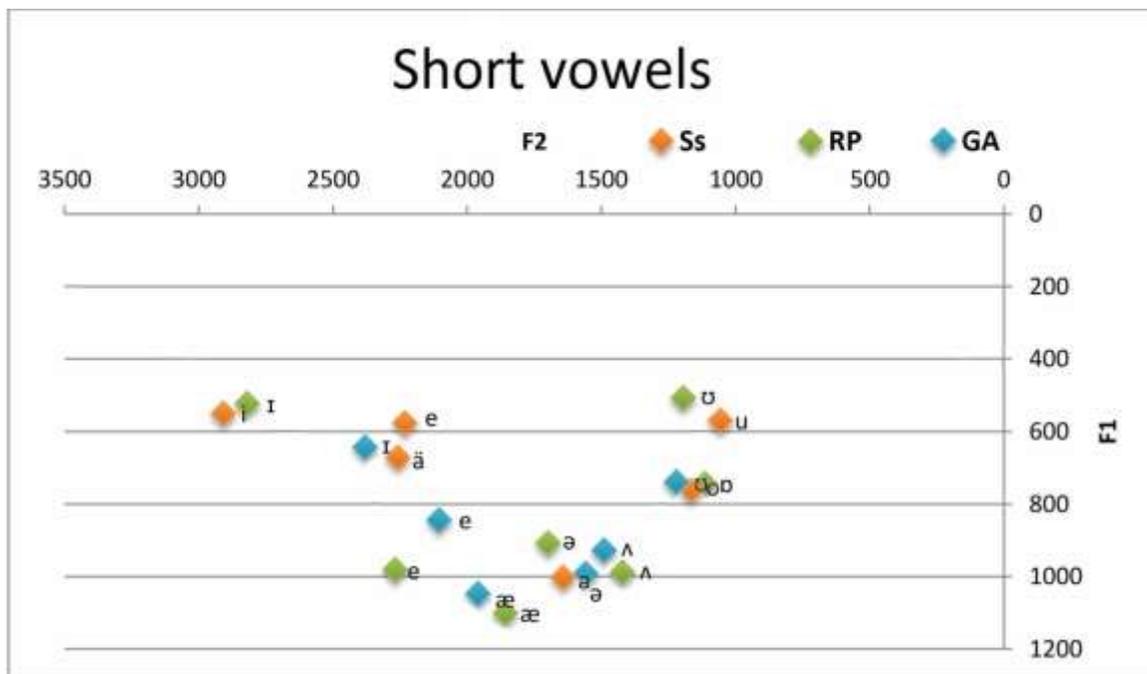


Chart 1 Short ERP, EGA, SS monophthongs

Table 3 represents the measured values of selected long monophthongs:

Phone me	Variety								
	SS			ERP			EGA		
	F1	F2	F3	F1	F2	F3	F1	F2	F3
i:/i	376	2913	314 3	371	226 9	319 1	454	2638	305 2
ɑ:/ǎ	1001	1595	295 0	100 2	131 3	336 3	891	1261	296 4
ɔ:/ó	594	1231	296 9	589	144 5	316 1	838	1089	309 1
u:/ú	434	693	305 5	424	142 5	302 4	468	1424	268 1

Table 3 Measured values in Hz; long monophthongs

Data recorded in Table 3 were interpreted as follows:

i:RP; i:GA; íS → in the case of i:GA, the highest point of the tongue is a little bit lower when compared to i:RP and íS, while these two sounds are pronounced with similarly raised tongue. íS is with the F2 value of 2913Hz also the most front vowel from these three observed vowels and i:GA, having F2 value 2638Hz is a correspondent of Slovak sound. íS, seems to be the most extreme in this group of sounds as the corners of the lips are most widely spread and i:GA on the other hand, when producing this sound the corners of lips are closer to each other.

ɑ:RP; ɑ:GA; ǎS → based on the findings, ǎS and ɑ:RP are pronounced with the tongue in the same low position (ǎS: ɑ:RP 1001Hz:1002H), however, ɑ:RP is a bit back and ɑ:GA is even more back. On the other hand, in the case of ǎS and ɑ:GA, the mouth is similarly open (F3 ǎS: ɑ:GA 2950Hz:2964Hz).

