المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

Case Study of the Acoustic Vowel Space of Iraqi Students English Vowels and Standard American English Vowels

Salim Khulaif Saad
Fine Arts Institute
Al-Nassiriyah- Iraq
Email: salimkhulaif@yahoo.com

ABSTRACT

English language is taught in Iraqi schools in a wide and intensive manner, but many of Iraqi students have problems mastering the English Language. The most significant issue is the correct pronunciation of words or sounds. It is difficult to acquire the correct pronunciation since most of these sounds in phonetics system of English and Arabic languages are different. This research will focus on the participant's English vowels production while making inferences to his social network, possible L1 interferences, comparisons to Standard US English, and Iraqi Students English vowels. Furthermore, the researcher will use 13 words created by Peterson and Barney 1952 in the production analysis and for recording the words pronunciation Praat software will be used. The results from the participant will compare with US English vowels and will be analyzed by the researcher.

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

Introduction

There are some languages that are of particular importance in the world. The most important of these languages is English, which is the first language in the world in many fields such as economy , literature and media (Al-Saadi, 2015). Furthermore, it is taught in Iraqi schools in a wide and intensive manner, but many of Iraqi students have problems mastering the English Language. The most significant issue is the correct pronunciation of words or sounds. It is difficult to acquire the correct pronunciation since most of these sounds in phonetics system of English and Arabic languages are different (Huthaily, Khaled, 2003).

Language differences represent real problems in pronunciation, especially in the field of the effects of the mother tongue on the second language. This research will focus on the participant's English vowels production while making inferences to his social network, possible L1 interferences, comparisons to Standard US English, and Iraqi Students English vowels.

Our participant is an student from Fine Arts Institute who studied English as a secondary language for nine years. His L1 is Arabic, he is in his early 20's. This study will use phonetic spectrograms to predict what English vowels this participant will likely struggle with. The researcher will use the list created by Peterson and Barney 1952 in the production analysis. This list includes: <heed>, <hid>, <hayed>, <head>, <had>, <hawed>, <hoed>, <hag> , <hod>, <hood>, <who'd>, <hud> , and <heck>. Furthermore, in order to analyze the production of the participant vowel the researcher used the Praat software program. Praat has been developed for doing digital phonetic analysis of speeches on computers. The results from the participant will compare with US English vowels (see appendix) and will be analyzed by the researcher.

Literature Review

Modern Standard Arabic (MSA) and Iraqi Dialect

Modern Standard Arabic has three vowels as seen in Figure 1 (Thesieres, 2001). However, dialect variations differ. Holes (1990)documents eight vowels used in Arabic area: five long and three short. They are /i:/,/e:/, /a:/,/u:/,/o:/, /i/,/a/, and /u/ . L2 vowels are often substituted [I] with /i/, [ʊ] with /u/, [æ] with /a/ and the substitution of long vowels vary.

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

Figure 1 Vowel chart of modern standard Arabic from (Thesieres, 2001)

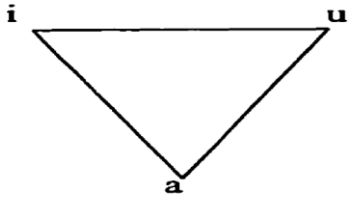
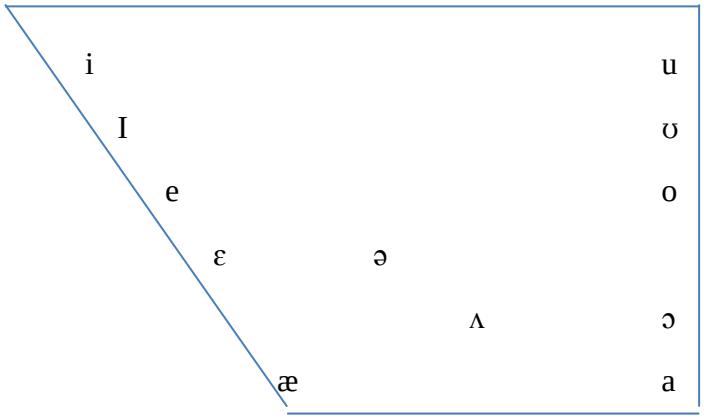


Figure 2 is an American English vowel chart. Notice that there are three vowels which according to these charts English and Modern Standard Arabic (MSA) hold in common. They are /i/, /a/ & /u/.

Figure 2 A English Vowel Chart modified from (Fromkin, Rodman, & Hyams, 2003).



