

## Vowel Duration in Native English Speakers' Articulation of Monosyllabic Words and in that of Kurdish University Students of English

Inaad Mutlib Sayer<sup>1</sup>, Ph.D. (corresponding author)  
Lecturer,

Sahima Abdul Salam<sup>2</sup>, M.A.  
Assistant Lecturer,

<sup>1,2</sup> University of Human Development, Kurdistan Region, Iraq

**Abstract:** *This research is concerned with vowel duration in the articulation of native English speakers of monosyllabic words and in that of Kurdish university students of English. It aims at identifying the durations of vowels, as a result of word-final voicing, in both articulations and comparing them to see to what extent Kurdish university students of English are aware of the influence of voicing context on vowel duration. The Subjects of the study were twenty second-year students (ten girls and ten boys) selected randomly to articulate nine minimal pairs of monosyllabic words chosen from "Better English Pronunciation 2nd edition, by J. D. O'Connor", together with their pronunciation audio files. The audio files were used as data of the native English speaker's articulation. Both the native English speakers' articulation and the students' articulation were analysed acoustically using PRAAT. The analysis has shown clear differences in vowel duration between native speakers' articulation and that of Kurdish university students of English. Furthermore, the female group of the Kurdish subjects produced vowels longer than the male group did; however, they did not approach the native vowel durations. It seems that Kurdish university students of English are unaware of the influence of word-final voicing on vowel duration since they, on average, deviated much from the native English articulation. Furthermore, they reversed the influence of voicing context in 47.7% of their articulation.*

**Key Words:** *Vowel duration, Voicing context, Interlanguage phonology, Foreign language learning, Acoustic phonetics*

### 1. Introduction

The degree to which the acoustic properties of a vowel are influenced by context depends on several factors (Stevens, 1998: 573). One of these factors is "the phonetic nature of a following consonant" (Lehiste, 1976: 227; Lisker 1974: 225). The duration of a vowel, for instance, can vary considerably depending on the voicing, point of articulation, or manner of articulation of a following consonant (Steinlen, 2005).

It is well-documented in the phonetic literature that voiced consonants lengthen a preceding vowel, whereas voiceless consonants shorten it (Chen, 1970; Gimson, 1980; House, 1961; Klatt, 1973; Lisker, 1974; Luce and Charles-Luce, 1985; Malécot, 1970; Peterson and Lehiste, 1960; Roach, 2009; Strange et al. 1976; Treiman et al, 2003). All these researchers examined, in one way or another, the influence of consonantal context on the production of vowels, demonstrating, among other findings, that vowels before voiced consonants are longer than before voiceless consonants.

The above-cited studies examined the effect of consonantal context on the native production of English vowels. However, little attention was given to “the way in which the production of non-native vowels is affected by consonantal context” (Steinlen, 2005: 1). The majority of the studies in second language acquisition were focusing on morphology and syntax, neglecting phonology (Warsi, 1992). Few works on interlanguage phonology (Crowther and Mann, 1992; Dawson, 2003; Flege et al., 1992; Mack, 1982; Mitleb, 1981) examined the effect of word-final consonants on vowel length in the English of Greek, Japanese, Chinese, Arabic, Spanish and French speakers. They reported that L2 learners fail to produce vowel durations in a native-like manner. Although L2 learners articulate vowels longer before voiced than before voiceless consonants, but the durational difference is smaller than the native values.

One study, which dealt with vowels within interlanguage phonology, was conducted by Al-Hamadi and Ali (2012). They examined the acoustic features of English pure vowels in the “clear and conversational speech” of two native speakers and twenty Iraqi adult learners of English. As far as vowel duration is concerned, they found that the Iraqi learners of English produced vowels in both speech styles longer than the native speakers did. Moreover, the female group of the Iraqi subjects produced longer vowel durations, compared to the male group.

Interest in the topic of the present research stems from the fact that none of the previous studies has examined the effect of voicing context on the duration of English vowels in the interlanguage of Kurdish university students of English. Therefore, the major aim of this paper is to assess the influence of voicing on the duration of vowels in monosyllabic words as produced by Kurdish university students of English. It is hypothesized that English vowels articulated by native English speakers (hence NES) and the same vowels articulated by Kurdish University students of English will show clear differences in their durations. Where clear differences are found, it will be found that they can be explained as the result of the students using their native-language vowels as equivalent to the target English vowels.