ɔ:RP; ɔ:GA; óS → all three sounds are produced with the tongue above the mid position, but ɔ:GA is pronounced little closer to mid position, which makes ɔ:RP a closer corresponding sound to óS. All three of them are relatively back, while ɔ:GA (F2 1089Hz) is the most back vowel from the trio of observed sounds, while óS, with F2 1231Hz, is placed between ɔ:GA and ɔ:RP.

u:RP; u:GA; úS → in all three sounds, the tongue is raised in the similar position, the highest, however, is when pronouncing u:RP (F1 424Hz). Worth noticing is a fact that úS is the most back of all the observed [u] sounds (F2 693Hz), much more back than its English correspondents. In the case of u:RP, it is worth noticing that it is even more back than ɔ:RP (F2 1425Hz and 1445Hz). As to the roundness, F3 of úS (3055Hz) suggests that it is not as rounded as its English correspondents.

Chart 2 shows the measured values as follows:

would be worthy, to carry out further research on a greater sample of L1 respondents in all three sound systems, in order to achieve results, which would be more valid and thus generally applicable. Moreover, this paper depicts partial findings of a broader research project conducted within diploma thesis.

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Appendices

Appendix 1 – The list of books as recommended by Slovak Ministry of Education

Book	Publisher
Treetops	Oxford University Press (UK)
First Friends	Oxford University Press (UK)
Way Ahead	Macmillan (US)
Story magic	Macmillan (US)
That's up	?
Kid's box	Cambridge University Press (UK)
English World	Macmillan (US)
Our Discovery Island	Pearson and Longman (UK)
Incredible English	Oxford University Press (UK)
English Quest	Macmillan (US)
Family and Friends	Oxford University Press (UK)
Playway to English	Cambridge University Press (UK)
Tracks	Pearson and Longman (UK)
Busy Bee	Juvenia Education (SK)
Welcome Starter	Express UK Publishing (UK)
English Adventure	Pearson and Longman (UK)
Macmillan Next Move	Macmillan (US)
Fairyland	Express UK Publishing (UK)
The English Ladder	Cambridge University Press (UK)
Supernature	?
Our world (An American English starter)	Cengage Learning (US)
Smileys	Express UK Publishing (UK)

Appendix 2 – The tables and charts of English and Slovak monophthongs

Vocalic systems

Table 1 English and Slovak short vowels (Lenhardt, 1977, p. 290, Rogers, 2000)

E _{RP}	ɪ	e	ʌ	ɒ	ʊ	æ	ə	
E _{GA}	ɪ	e	ʌ		ʊ	æ	ə	
S _S	i	e	ɑ	o	u			ä

Table 2 English and Slovak long vowels (Lenhardt, 1977, p. 290, Rogers, 2000)

E _{RP}	i:	ɑ:	ɔ:	u:	ɜ:	
E _{GA}	i:	ɑ:	ɔ:	u:	ɜ:	
S _S	í	á	ó	ú		é

Table 3 English and Slovak diphthongs (Lenhardt, 1977, p. 290, Rogers, 2000)

E _{RP}	e	ɑ	ɔ	ə	ɔ	ɪ	ε	ʊ							
E _{GA}	e	ɑ	ɔ		ɑ				ɔ						
S _S										e	i	a	i	u	ô

Diagram 1 English and Slovak short vowels (Ološtiak, 2007, p. 53)

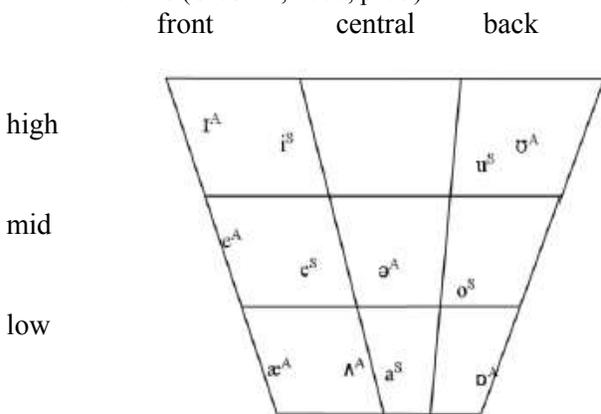
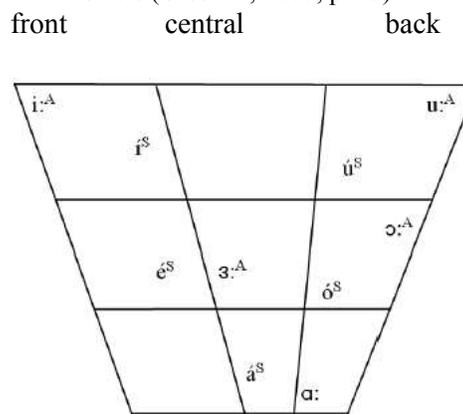
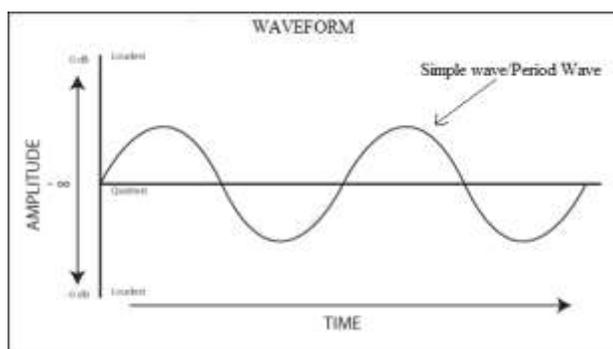


