An Acoustic Analysis of English Vowels Produced by Male and Female Iraqi EFL Learners

Haneen Kareem Khalaf
han20h1004@uoanbar.edu.iq
Fuad Jassim Mohammed
ed.fuad.jassim@uoanbar.edu.iq
Department of English, College of Education for Humanities, University of Anbar
Department of Law, Al Maaref University College, Ramadi, Iraq

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Abstract

A lot of studies showed that males and females vary in their production of English vowels as a result of biological variances in their vocal tract. These differences cause a challenge when they are employed for an instrumental analysis of speech sounds including male and female speakers. The primary purpose of the present study is an attempt to provide experimental evidence for certain linguistic causes of production errors of English vowels spoken by Iraqi EFLLs at university level. It concentrates on acoustic analysis and gender-related differences, as well as comparing native to non-native production of vowels. To achieve these goals, sixty Iraqi participants (30 males and 30 females) who are university EFLLs were recruited to perform a speech production task of the eleven English vowels in a /hvd/ context embedded in a carrier sentence (say… again). The data were analyzed using PRAAT to extract first and second formant frequencies and vowel duration for each vowel. Lobanov ANAE Method (2006) was followed to normalize F1 and F2 values. The data were compared to data from research projects (Wells,1992 and Deterdings, 2006) looking at the English vowels produced by native speakers. The collected data were statistically analyzed by implementing two processes of statistical analysis. The first process is the descriptive statistics, such as manual input of data and display them as bar charts that were done using Excel sheets. This was carried out to quantify the data obtained. The second process was inferential statistics, such as independent-sample t-test that was achieved using, SPSS software. It was conducted, to identify if the results hold any statistical significance. The results showed that Iraqi EFLLs produced the targeted vowels shorter than native English speakers. In terms vowel quality, they produced lower and more fronted vowels than the control group. In addition, this study revealed that there are statistically significant cross-gender differences between male *and female* Iraqi EFLLs in the production English vowels. It is concluded that learners' gender plays a considerable role in their production of English vowels.

1. Introduction

There are some reasons that influence accuracy in learning English language, mainly the production of English vowels. One of these reasons is the gender of the speakers. Some aspects of females' language behavior differ from those of males. The differences between male and female voices are associated with physiology or differences in vocal tracts (Pépiot, 2012).

Fant (1966) showed that the vocal differences between the genders can be explained primarily by anatomical and physiological differences, in which the females' vocal folds are longer and thicker than male speakers. This clarifies that male speakers tend to vibrate more slowly than female speakers (Kahana, 1978). Fant, (1970) shows the length of the vocal tract can be considered as a significant anatomical problem, that is the space from the vocal folds to the lips. Simpson (2009) indicated that the average length of the male vocal tract is 17 to 18 cm. while the average length of the female vocal tract is about 14.5 cm. These variances would explain the gender differences observed in vowel quality and quantity.

Many studies presented the differences between male and female speakers due to the differences in vocal tract. Koffi in (2019) pointed out that there were physiological variances between males and females in the acoustic measurements of English monophthongs as produced by Nepali males and females separately. He concluded that female speakers produced vowels more intelligible than those that are uttered by their male peers. In 2018, Abbasi et al measured the production of the English vowels /æ/, /e/, /ɪ/, /ɒ/ and /ə/ by 5 males and 5 females Pakistani EFL learners. they measured duration and F1 and F2 fundamental frequency. They concluded that properties of vowels produced by Pakistani speakers differs from English speakers, as well as, males differed from females in the production of English monophthongs. The basic matter which is related to the problem of this study is gender plays an important part in the production of English vowels. Thus, regarding to the knowledge of the researcher, the problem gender influence in the production of English vowels by Iraqi EFL learners has not been examined yet. Hence, the present investigation is a try to fill this gap in the literature.

The study is restricted in dealing with the production of English monophthongs by male and female Iraqi learners. It is conducted by selecting samples of Iraqi students who are studying English as a foreign language at university of Anbar/ College of Education for Humanities/ Department of English. It is concerned with the third-year students who speak two different Iraqi dialects and studied phonetics and phonology in the last two years. Since it has negligible impacts on the realization of English vowels, the context /hVd/ is used. Nevertheless, utilizing different contexts may give various results. Therefore, this project is aiming at Investigating English vowels produced by Iraqi EFLLs and compare them with English one, and Finding out if there are any gender-related differences among Iraqi EFLLs in the production of English vowels.

2.Material and Methods

2.1. Research Design

This study follows a mixed-mood procedure (descriptive-quantitative method) since it uses quantitative procedures that process data statistically and numerically. In addition, this study discusses the data qualitatively by describing how the Iraqi EFL learners pronounce the English vowels compered to English native speakers. Furthermore, this study utilizes mix mod method to get deep information, sufficient and clear analysis about the data under study. However, under the existing models, data collection and data normalization are made. To get better understanding about the production of English monophthongs by Iraqi EFL learners, data is described and compared with native speakers' productions (deterding 2006 and wells) . It deals with the acoustic features of English vowels as the vowels quality and the quantity to answer the research questions**.** the production test in which Iraqi EFLLs were requested to articulate a list of words in meaningful sentences was created in order to collect data. The data were analyzed acoustically using PRAAT, normalized using NORM site and statistically computed by SPSS software.