More specifically, the study is an attempt to find answers to the following questions:

1. What are the durations of vowels in English monosyllabic words articulated by the native English speaker?
2. What are the durations of vowels in English monosyllabic words articulated by Kurdish University students of English?
3. What are the durational differences of English vowels articulated by native English speakers and by Kurdish University students of English? To what extent are Kurdish University students of English aware of the influence of final consonants on the length of English vowels?
4. What are the vowel duration differences shown in the comparison between female and male Kurdish University students of English?

## 2. Methodology

### 2.1. The Material

The test material consists of nine minimal pairs (Table 1). The minimal pairs were chosen with different vowel quality; three contained diphthongs, three long vowels and three short vowels. All the test minimal pairs are monosyllabic words ending in one consonant coda. The context in each minimal pair is neutralized except for the final consonant, i.e. both members of each minimal pair begins with same onset and contains same vowel, but the coda is a voiceless consonant in one member and a voiced consonant in the other.

The test minimal pairs were chosen from *Better English Pronunciation, 2nd edition* by J. D. O'Connor, 1980. The recordings of these minimal pairs have been extracted from the book exercises to be used as data of the native speaker's articulation.

Table: 1  
The nine minimal pairs of the study

voiceless	rope	place	safe	heart	leaf	search	back	hiss	rich
voiced	robe	plays	save	hard	leave	surge	bag	his	ridge

### 2.2. The Subjects

The subjects of the study are twenty second-year students at the Department of English - College of Languages – University of Human Development. The group of the subjects consists

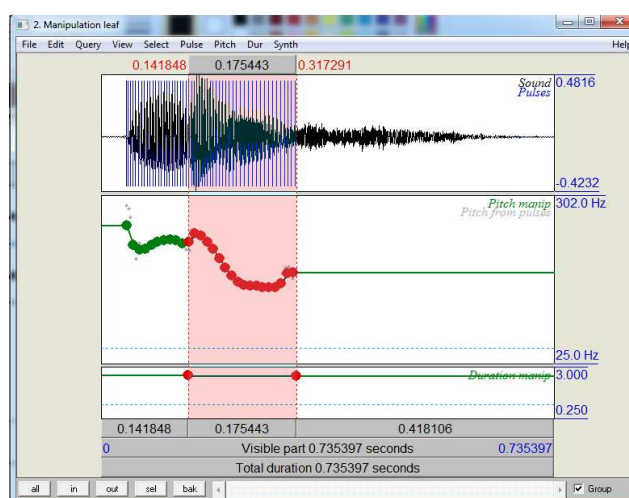
of ten males and ten females. All the members of the subjects' group are Kurdish university students of English. The male subjects are named M1 to M10, and the female subjects F1 to F10.

### 2.3. The Procedure

The test words were printed together with their phonemic transcription in 24 Calibri font. The subjects of the study were asked to read the list of words through a microphone connected to a computer. PRAAT was used for the recording of the students' articulation.

Both the native speakers' articulation and that of Kurdish subjects were analysed using PRAAT, which is a software for phonetic analysis. The boundaries of the vowel in each monosyllabic word were determined through creating a manipulation file for the word in question, which is a feature in PRAAT enables the user to slow down the speed rate of the audio file so that s/he can decide on the phonemes boundaries approximately precisely (see picture 1 below).

Picture: 1

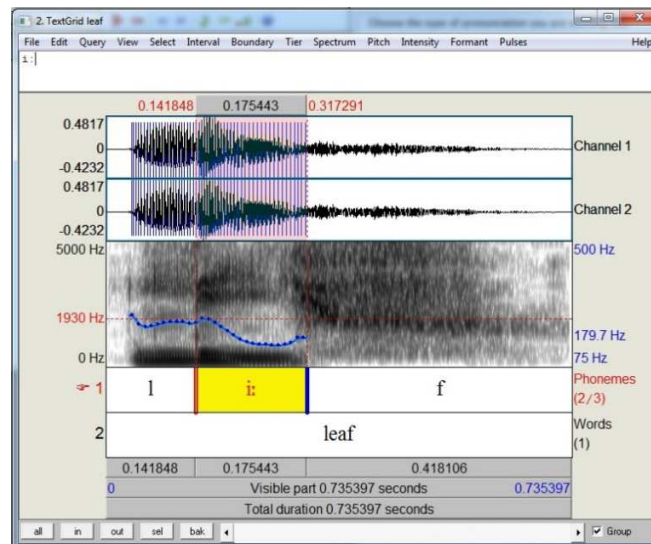


Manipulation file of the word *leaf*

Then, a textgrid file of the same monosyllabic word is created for doing the necessary annotation. Two tiers are added onto the textgrid file, one for the phonemes level and another for the word level. The duration, in seconds, of each segment appears on a bar below the tiers, as shown in the following textgrid of the word *leaf*.