Diagram 2 English and Slovak long vowels (Ološtiak, 2007, p. 53)

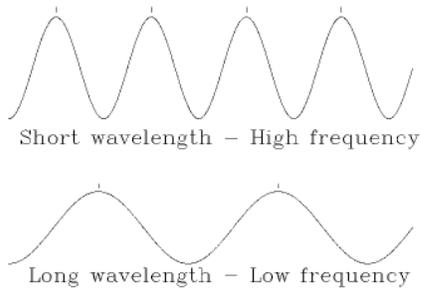


Appendix 3



Pic. 1 A waveform, Simple wave, Period Wave, Amplitude (source:

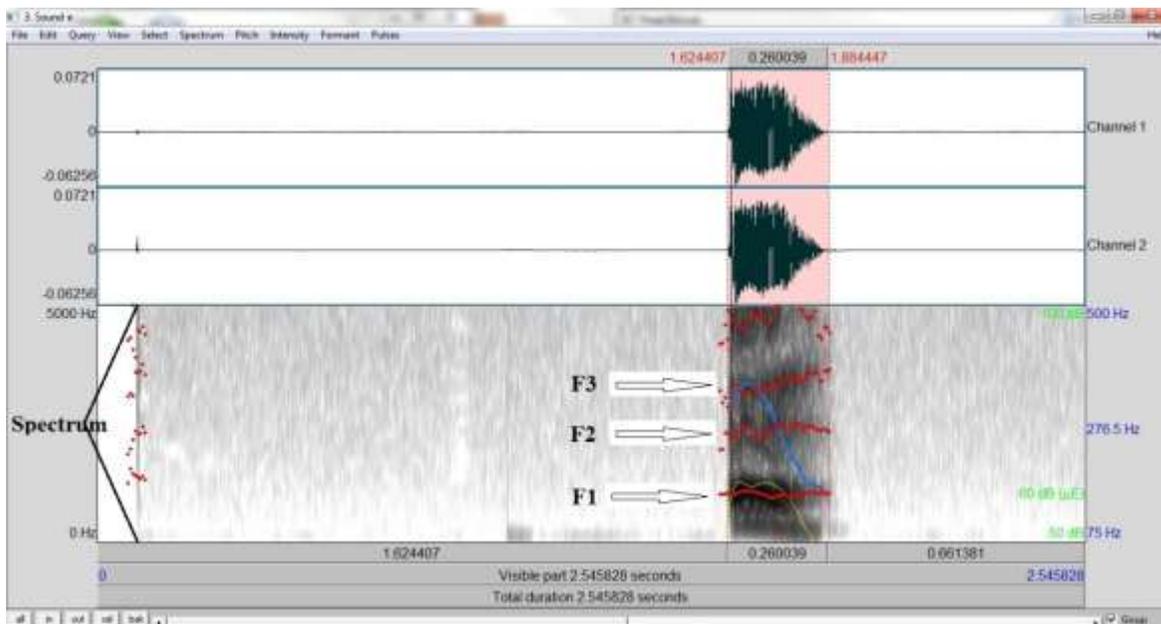
<http://english.stackexchange.com/questions/61541/term-for-graphical-representation-of-sound>, retrieved 03-24-2015)



Pic. 2 Frequency (source: <http://www.astro.cornell.edu/academics/courses/astro201/wavelength.htm>, retrieved 03-24-2015)



Pic. 3 A complex wave (source: http://www.school-for-champions.com/science/noise_cancellation.htm#.VRHRmdyh22s, retrieved 03-24-2015)



Pic. 4 A spectrogram of sound /a/, showing spectrum and formants (source: PRAAT)