2.2Sampling Method and Participants

The participants of the present study are 60 Iraqi EFL learners at the Department of English Language, College of Education for Humanities, University of Anbar. All of them are third-year students enrolled in the

academic year (2021- 2022). The participants are 30 male and 30 female speakers. The reason behind choosing third year students, is that they have practiced pronouncing English vowels in their phonetics and phonology classes in the first and second stages.

There was no history of speech or hearing impairment among the speakers. The participants ranged in age from 21 to 26 years. Four participants (2 males and 2 females) were employed to test the material initially. Because students were attending courses and completing schoolwork and term examinations at the time, all recordings were spread out over a period of six weeks. They were summoned during their free time, when they had no commitments. They were not told the actual aim of their reading of the words to retain authenticity and trustworthiness, but were told that their productions would be employed for research purposes. Further, they were promised that they wouldn't have to worry about mistakes when uttering the words since their recorded sounds would be unknown and there would be no correct or incorrect answers.

Before the recording began, each participant was handed a numbered copy of the wordlist and was given the opportunity to look over the words. The researcher made seventy-three recordings in all, but only sixty were chosen for data analysis. In the event, 13 Speakers were removed from the analysis since they produced many vowels as diphthongs. They were confused, thus their productions were not fast and not clear.

2.3 Speech Production Task

The production test conducted in this study consists of 11 words containing of 11 English monophthongs. The recordings happened in a silent room at the phonetic laboratory, department of English, college of education for humanities, University of Anbar, where the participants can be available. The task was done by giving them a sheet of wordlist the students who are under investigation were supposed to pronounce those words loudly. The researcher recorded their pronunciation by using a recording devise. Each participant repeated each of the eleven English terms twice, for a total of 22 tokens for each subject. A total of 1320 vowel tokens were produced by all the subjects.

Numbers	The vowels	The carrier sentence
1	**/e/**	say head again
2	**/i/**	say hid again
3	**/æ/**	say had again
4	**/ɒ /**	say hod again
5	**/ʊ/**	Say hoed again
6	**/ʌ/**	Say hud again
7	**/i: /**	say heed again
8	**/a: /**	say hard again
9	**/ɔ: /**	Say hawed again
10	**/u: /**	Say who'd again
11	**/ɜ: /**	say heard again

2.4 PRAAT

The first and second formant and duration values of each vowel were analyzed and measured using PRAAT "doing phonetics by computer" version 6.2.05 by Paul Boersma and David Weenink Website: praat.org. To extract both f1 and f2 as well as vowel lengths. PRAAT is an open-source software application for categorizing and editing speech signals, and different acoustic (formant, duration, pitch etc.) analyses and manipulations well as. (Biersma &Weenink, 1996, cited in, Ali, 2011).

2.5 Acoustic Measurements for Fundamental Frequencies and Duration of Vowels.

The most common method used by phoneticians to describe vowels is to measure the frequencies of formants. Ladefoged (2001) showed that "vowels can always be accurately described in terms of the frequencies of the first three formants. The third format adds to quality distinction but there is no easy way of making it more evident (Ladefoged, 2001). It, like the first two, plays a function in determining vowel quality, but its involvement is less obvious (Ladefoged, 2006). Therefore, this experiment aims at measuring first and second formants since they are the most essential acoustic features that can be detected in spectrograms and can be used to correctly identify and classify vowel quality (Delattre et al., 1955, cited in Ali, 2013). F1 and F2 of the vowels were "taken from the middle point of the vowel" to achieve consistency (Lucic, 2015, p. 2). The midpoint of the vowels is regarded the most trustworthy position to assess monophthongs because vowels are at their most steady state (Hillenbrand. et al, 1995, cited in Hubais & Pillai ,2010).

In terms of duration, it refers to the time occupied in the production of a sound. The way of measuring it is so complicated because the delamination of sound units acoustically needs segmentation of the utterances, so the impression of sound would be complex even when it occurs, the duration rate given may not correspond to linguistic judgements of the sound length. The duration values for each token were measured firstly. The beginning of a vowel was marked by the starting point of voicing for that vowel preceded by the voiceless consonant /h/ and by a sudden change in formant frequency or intensity preceded by the voiced consonant /d/. Further, the offset of the vowels was marked by the offset of voicing or a sudden drop in intensity, indicating closure. The vowels onsets were determined by visual inspection of the waveform and spectrogram, as well as by ear. Vowel duration was calculated in milliseconds. To avoid the possible effect on duration of contextual factors such as number of syllables and following consonantal segment, all vowel tokens appeared in one syllable words. To ensure a measure of consistency in the rate of speech, all subjects were instructed to read at a normal speed. Of these .

2.6 Normalization

The normalization process is an important step in data analysis, due to normalizing a vowel quality will reduce the physiological variation (i.e., differences in mouth sizes) between speakers to make the values equal (Adank, Smits, & Van Hout, 2004) It is an appreciated tool to facilitate across-speaker and across language comparisons (Yang, 1996). To eliminate inter-speaker differences of the formant value because of biological differences in the volume of a speaker's vocal tract during the production of vowels, and so they would be comparable directly, the phoneticians This process is called Vowel Formant Normalization (Flynn, 2011). It is preferred to follow the TELESUR G normalization algorithm since it is used by Labov et al. (2006).