The duration values of the vowels will be gathered on a table so that the required statistics will be done.

Picture: 2



Textgrid file of the word *leaf*

### 3. Results

#### 3.1. Native English Speaker's Results

The effect of voicing on vowel duration is obvious in the native English speaker's data (Table: 2). The acoustic analysis showed that the average duration of the vowels in the study material is smaller before voiceless consonants (215.3 msec) than before voiced consonants (364.8 msec) (see Figure 1 below). That is to say, the ratio is 0.59:1. The mean difference in vowel duration within the consonantal context of the study is 149.4 msecs.

The range of vowel durations in the voiceless context is between 131.3 msecs (the short vowel / ɪ / of *hiss*) and 290.5 msecs (the long vowel / ɜ: / of *search*). By contrast, in the voiced context, the range is between 228.2 msecs (the short vowel / ɪ / of *his*) and 454.8 msecs (the diphthong / əʊ / of *robe*).

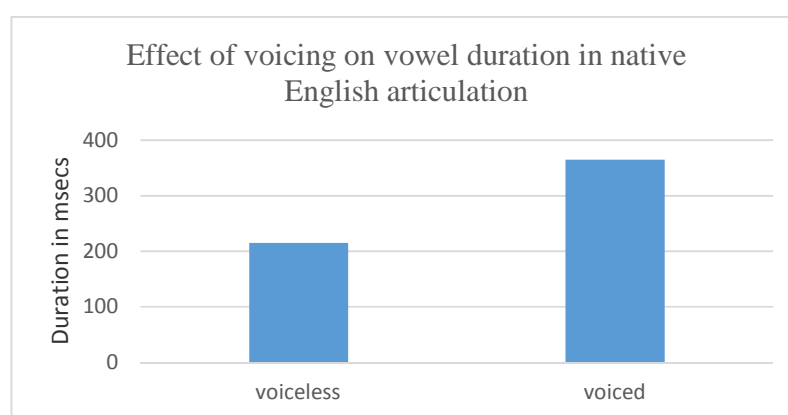
The mean duration of long vowels before voiceless consonants is 236.1 msecs, while before voiced consonants is 389.2 msecs. This indicates that long vowels in the voiced context are 153.1 msecs longer than in the voiceless context. The ratio is 0.61:1. For diphthongs, the mean duration

is 210.1 msec before voiceless consonants and 430.6 msec before voiced consonants. That is to say, diphthongs before voiced consonants are longer than before voiceless consonants in 220.4 msec. The ratio is 0.49:1. Concerning short vowels, the mean duration is 199.8 msec in the voiceless context and 274.5 msec in the voiced context. In other words, short vowels are 74.7 msec longer before voiced consonants than before voiceless consonants. The ratio of voiceless to voiced is 0.73:1.

Table: 2  
Vowel duration in the native speaker's articulation

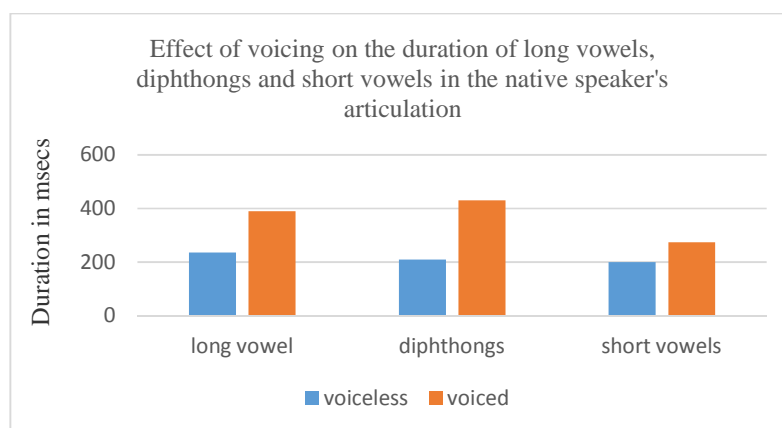
Vowel duration before voiceless consonants in msec		Vowel duration before voiced consonants in msec	
words	values	words	values
leaf	175.4	leave	436.8
heart	242.5	hard	290
search	290.5	surge	441
rope	214.1	robe	454.8
safe	212.5	save	428.3
place	203.8	plays	408.7
back	273.6	bag	317.3
rich	194.6	ridge	278.1
hiss	131.3	his	228.2

Figure: 1



Average duration of vowels in the native English speaker's articulation of English monosyllabic words.