Speech Learning Model

Flege's Speech Learning Model (SLM) posits that phonetic variations of a L2 speaker can be predicted by ma

king inferences from the speakers L1. that initially vowels that do not exist in the speaker's L1 will be mispronounced but can be learned, however, vowels which are similar to the speaker's L1 will continue to be mispronounced because they substitute their L1's vowels for their L2 (1988) (Flege & Port, 1981). Flege's SLM (Flege & Port, 1981) (Flege, 1988) would then predict that initially the English vowels /e/,/I/,/ɛ/,/æ/,/ʌ/,/ʊ/ and /o/ will be mispronounced by our participant because they do not exist in MSA or in his regional dialect, but after a time they would be learned.

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

However, after some time the participant will continue to struggle with the English vowels acoustically similar to Arabic: /i/, /a/ & /u/.

In Munro's (1993) study, researchers found that native speakers judge accentedness of L2 English speakers who's L1 is Arabic, based namely on variations in their F_1 and F_2 even the most noticeable difference spectrographically is in duration of their vowels (Flege & Port, 1981). Munro also found that the F_1 and F_2 of the English vowels of Arabic L1 speakers are consistently lower than Standard English.

Flege, Munro & Fox (1994) studied English vowel perception in native speakers of English and Spanish speakers of English as a second language. They found that the Spanish speakers perceived the variations of vowel sounds that were not in their native language better than vowels sounds that are similar between English and Spanish, Showing that the SLM applies not only to spoken vowels but to audibly perceived language.

Participant

The study's participant is a male student in Fine Arts Institute/ South of Iraq. He speaks Arabic as his native language. The student has been studying English for 9 years as secondary language in schools, and he is in his early 20's. While interviewing the participant about his social network, the participant identified that the English teachers who he interacts with the most in time duration of studying were all native Arabic speakers and that when he speaks with those people they use Arabic. The participant also admitted that even while in English classes he used Arabic to speak with his teacher but he watch and listen most the time to American movies and songs. His English as a second language is advances where he could listen and speak English with his teacher fluently.

Data Collection and Procedures

The vowel sounds of the participant have been recorded by the Praat program. Praat is free software program for analyzing sounds (Pascal van). 13 words have been recorded and analyzed through spectrographs shown on Praat. The numbers were taken of Formant 1 (F1), Formant 2 (F2), and the duration. The participant repeated each word three times in order to take the average number of the word. The sounds are 13 different minimal pairs spoken in the context h–d (heed, hid, head, had, hod, hawed, hood, who'd, hud, heard, hayed, hag and heck). Final numbers taken from the participant's vowels were then compared with standard American male vowel formants. Because of Munro's (1993) findings that first and second formants are most responsible for native perceptions of accentedness , we will focus solely on first and second formants. Spectrographs and formant information for the participant and the researchers can be found in the appendix.

DOI: 10.33193/IJoHSS.9.15

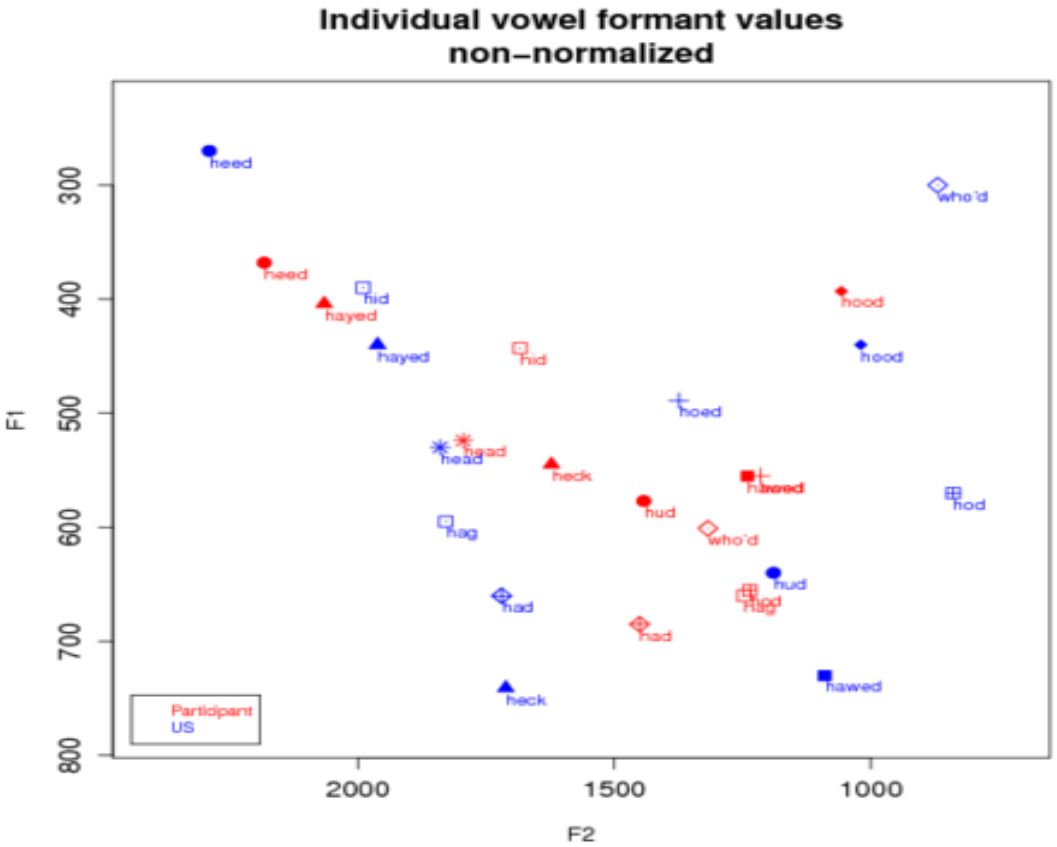
المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