2.7 Steps of Data Analysis Procedures.

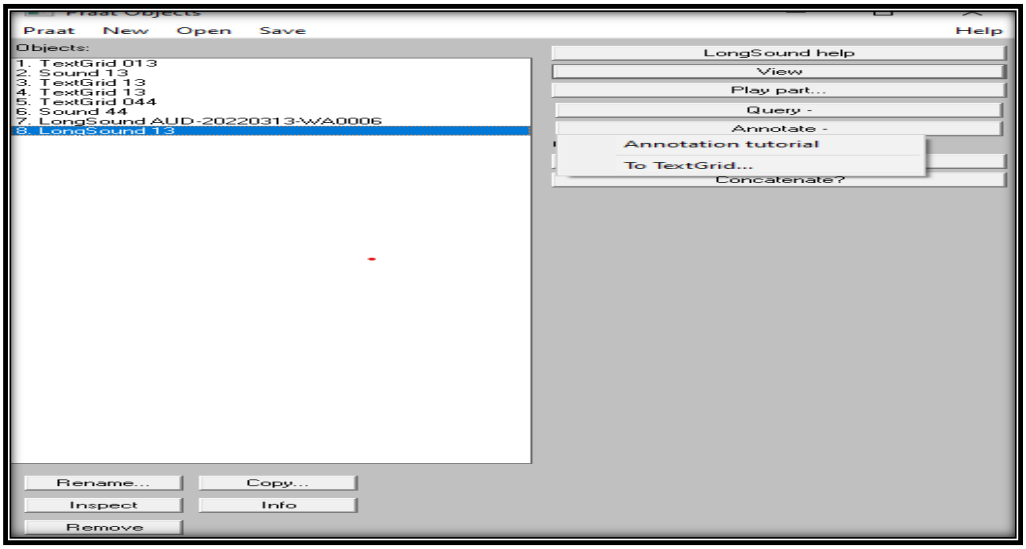
Procedure indicated in the acoustic measurements of English vowels can be elaborated as follows:

1- The recordings of each participant were made by a recorder devise called TASCAM (see appendix F). When the recordings were completed, they were downloaded to laptop and saved as wav sound files.

2- The researcher labeled each sound file individually for ease of access. The sound file convert software called Audacity was downloaded to convert sound files from WMA form to WAV form for conducting the acoustic analysis via using the PRAAT software.

3- Opening PRAAT, entering wav files, forming a Text Grid file and then create tiers for writing words and sounds for each voice recording, as observed in the figure below:

Figure 1: forming Textgrid for creating tires



4- Marking the words in /hvd/ contexts manually, and by using the wave form and spectrogram the researcher determined the whole vowel from the onset to the offset. Two tier intervals were created, the first tier interval was intended for the words (e.g. heed), and the second tier interval was built for the vowel (e.g. /i:/)

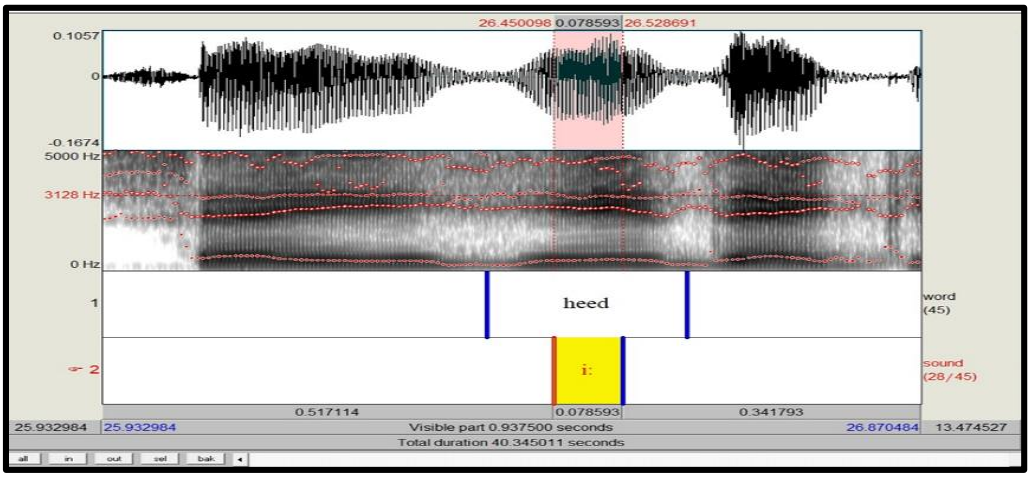


Figure 2 : Screenshot of word heed in PRAAT

5- Duration values were extracted automatically by pressing on the vowel as it is seen in Figure (3.2). As well as, F1 and F2 values were taken out for each vowel.