Figure: 2



Average duration of long vowels, diphthongs and short vowels in the native English speaker's articulation of English monosyllabic words.

### 3.2. Kurdish University Students' Results

#### 3.2.1. Overall Results

Two articulations of the minimal pair *hiss/his* were excluded from the Kurdish male group data (M4 and M9) because they were not clear.

Analysis of the Kurdish subjects' articulation of the test minimal pairs has shown that the overall average duration of vowels scored is 213.35 msec before final voiceless consonants and 213.41 msec before final voiced consonants, as shown in Figure 3 below. The ratio of the effect of voiceless to voiced consonants on vowel duration is 1:1. That is to say, the effect of the voicing context is neutral.

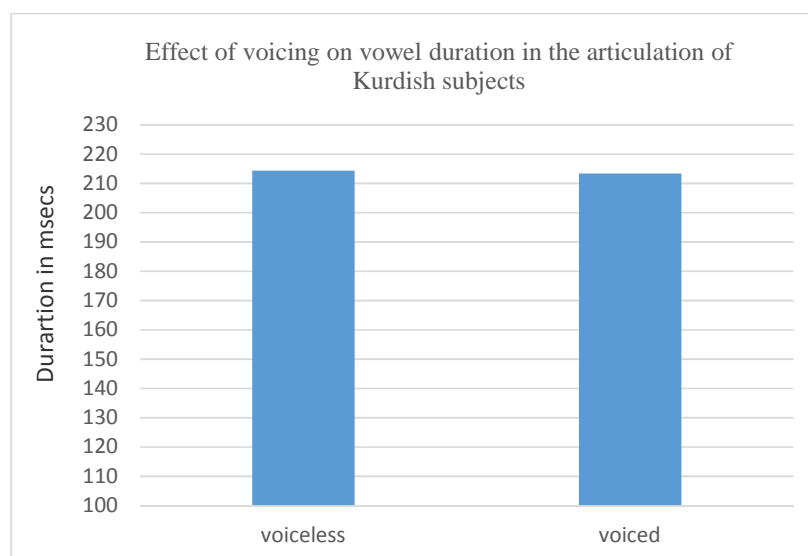
The durations of vowels before voiceless consonants are between 92.5 msec and 397.3 msec, whereas before voiced consonants they are between 70.2 msec and 400.7 msec. Within the voiceless context, the lowest value of duration (92.5 msec) is given to the short vowel /ɪ/ of *hiss*, whereas the highest value (397.3 msec) is given to the diphthong /eɪ/ of *safe*. On the other hand, in the voiced context, the lowest value of duration (70.2 msec) is assigned to the long vowel /i:/ of *leave*, whereas the highest value (400.7 msec) is assigned to the long vowel /ɜ:/ of *surge*. (See Table 3 below)

In 84 out of 176 minimal pair articulations, the Kurdish subjects produced vowels before the voiced final consonants *shorter* than before the voiceless final consonants.