Findings & Analysis

Normalization

In Figure 3 one can see the vowels normalized. This figure shows each vowel contrasting the participant's vowels (red) and the standard formants of an average male in the United States. Two minimal pairs, <hag> & <heck>, vary in native speakers in the United States and were included to show which vowels were used in these words. Thus these words have to US counterparts in the normalization chart.

Figure 3



First Formant Analysis

Three of the participant's vowels stuck out because of the trouble they gave the participant and because of a sharp contrast with the US male standard in first formant: <who'd> [u] (301 Hz lowered), <hawed> [a] (175 Hz raised), and <heed> [i]

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

(98 Hz lowered). Notice that these three vowels also occur in MSA. Therefore, <hawed> and <heed> will likely be marked with accentedness , however, <who'd> is so far from the US male standard that it may be misunderstood as [hʌd].

Second Formant Analysis

Five vowel sounds gave the participant trouble and contrasted with the US male standards vowels: <who'd> [u] (448 Hz fronted), <hod> [ɔ] (396 Hz fronted), <hid> [I] (306 Hz backed), <had> [æ] (269 Hz backed), & <hud> [ʌ] (253 Hz fronted). The participants <who'd>, <hod> and <hid> are so far from the US male standard vowel pronunciations that they will likely be misunderstood. Both <who'd> and <hod> will likely to be misunderstood as [hʌd].

Hag & Heck

Our participant's <hag> was spectrographically closest to the US standard's [ʌ] and the vowel is pronounced almost exactly as in the participant's pronunciation of <hod>. The participant's <hag> is backed 581Hz compared to the Average US male's <hag>, A native speaker would likely understand our participant's <hag> as <hug>.

Our participant's <heck> was not spectrographically very close to any US standard vowels, however it is closest to the US standard male's [ɛ] but was backed to a middle vowel. Our participant's <heck> is raised 196Hz above the US standard male's <heck>.

Conclusions

Congruence with Flege's SLM

When considering the first formant Flege's Speech Learning Model holds true; the three vowels which are held relatively in common by both English and MSA showed the largest spectrographic contrast to the average male from the United States. However, when considering the second formant, with the exception of /u/ as found in <who'd>, the vowels which showed the greatest contrast to standard pronunciation were not held in common with MSA.

Additional supporting evidence for SLM could be the two vowels which the participant produced closest to standard pronunciation. /ɛ/ as found in <head> had a F_1 with only 6Hz difference from the standard and a F_2 with only a 45 Hz difference from the standard. /ʊ/ as found in <hood> was produced which only a 47 Hz difference in F_1 and only a 38Hz difference in F_2. Neither of these vowels are held in common with the participant's L1 yet they are the vowels which were produced the most native like.

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

On the whole, this case study suggests that SLM does not apply equally to all speakers and/or some students may be in flux in their vowel pronunciations and may only fulfill some of the predictions made by SLM.

Implications for SLA Teaching

Implications for teaching drawn from this study are as follows. Students may initially find commonalities between their L1 and L2 and simplify their L2 to reinforce these commonalities. It may also be that learners simply do not perceive slight differences between languages. What initially was a comfortable transition for an early learner may later turn out to be a blind spot in their learning.