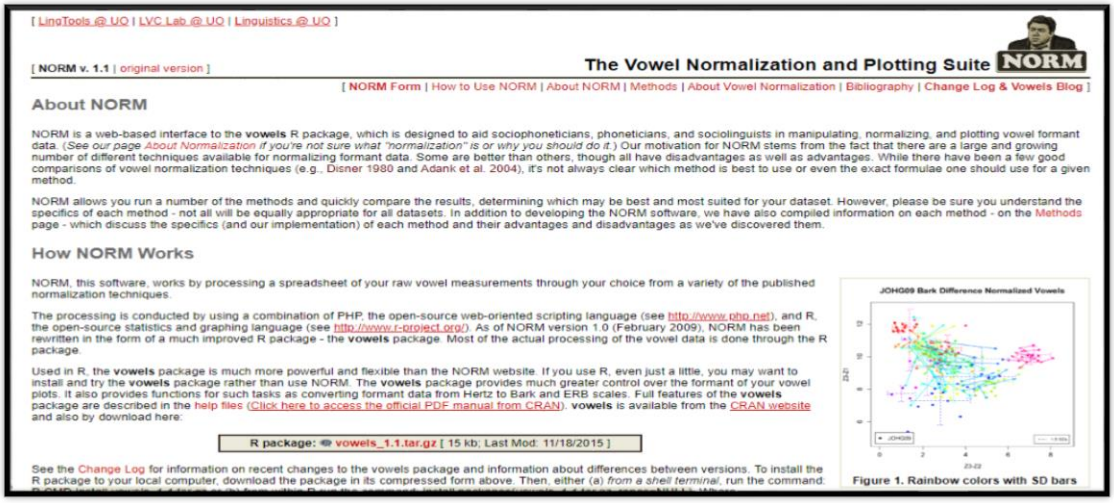
6- According to Ladefoged's (2003) ways of checking the reliability of the measurements, the formants and duration measurements were repeated. It took about one month to repeat them.

7- Since each token was recorded twice, both the repeated tokens were compared to each other as a second stage to confirm the reliability of the F1 and F2. If, there was differences more than 50 Hz between the first and the second repetition of the same formant, they were tested again to confirm that there was no fault with the measurements.

8- The data extracted from PRAAT were transferred to the Excel files in order to calculate the average values of duration and F1 and F2 as well.

9- F1 and F2 values were normalized and plotted using a free online website called NORM (durations were not normalized), and transferred to SPSS software for statistical implementations.

Figure 3 : Screenshot of the vowel normalization and plotting suite



3.Statistical Data Analysis

After completing the normalization process regarding vowel quality and extracting means of vowel quantity, the data were set to analysis through utilizing tests to measure the association between the independent and dependent variables. One of the main purposes of conducting a statistical test is to see whether or not the mean differences have a statistical significance to reject or accept the null hypothesis(Rose and Sullivan, 1996, cited in Muhammed, 2018, p. 139).

The criterion which is utilized to examine the significance (Sig.) is 0.05. The level of significance or probability values utilized by researchers named the *p* value. If it is equal or less than 0 .05 the p value is considered to be statistically significant. In contrast, it is considered statistically insignificant if the p value is greater than 0 .05, (the correlation is the product of chance and has no meaning). In this study, independent T-test is conducted to measure the influence of independent (social) variables on linguistic variables (Miller, Acton, Fullerton, & Maltby, 2002).

Results and Discussion

1. Duration Differences According to Gender

This section is limited to present the results related to temporal features of English vowels produced by male and female Iraqi EFLLs in comparing with data of English speakers taken from Wells (1962). It aims to find out the gender influences on the durational aspects of the vowel productions.

Figure 4: Mean duration (s) of English monophthongs produced by Iraqi male and female EFLLs and native speakers of English

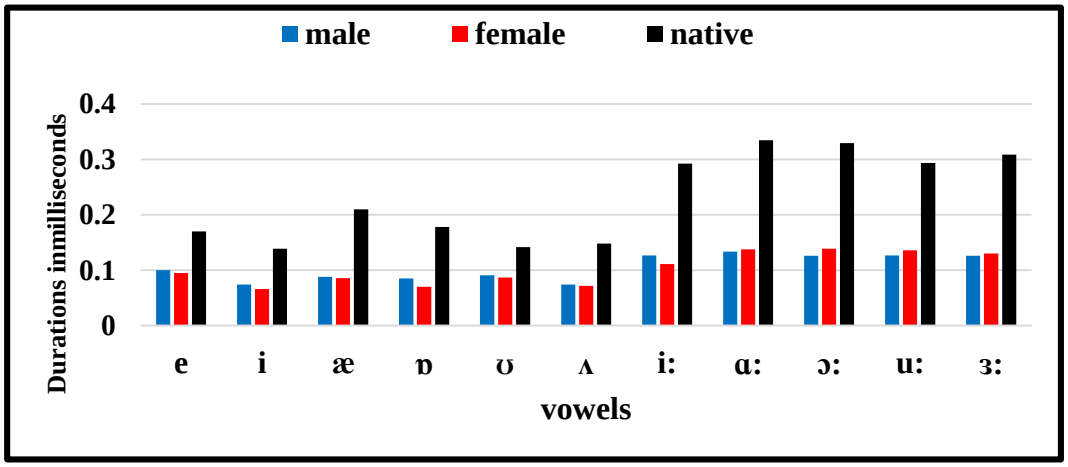


Table 2: Mean durations of vowels of Iraqi EFLLS are compared with native speakers of English (the data is taken from wells (1962).