Table: 3  
Vowel duration in the Kurdish university students' articulation

Vowel duration before voiceless consonants in msec																				
Words	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
leaf	389	284.3	309	206.4	185.9	209.7	269.5	227	206	160.2	136.7	229.2	114.4	207.8	107.4	144.3	150	232.6	137.1	180.1
heart	367.3	375	300.3	300.6	206.8	308	277.4	277.1	311.9	188.8	163.8	143.5	142.5	245.5	239.6	168.5	267.1	213.3	336.5	214.7
search	348.5	223.8	313.9	245.1	179.5	273.4	334.6	261.9	250.2	222	194.8	173	148.4	180.2	134.3	229	223.8	293.3	321.3	212.2
rope	280.8	266.4	286.3	199.1	198.7	236.1	244.8	285.5	166	217.2	165.9	165.9	102.7	245.1	194.8	177.9	217.3	153.1	224.2	144.1
safe	372.6	397.3	337.2	217.6	221.8	233.4	296.2	259.4	203.6	210.3	171.7	153.5	211.8	250.2	182.3	205.4	260.2	240.8	239.9	206.3
place	356.1	393.6	306	223.4	213.7	235.9	205.1	273.4	229.7	180.6	164.8	158	174.2	208.9	241.9	188	262.9	202.1	234.4	233.1
back	260.9	277.2	308.9	209.4	162.9	188	210.6	232.7	147.7	157.5	141.3	98	145.1	213.4	198.7	170.6	298.7	117	173.9	186.9
rich	296.7	287.5	180.1	221.2	191.4	202.7	204.3	149.2	126	178.9	156.5	190	136.9	146.8	114.8	148.1	127.4	175.5	156.3	124.5
hiss	211	283.1	191.2	197.1	140.9	163.1	233.4	153.6	164.8	166	131.1	103	94.4		92.5	133	226.1	166.9		152.9
Vowel duration before voiced consonants in msec																				
Words	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
leave	325.6	242.3	297.8	210.8	199.2	215.6	204.9	213.3	258	205	128.7	185.3	70.2	182.5	210.1	148.7	135.5	237.3	279.7	227.9
hard	304.9	328.3	388.4	244.8	301.3	264.7	243.1	206.4	296.7	159.6	161.8	165.2	161.8	237.2	243.5	215.1	260.4	273.6	236.2	239.3
surge	400.7	158.6	286.2	252.4	236.3	325.9	314.2	271.9	272.3	258.1	228.3	155.3	142.7	179.2	142.3	196.4	250.5	339.7	278.4	254
robe	282.6	211.2	313.6	178.9	243.9	242.5	194.8	243.5	148.4	176.1	95.3	204.8	106.2	271	170.1	125.8	271.2	246.1	328.1	253.5
save	383.8	256.3	342.5	267	176.2	239	301.7	223.5	166.1	158.9	133.8	187.7	184.5	187.2	193.8	203.4	196.6	215.8	246.8	194.5
plays	348.7	312.6	389.4	220.3	260.6	229.7	207	227.9	272.9	208.9	163.4	226.9	199.2	172.8	233.7	206.8	228.1	266.3	272.9	250.3
bag	230.2	134.5	317.4	237.6	180	209.9	184.7	191.2	189.3	195.3	162.4	142	193.9	162.6	202.4	163	229.2	172.7	234.4	232
ridge	270.3	153.6	179.8	218.5	211	155.2	192.4	160.9	131.9	159.8	195.2	111	210.6	178.5	200	126.3	111.6	151.6	164.8	127.6
his	197.7	168	324.9	216.1	152.5	167.1	225.4	171.5	137.1	127.3	134	104	108.9		167.6	104.9	172	171.6		116.5

Figure: 3

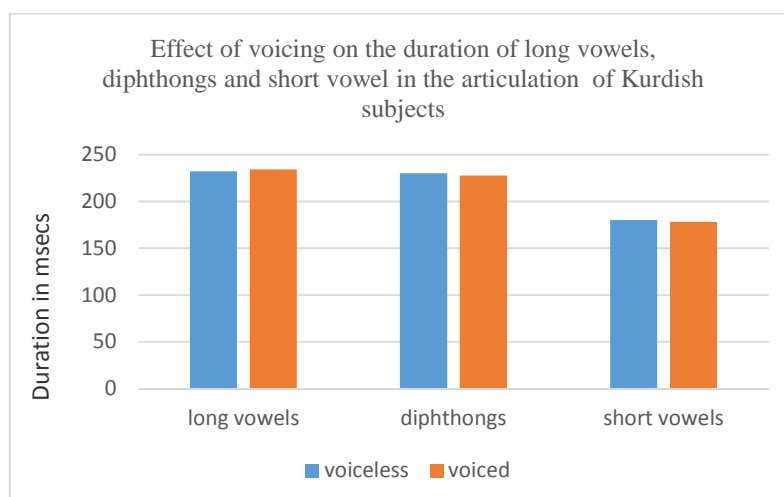




Average duration of vowels in the Kurdish subjects' articulation of English monosyllabic words.

The mean duration of long vowels before voiceless consonants is 231.6 msec, while before voiced consonants it is 334.2 msec. This means that long vowels in the voiced context are 2.6 msec longer than in the voiceless context. The ratio is 0.99:1. For diphthongs, the mean duration is 228.8 msec before voiceless consonants and 227.7 msec before voiced consonants. That is to say, diphthongs before voiced consonants are *shorter* than before voiceless consonants in 1.06 msec. The ratio is 1:1. Concerning short vowel, the mean duration is 179.6 msec in the voiceless context and 177 msec in the voiced context. In other words, short vowels are 2.6 msec *shorter* before voiced consonants than before voiceless consonants. The ratio of voiceless to voiced is 1.01:1. (Figure 4)

Figure: 4



Average duration of long vowels, diphthongs and short vowels in the Kurdish subjects' articulation of English monosyllabic words.