Students may pronounce vowels more native like in one formant than another. The participant in this study was closer to a native like pronunciation in vowel height than they were in vowel frontedness. This should remind teachers to pay attention to both.

The participant in this study produced some words so close to other words that they would have been confused by a native listener. If these vowels can be identified, a teacher can, with the student, focus on that vowel individually improving the student's native like proficiency.

References

Al-Saadi, Nawar. (2015). Importance of English Language in The Development of Tourism Managment. Academic Journal of Accounting and Economics Researches, 4(1, 33-45).

Flege, J. (1988). The Production and Perception in Foreign Languages. In H. Winitz, HUman Communications and it's disorders (pp. 224-401). Norwood: Ablex.

Flege, J., & Port, R. (1981). Cross-Language Phonetic Interference: Arabic to English. Language and Speech, 24(2), 125-148.

Flege, J., Munro, M., & Fox, R. (1994). Auditory and Categorial effects on cross language vowel perseption. Journal of the Acoustical Society of America, 95(6), 3623-3642.

Fromkin, V., Rodman, R., & Hyams, N. (2003). An Introduction to Language 9th Ed. Boston: Wadsworth Cengage Learning.

Holes, C. (1990). Gulf Arabic. New York: Routledge.

Huthaily, Khaled, (2003) "Contrastive phonological analysis of Arabic and English". Graduate Student Theses, Dissertations, The University of Montana, US. Retrieved from //https://scholarworks.umt.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=9145&context=etd

DOI: 10.33193/IJoHSS.9.15

Koffi, E. (to appear). Intelligibility Assesment and Acoustic Vowel Space: An Instramental Phonetic Account of the Production of English Lax Vowels by Somali Speakers.

Munro, M. (1993). Productions of English Vowels by Native Speakers of Arabic: Acoustic Measurments and Accentedness Ratings. Language and Speech, 36(1), 39-66.

Pascal van, L. (n.d.). Praat Short Tutorial: a basic introduction. Retrieved November 15, 2011, from http://www.stanford.edu/dept/linguistics/corpora/material/PRAAT_workshop_manual_v421.pdf

Peterson, G. E., & Barney, H. L. (1952). Control methods used in a study of the vowels. Journal of the Acoustical Society of America, 24, 175-184

Thesieres, H. (2001, June). An Articulatory Phonological Analysis of Vowel Phonology in Spoken MSA. Houston, Tesas: Rice University.

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019

Appendix

Recording of the participant

1. The formant and duration measurements of <*heed*> in the table below:

Repetitions	**<heed> [i]**	F1	F2	Duration
x 1	/hid/	362 Hz	2152 Hz	113 ms
x 2	/hid/	365 Hz	2189 Hz	121 ms
x 3	/hid/	378 Hz	2210 Hz	152 ms
	average	368Hz	2183Hz	128

2. The formant and duration measurements of <*hid*> in the table below:

Repetitions	**<hid> [ɪ]**	F1	F2	Duration
x 1	/hid/	431 Hz	1731 Hz	99 ms
x 2	/hid/	459 Hz	1656 Hz	107 ms
x 3	/hid/	440 Hz	1667 Hz	116 ms
	average	443 Hz	1684Hz	107 ms

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019

3. The formant and duration measurements of <*hayed*> in the table below:

Repetitions	**<hayed> [e]**	F1	F2	Duration
x 1	/hed/	416 Hz	2092 Hz	123 ms
x 2	/hed/	393 Hz	2029 Hz	125 ms
x 3	/hed/	403 Hz	2079 Hz	127 ms
	average	404 Hz	2067 Hz	125 ms

4. The formant and duration measurements of <*head*> in the table below:

Repetitions	**<head> [ɛ]**	F1	F2	Duration
x 1	/hɛd/	515 Hz	1816 Hz	112 ms
x 2	/hɛd/	519 Hz	1784 Hz	102 ms
x 3	/hɛd/	538 Hz	1785 Hz	108 ms
	average	524 Hz	1795 Hz	107 ms

5. The formant and duration measurements of <*had*> in the table below:

Repetitions	**<had> [æ]**	F1	F2	Duration
x 1	/hæd/	689 Hz	1439 Hz	113 ms
x 2	/hæd/	692 Hz	1423 Hz	107 ms
x 3	/hæd/	674 Hz	1493 Hz	114 ms
	average	685 Hz	1451 Hz	111 ms