vowels	*e*	*i*	*æ*	*ɒ*	*ʊ*	*ʌ*	*i:*	*a:*	*o:*	*u:*	*3:*
Males	0.100	0.074	0.088	0.085	0.091	0.074	0.127	0.134	0.126	0.127	0.126
Female	0.095	0.066	0.086	0.070	0.087	0.072	0.111	0.138	0.139	0.136	0.130
Native	0.170	0.139	0.210	0.178	0.142	0.148	0.293	0.335	0.330	0.294	0.309

As can be seen, the average duration for the long are distinct. However, figure 4 and table 2 above point out that there are differences in vowel duration means between Iraqi male and female learners. Iraqi learners incorrectly utter English tense/lax vowels in accordance with Arabic. In general, male and female Iraqi EFLLs produced vowels shorter than native English speakers. Moreover, they struggled in implementing the acoustic norms of the English vowels. Thus, the incorrect performance in this area may be ascribed to the less exposure to the target language vowels (Ali, 2013).

Accordingly, male participants performed the front lax vowels /e/ (0.100ms), /i/ (0.074ms), /i:/ (0.127ms) and /æ/ (0.088ms) longer than their female peers. Iraqi female students scored 0.095ms for /e/, 0.066ms for /i/, 0.111ms for /i:/ and 0.086ms for /æ/. Native English speakers produced these front vowels longer than the both Iraqi groups. Interestingly, Iraqi females scored shorter rates for /i/. Thereby, it can be seen that Iraqi female learners struggled with the production of this vowel /i/ more than other vowels. All the front vowels were uttered in different durations by Iraqi learners. They are not statistically significant (p. > 0.05) (see Table 5).

Turning now to the central vowel durations, (see Figure 4) it is noted that the lax vowel /^/ scored 0.074ms by Iraqi male participants and 0.072ms by Iraqi female participants. It has almost similar temporal features. However, it has no statistically insignificant differences (p, 0.641). Also, the long central vowel /3:/ is scored

0.130ms by females, 0.126 by males and 0.309 by English speakers. Unlike /^/ it is uttered by females longer than male group. It did not hold significant differences (p = 0.717> 0.05).

Regarding, the long back vowels, / ɑ: / (0.138ms), / ɔ:/ (0.139ms), /u: / (0.136ms), they were pronounced by females slightly longer than that of males. All these vowels hold no significant variations between the two Iraqi groups at level > 0.05(see Table 3). While the lax back vowel /ɒ/ scored 0.085ms and /ʊ/ scored 0.091ms by male participants longer than females' temporal aspects of these vowels. They decrease to 0.070ms of /ɒ/ and 0.087ms for /ʊ/. The statistical results of the vowel /ɒ/ reveals that there are significant differences between male and female students in the production of this vowel. The p. value of /ɒ/ (0.013) less than 0.05. Thus gender as an independent variable influences the dependent variable/ɒ/ the null hypothesis is rejected as dialect has an impact on the quantity of vowel /ɒ/.To conclude, Iraqi males pronounced the short vowels and /i: / longer than Iraqi females, while, females produced long vowels longer than males. The table below shows statistical implementations of these differences.

Table 3: Results of Levene's test and Independent Samples t-test concerning the quality of English vowels production of Iraqi male and female learners.

		Levene's Test		t-test for equality of means			
Word	**vowel**	**f**	**sig**	**t**	**P.value**	**Mean difference**	**Statistical sig**
head	**e**	0.081	0.777	0.308	0.759	0.006167	insignificant
hid	**i**	4.235	0.044	-0.997	0.323	-2.523983	insignificant
had	**æ**	6.991	0.011	0.407	0.686	0.002771	insignificant
hod	**ɒ**	0.447	0.507	2.574	**0.013**	0.015729	**significant**
Hoed	**ʊ**	1.255	0.267	0.630	0.531	0.004867	insignificant
hud	**ʌ**	0.604	0.440	0.469	0.641	0.002981	insignificant
heed	**i:**	0.080	0.778	1.252	0.216	0.018031	insignificant
hard	**a:**	0.538	0.466	0.146	0.885	0.001547	insignificant
hawed	**ɔ:**	2.810	0.099	-1.396	0.168	-0.013379	insignificant
Who'd	**u:**	0.373	0.544	-0.426	0.672	-0.008000	insignificant
heard	**3:**	7.050	0.010	-.364	0.717	-0.003360	insignificant

The t-test results in this table explain that no statistically significant differences were identified between male and female Iraqi speakers in the vowel duration except /ɒ/. This fact can be ascribed to the fact that gender does not have an impact on the implementation of the participants' use of this vowels (p. >0.05). The null hypothesis which states that there is no relationship between dialect (independent variable) and the quality of these vowels can be accepted. Vice versa, the alternative hypothesis (dialect and vowel production are related) is rejected.
In contrast, the statistical result of the back vowel /ɒ/ reveals that there are significant differences between male and female participants in the production of this vowel (p. 0.013). Thus, gender as an independent variable influences the dependent variable/ɒ/ the null hypothesis is rejected as dialect influences the production of vowel /ɒ/.