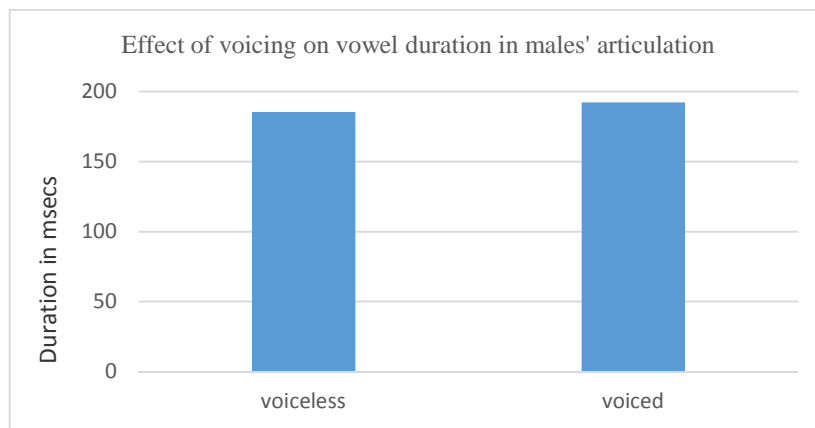
The Kurdish subjects altered the vowel quality in 57 out of 356 articulations of the test words; in 21 of them, they realized diphthongs by long vowels. They also devoiced the final voiced consonant in 16 out of 178 articulations in the voiced context.

### 3.2.2. Males' Results

Male students scored an average vowel duration 184.7 msec before final voiceless consonants and 192.3 msec before final voiced consonants. These values of vowel duration indicate that the influence of the voicing context on vowel duration is very little; the difference between voiceless influence and voiced influence is only 7.5 msec. Male students also produced

the vowels before final voiced consonants *shorter* than the vowels before final voiceless consonants in 36 cases out of 86. In the male students' articulation, the least duration (70.2 msec) is that of the long vowel / i: / of *leave*, and the greatest duration (344.8 msec) is that of the long vowel / ɜ: / of *surge*.

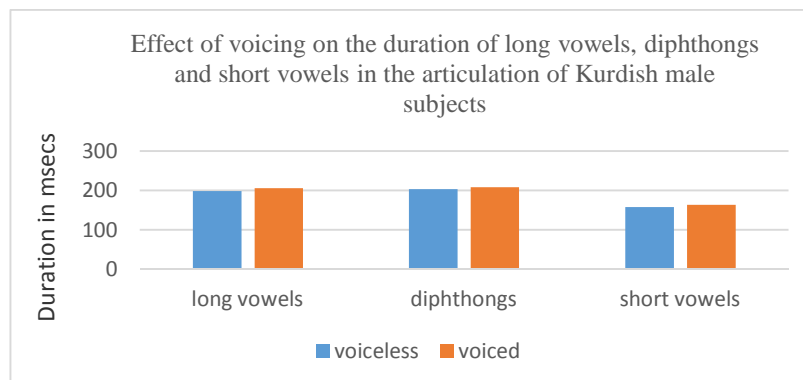
Figure: 5



Average duration of vowels in the males' articulation of English monosyllabic words.

In the males' articulation, the average duration of long vowels is 196.1 msec before voiceless consonants and 205.5 msec before voiced consonants. This means that long vowels are 9.4 msec longer before voiced consonants than before voiceless consonants. The ratio of voiceless-to-voiced effect is 0.95:1. The mean duration of diphthongs is 199.4 msec in the voiceless contexts and 207.9 msec in the voiced context. That is to say, diphthongs are 8.5 msec longer in the voiced context than in the voiceless one. The ratio of voiceless-to-voiced effect is 0.96:1.

Figure: 6



Average duration of long vowels, diphthongs and short vowels in the Kurdish male subjects' articulation of English monosyllabic words.