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019

6. The formant and duration measurements of <*hod*> in the table below:

Repetitions	**<hod> [ɑ]**	F1	F2	Duration
x 1	/hɑd/	684 Hz	1235 Hz	87 ms
x 2	/hɑd/	658 Hz	1230 Hz	87 ms
x 3	/hɑd/	624 Hz	1245 Hz	99 ms
	average	655 Hz	1236 Hz	91ms

7. The formant and duration measurements of <*hawed*> in the table below:

Repetitions	**<hawed> [ɔ]**	F1	F2	Duration
x 1	/h**ɔd**/	583 Hz	1183 Hz	120 ms
x 2	/h**ɔd**/	557 Hz	1357 Hz	106 ms
x 3	/h**ɔd**/	525 Hz	1183 Hz	118 ms
	average	555 Hz	1241 Hz	114 ms

8. The formant and duration measurements of <*hood*> in the table below:

Repetitions	**<hood> [ʊ]**	F1	F2	Duration
x 1	/hʊd/	388 Hz	1054 Hz	114 ms
x 2	/hʊd/	406 Hz	1080 Hz	122 ms
x 3	/hʊd/	387 Hz	1040 Hz	111 ms
	average	393 Hz	1058 Hz	115 ms

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019

9. The formant and duration measurements of <*who'd*> in the table below:

Repetitions	**<who'd> [u]**	F1	F2	Duration
x 1	/hud/	629 Hz	1318 Hz	104 ms
x 2	/hud/	584 Hz	1347 Hz	127 ms
x 3	/hud/	592 Hz	1290 Hz	121 ms
	average	601 Hz	1318 Hz	117 ms

10. The formant and duration measurements of <*hud*> in the table below:

Repetitions	**<hud> [ʌ]**	F1	F2	Duration
x 1	/hʌd/	586 Hz	1433 Hz	101 ms
x 2	/hʌd/	580 Hz	1417 Hz	103 ms
x 3	/hʌd/	565 Hz	1479 Hz	98 ms
	average	577 Hz	1443 Hz	100 ms

11. The formant and duration measurements of <*hoed*> in the table below:

Repetitions	**<hoed> [o]**	F1	F2	Duration
x 1	/hod/	577 Hz	1172 Hz	106 ms
x 2	/hod/	543 Hz	1233 Hz	126 ms
x 3	/hod/	545 Hz	1244 Hz	100 ms
	average	555 Hz	1216 Hz	110 ms

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019

12. The formant and duration measurements of <*hag*> in the table below:

Repetitions	**<hag>**	F1	F2	Duration
x 1	/hag/	651 Hz	1289 Hz	147 ms
x 2	/hag/	652 Hz	1231 Hz	142 ms
x 3	/hag/	679 Hz	1225 Hz	144 ms
	average	660 Hz	1248 Hz	144 ms

13. The formant and duration measurements of <*heck*> in the table below:

Repetitions	**<heck>**	F1	F2	Duration
x 1	/hek/	556 Hz	1635 Hz	73 ms
x 2	/hek/	546 Hz	1629 Hz	77 ms
x 3	/hek/	535 Hz	1605 Hz	78 ms
	average	545 Hz	1623 Hz	76 ms

DOI: 10.33193/IJoHSS.9.15

المجلة الدولية للعلوم الإنسانية والاجتماعية
International Journal of Humanities and Social Sciences
website:www.ijohss.com
Email:editor@ijohss.com
ISSN: 2415 – 4822
العدد (9) سبتمبر 2019
IJOHSS

Table 1

N0	Vowels	US Male F1	US Male F2	Part. F1	Part. F2
1.	<heed> [i]	270	2,290	368	2183
2.	<hid> [ɪ]	390	1,990	443	1684
3.	<hayed> [e]	440	1,962[1]	404	2066
4.	<head> [ɛ]	530	1,840	524	1795
5.	<had> [æ]	660	1,720	685	1451
6.	<hawed> [ɑ]	730	1,090	555	1241
7.	<hoed> [o]	489	1375	555	1216
8.	<hod> [ɔ]	570	840	655	1236
9.	<hood> [ʊ]	440	1,020	393	1058
10.	<who'd> [u]	300	870	601	1318
11.	<hud> [ʌ]	640	1,190	577	1443
12.	<hag>	595	1829	660	1248
13.	<heck>	741	1712	545	1623

[1] Male frequencies based on Thomas' own pronunciation. Thomas, Erik R. 2011. *Sociophonetics: An Introduction*. New York: Palgrave Macmillan, p. 240. The formant values were obtained by averaging the frequencies provided by the author.

DOI: 10.33193/IJoHSS.9.15