2. Gender Variations in Fundamental Frequencies of Male and Female Iraqi EFLLS

It is intended here to present and discuss the differences between Iraqi male and female participants speaking two mutual Iraqi dialects compared with native English data.

Figure 5: The normalized vowel space of English vowel tokens produced by Iraqi male and female Iraqi EFLLS and native English speakers. F1 values are plotted vertically and F2 horizontally. Each point in the graph represents the centroid (mean F1-F2 coordinates) in the acoustic vowel space of one vowel type of eleven vowels

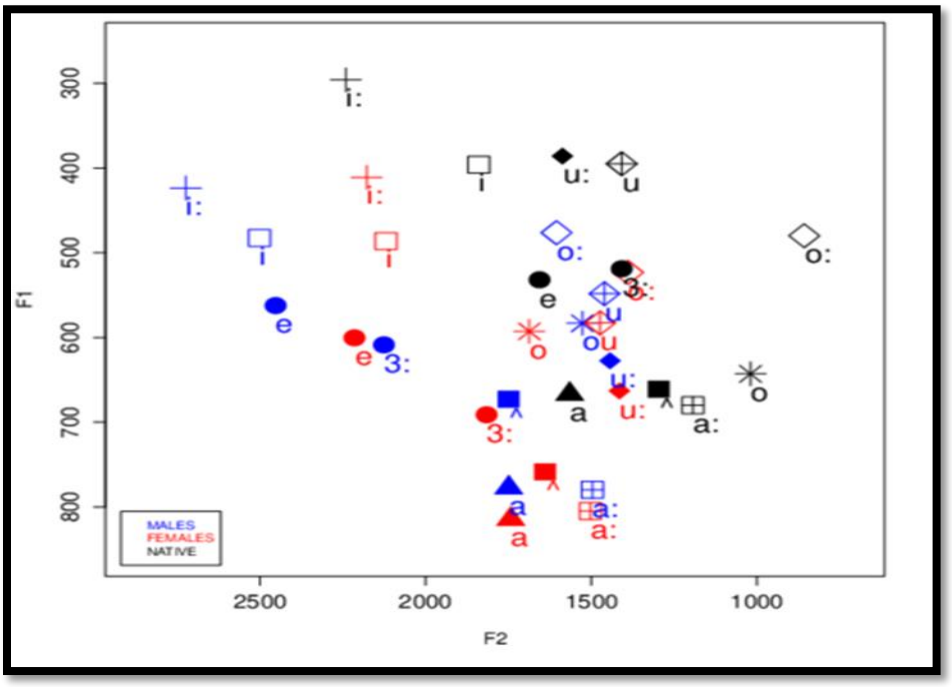


Table 4: Mean Formant frequencies of the eleven phonetic monophthong vowels of SSBE, as produced by Iraqi English speakers and native group

vowels		**e**	**i**	**a**	**ɒ**	**u**	**^**	**i:**	**ɑ:**	**ɔ:**	**u:**	**3:**
Males	**F1**	562	482	777	583	548	673	423	780	627	482	608
	F2	2453	2502	1749	1527	1460	1749	2724	1497	1443	1605	2126
Females	**F1**	600	486	814	592	582	758	411	804	663	523	691
	F2	2215	2120	1743	1687	1473	1640	2178	1502	1415	1389	1816
Native speakers	**F1**	532	396	667	643	395	661	296	680	386	480	519
	F2	1656	1839	1565	1019	1408	1296	2241	1193	1587	857	1408

Several observations can be made about the data in Table 4. Generally, it suggests that Iraqi EFL learners face difficulty in implementing native English norms. One of the most interesting observations is that that Iraqi participants articulated English vowels lower and more fronted than do native speakers. Females produced almost all vowels (except /i/ and /i:/) lower and more fronted than their male classmates.

Taking the front vowels as a starting point, the English vowels /i / (F1: 482HZ, F2: 2502 Hz), and /i: / (F1:423Hz, F2: 2724HZ) produced by males were more fronted and lower than those of females'. Concerning the native speaker's productions, the Iraqi male and female participants produced these two vowels lower and fronted than males. Further, males scored 562HZ for F1 and 2453Hz for F2 during the production of /e/ vowel. It is higher and more fronted than females' one as they scored 600HZ for F1 and 2215HZ for F2. Yet, it was found that /i/,/e/ and /i:/are produced separately by both male and female Iraqi EFL learners. They recognized among those three vowels. So, it can be said that Iraqi learners do not have a problem in producing these vowels. This result does not agree with Aboubaker, (2008) as he presented that the vowels /e/, /i/ and /i:/ reflected areas of shared mistakes because learners tend to say pin for pen bit for bet. However, the differences between males and females in the production of these vowels did not hold any statistical significance $p > 0.05$ except in the case of /i:/ which hold statistical significance $p (0.021) < 0.05$.