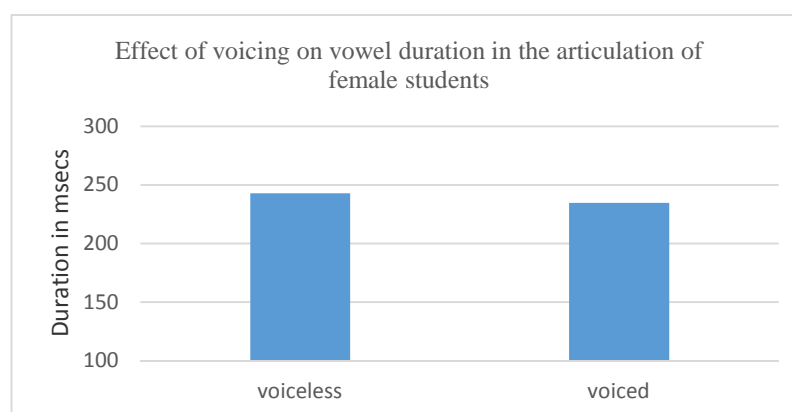
For short vowels, the mean duration is 153.2 msec before voiceless consonants and 160.7 msec before voiced consonants. Put another way, short vowels are longer 7.5 msec before voiced consonants than before voiceless consonants. The ratio of voiceless-to-voiced effect is 0.95:1. (See Figure 6 above)

Males changed the quality of the vowel in 27 out of 178 articulations. In addition, they devoiced the final voiced consonant in 7 of the 88 voiced articulations.

### 3.2.3. Females' Results

The average duration in the female students' articulation is 242.8 msec in the voiceless context and 234.5 msec in the voiced one. The ratio of voiceless-to-voiced context is 1.04:1. This indicates that female students, on average, produced vowels before voiceless consonants *longer* than before voiced consonants. (Figure 7 below).

Figure: 7



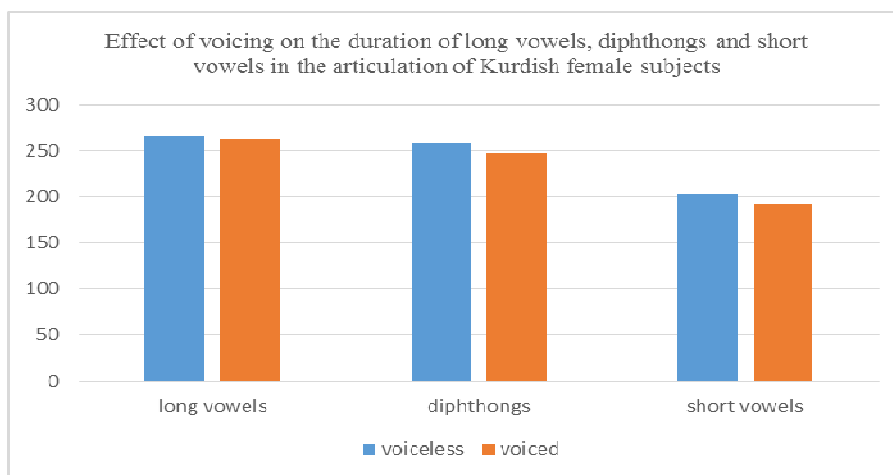
Average duration of vowels in the females' articulation of English monosyllabic words.

Female students scored the lowest duration value (126 msec) in their production of the short vowel / ɪ / of *rich* and the highest duration value (400.7 msec) in their production of the long vowel / ɜ: / of *surge*. Within the voiceless context, the lowest duration value is 126 msec (see above), and the highest value is 397.3 msec, given to the diphthong / eɪ / of *safe*. Whereas, within the voiced context, the lowest duration value is 127.3 msec, assigned to the short vowel / ɪ / of *his*, and the highest duration value is 400.7 msec (see above). Moreover, in 48 out of the

90 minimal pair articulations performed by the female students, vowels are longer in the context of voiceless consonants than in the context of voiced consonants.

In the females' articulation, the average duration of long vowels is 267.1 msec before voiceless consonants and 262.9 msec before voiced consonants. This means that long vowels are 4.2 msec *shorter* before voiced consonants than before voiceless consonants. The ratio of voiceless-to-voiced effect is 1.02:1. The mean duration of diphthongs is 258.3 msec in the voiceless contexts and 247.6 msec in the voiced context. That is to say, diphthongs are 10.6 msec *shorter* in the voiced context than in the voiceless one. The ratio of voiceless-to-voiced effect is 1.04:1. For short vowels, the mean duration is 203.3 msec before voiceless consonants and 193 msec before voiced consonants. In other words, short vowels are 10.2 msec *shorter* before voiced consonants than before voiceless consonants. The ratio of voiceless-to-voiced effect is 1.05:1. (See Figure 8)

Figure: 8



Average duration of long vowels, diphthongs and short vowels in the Kurdish female subjects' articulation of English monosyllabic words.