Further, The iraqi male participants performed the low front vowel / æ / (equal to a in fig.4) (F1:777HZ, F2: 1749HZ) and the low back vowel / ɑ: /(equal to a: in the above figure) (F1: 780HZ, F2: 1497HZ) higher and little backer than females / æ / (F1: 814HZ, F2: 1743HZ) and / ɑ:/ (F1: 804HZ, F2: 1502HZ). In terms native participants, they are uttered / æ / (F1:667HZ, F2:2241HZ) and / ɑ:/ (F1:680HZ, F2:1193HZ) higher ,more backed than Iraqi male and female participants. Despite the noticeable differences between Iraqi males and females in the production of these vowels, they were only significant for /i/ $p<0.05$. Gender differences among Iraqi speakers were significant for F1 of the short vowel /i/ at $p < 0.05$.

In terms to central vowels, it is worth to note that the males' mid-central, unrounded short vowel /^/ (F1:673HZ, F2:1749HZ) was found to be higher and more fronted than females' /^/ (F1:758HZ, F2:1640HZ), while native speakers produced /^/ (661HZ, 1296HZ) higher and more front the two groups. Furthermore, the mid front vowel /3:/ seemed to cause no difficulty for both male and female Iraqi students. Iraqi learners here pronounced it almost in the same way native English speakers did. The acoustic space of males'/3:/ was 608HZ, for F1and 2126HZ for F2 higher and more fronted than females' /3:/ that had an acoustic space 691HZ, for F1and 1816HZfor F2 lower and less fronted than that of native English speakers. There were no gender differences in the production of this vowel since the differences did not hold any statistical significance ($p > 0.05$). As well, both male and female Iraqi learners produced /3:/ lower and more fronted the native group. This result goes in line with Hubais and Pillai

(2010) who showed that the vowel /ɜ:/ is produced by the Omani subjects in a front rather than central position than native English speakers.

In addition, the Iraqi males' back vowels /ɔ:/ (F1:627HZ, F2:1443Hz) higher and more backed than females' /ɔ:/ (F1: 663HZ, F2: 1415Hz), while the native speakers scored 386HZ for F1 and 1587Hz for F2, Higher and more backed than Iraqi participants. In the same vein, male participants uttered /ɒ/ (F1: 583HZ, F2:1527Hz), higher and more backed than females' /ɒ/ (F1:592HZ, F2: 1687Hz) These variances have statistically significant difference since the p value is 0.00 . Yet, the native speakers' /ɒ/ is produced lower and more retracted than the both Iraqi groups.

An important observation is that the female speakers' production of /ɔ:/ and /ɒ/ are spread nicely. The three above mentioned vowels are produced more separated way than those of males. This result goes in line with Abbasi et al (2018) who showed that "Nepali female speakers' pronunciation of English vowels conforms to the principle of Sufficient Perceptual Separation, "whereby the sounds of a language are kept acoustically distinct to make it easier for the listener to distinguish one from the other," (Ladefoged 2006, p. 222, cited in Abbasi et al, 2018, p. 106). There were no statistical significant differences as p values less than 0.05. As well as,

Moreover, the female' back vowels /u/ (F1:582HZ, F2:1473Hz) are produced lower and more fronted than native English speakers and their male peers and native English speakers' one. Additionally, the males' /u: / (F1:476HZ, F2: 1605Hz), and females' /u: / (F1:523HZ, F2:1389 Hz), seems to be close in the vowel space, but in case of native speakers, it is totally different. English speakers produced /u: / higher and more backed than males' and females' /u: /. This suggests that the vowels produced by Iraqi learners do not conform to native English patterns. More interesting differences are that several English vowels produced by Iraqi EFLLs do not show a clear learning pattern; do not look like those of the target language. These differences in back vowels performance were statistical insignificant ($p > 0.05$).

Table 5: Results of Levene's test and Independent Samples t-test concerning the quality of English vowels production of Iraqi EFLLs

			Levene's Test		t-test for equality of means			
Word	**vowel**		**f**	**sig**	**t**	**P.values**	**Mean difference**	**Statistical sig**
Head	**e**	**F1**	0.003	0.954	0.150	0.882	0.028767	insignificant
		F2	8.238	0.006	-0.383	0.703	-0.091300	
hid	**i**	**F1**	2.025	0.160	2.367	**0.021**	0.369867	**significant**
		F2	9.505	0.003	0.491	0.625	0.100633	insignificant
had	**æ**	**F1**	5.794	0.019	-1.292	0.202	-0.226133	insignificant
		F2	2.076	0.155	0.491	0.625	0.100633	
hod	**ɒ**	**F1**	3.017	0.088	1.901	0.062	0.315000	insignificant
		F2	1.801	0.185	-4.020	**0.000**	-0.438000	**significant**

hoed	**ʊ**	**F1**	3.964	0.051	-0.936	0.353	-0.115667	insignificant
		F2	0.984	0.325	-1.082	0.284	-0.158267	
hud	**ʌ**	**F1**	1.687	0.199	-1.841	0.071	-0.432233	Insignificant
		F2	0.060	0.808	0.227	0.821	0.035000	
heed	**i:**	**F1**	6.074	0.017	1.715	0.092	0.368567	insignificant
		F2	1.229	0.272	1.388	170	0.330633	
hard	**a:**	**F1**	7.037	0.010	-0.342	0.733	-0.066400	insignificant
		F2	0.003	0.957	0.034	0.973	0.005667	
hawed	**ɔ:**	**F1**	0.186	0.668	0.429	0.670	0.090133	insignificant
		F2	4.850	0.032	0.534	0.595	0.085933	
Who'd	**u:**	**F1**	1.044	0.311	-0.297	0.767	-0.040867	insignificant
		F2	1.195	0.279	0.558	0.579	0.104967	
heard	**3:**	**F1**	0.549	0.462	-1.502	0.139	-0.281267	insignificant
		F2	0.001	0.969	1.081	0.284	0.190033	

Accordingly, there is no statistically significant relationship between the spectral features of vowels and the gender variation, because the p. values is more than the significance level 0.05 with exclusion to/ ɒ / and /i/, so there are no significant differences were identified between dependent variable and independent variables. So, the null hypothesis is accepted that there is no relation between them concerning the performance of the vowel as it is showed in the table. Regarding, /i/ and /ɒ/, there are significant differences between males and females in their production as gender affects these vowels only.

Conclusions.

This paper concluded that:

1.There are differences between Iraqi EFLLs and native English speakers in the production of English monophthongs.

2. English vowels were pronounced by Iraqi EFL learners shorter than native English speakers did.

3.Learners' gender on their production of English vowels has been found to be influential.

4. Iraqi male participants pronounced the short vowels and /i:/ longer than their female classmates,

5.female learners produced long vowels longer than males. However, these differences were statistically insignificant except /ɒ/ which scored significantly significant difference at p.0.05.

6. Males produced vowels more fronted and higher than females. These differences were statistically insignificant except /i, ɒ/

7. Iraqi EFLLs produced vowels more fronted and lower than native English speakers

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المستخلص

أظهرت الكثير من الدراسات أن الذكور والإناث يختلفون في إنتاجهم لحروف العلة الإنجليزية نتيجة للتباينات البيولوجية في السبيل الصوتي. تسبب هذه الاختلافات تحديًا عندما يتم توظيفهم لإجراء تحليل فعال لأصوات الكلام بما في ذلك المتحدثين الذكور والإناث. الغرض الأساسي من هذه الدراسة هو محاولة تقديم أدلة تجريبية لبعض الأسباب اللغوية لأخطاء إنتاج حروف العلة الإنجليزية التي تنطق بها اللغات الإنجليزية كلغة أجنبية على المستوى الجامعي. ويركز على التحليل الصوتي والاختلافات المتعلقة بالجنس ، بالإضافة إلى مقارنة الإنتاج الأصلي للأحرف المتحركة لغير الناطقين بها. لتحقيق هذه الأهداف ، تم تجنيد ستين مشاركًا عراقيًا (٣٠ من الذكور و ٣٠ من الإناث) من الطلاب الجامعيين في اللغة الإنجليزية كلغة أجنبية لأداء مهمة إنتاج الكلام من أحد عشر حرفًا متحركًا باللغة الإنجليزية في سياق / hvd / aمضمّن في جملة ناقلة (قل ... مرة أخرى). تم تحليل البيانات باستخدام PRAAT لاستخراج ترددات الصياغة الأولى والثانية ومدة حرف العلة لكل حرف متحرك. تم اتباع طريقة Lobanov ANAE (2006)تسوية قيم F1 و F2. تمت مقارنة البيانات مع بيانات من مشاريع بحثية (Wells,1962 and Deterding,2006) تبحث في حروف العلة الإنجليزية التي ينتجها متحدثون أصليون. تم تحليل البيانات التي تم جمعها إحصائيا من خلال تنفيذ عمليتين من التحليل الإحصائي. العملية الأولى هي الإحصائيات الوصفية ، مثل الإدخال اليدوي للبيانات وعرضها كمخططات شريطية تم إجراؤها باستخدام أوراق Excel.تم تنفيذ هذا لتحديد البيانات التي تم الحصول عليها. كانت العملية الثانية عبارة عن إحصائيات استنتاجية ، مثل اختبار t للعينة المستقلة الذي تم تحقيقه باستخدام برنامج SPSS.تم إجراؤه لتحديد ما إذا كانت النتائج تحمل أي دلالة إحصائية. وأظهرت النتائج أن اللغة الإنجليزية كلغة أجنبية ((EFLLالعراقية أنتجت حروف العلة المستهدفة أقصر من الناطقين باللغة الإنجليزية. من حيث جودة الحروف المتحركة ، فقد أنتجوا أحرفًا متحركة أقل وأكثر في المقدمة من المجموعة الضابطة. بالإضافة إلى ذلك ، أوضحت هذه الدراسة أن هناك فروق ذات دلالة إحصائية بين الجنسين بين الذكور والإناث في EFLLs العراقية في إنتاج حروف العلة الإنجليزية. وخلص إلى أن جنس المتعلمين يلعب دورًا كبيرًا في إنتاج حروف العلة الإنجليزية

حنين كريم خلف دحام **م.د. فؤاد جاسم محمد**

جامعة الانبار

كلية التربية للعلوم الإنسانية – قسم اللغة الإنجليزية

كلية المعارف الجامعة - قسم القانون

الرمادي، العراق