Females changed the quality of the vowel in 30 out of 180 articulations. Furthermore, they devoiced the final voiced consonant in 9 of the 90 voiced articulations.

### 3.2.4. Native vs Kurdish Articulation of Monosyllabic Words

Table: 4 summarizes the comparison between the native speaker's articulation and that of Kurdish university students of English in terms of the lowest and highest vowel durations, the

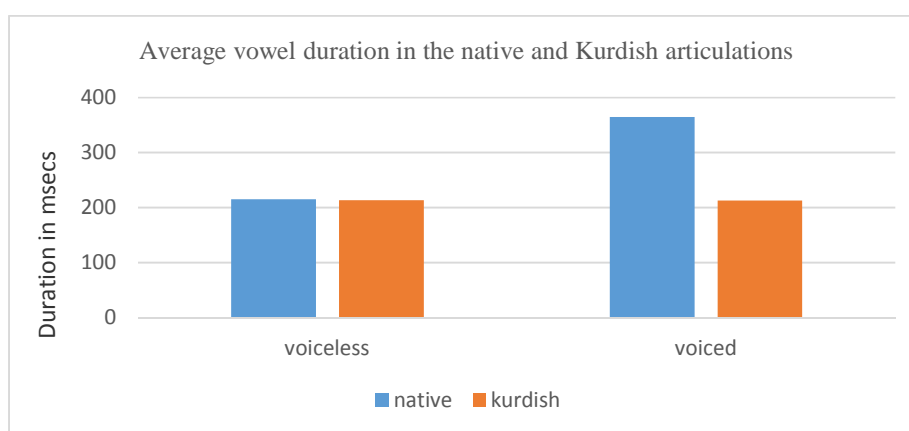
general average duration, the average duration of long vowels, the average duration of diphthongs, and the average duration of short vowels.

Table: 4  
Comparison between the native speaker's results and those of the Kurdish subjects

Item	voiceless				voiced			
	Native speaker	Kurdish subjects			Native speaker	Kurdish subjects		
		All	Females	Males		All	Females	Males
Lowest duration	131.3	92.5	126	92.5	228.2	70.2	127.3	70.2
Highest duration	290.5	397.3	397.3	336.5	454.8	400.7	400.7	344.8
General average duration	215.3	213.8	242.8	184.7	364.8	213.4	234.5	192.2
Average duration of long vowels	236.1	231.6	267.1	196.1	389.2	234.2	262.9	205.5
Average duration of diphthongs	210.1	228.8	258.2	199.4	430.6	227.7	247.6	207.9
Average duration of short vowels	199.8	178.2	203.2	153.1	274.5	176.8	193	160.7

In the native articulation, the mean duration of vowels is 215.3 msec in the voiceless environment and 364.8 msec in the voiced environment, but in the Kurdish Students' articulation, it is 213.8 msec in the voiceless environment and 213.4 msec in the voiced environment. (Figure 9). The results of the comparison indicate that Kurdish students produced vowels before voiceless consonants longer than native speakers did. Moreover, Kurdish students made vowels before voiced consonants significantly shorter than native speakers did, and shorter than before voiceless consonants.

Figure: 9



## Comparison between vowel durations in the native speaker's articulation and that of Kurdish students

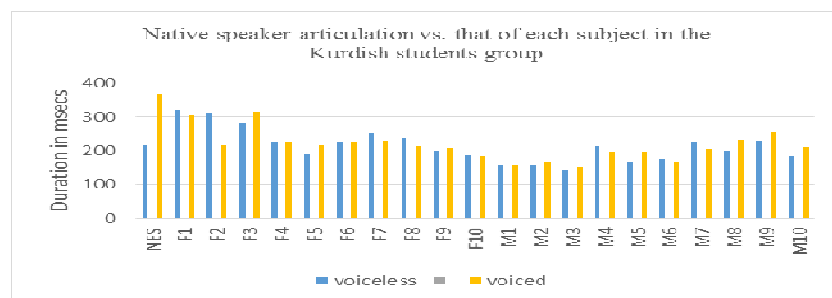
The ratio of the effect of voiceless to voiced consonants on vowel duration is 0.59:1 in the native articulation while it is 1:1 in the Kurdish students' articulation. In other words, the native speaker produced vowels before voiced consonants 149.4 msec longer than before voiceless consonants, while the Kurdish students produced the same vowels before voiced consonants 0.4 msec *shorter* than before voiceless consonants. That is to say, the effect of voicing context on vowel duration is *reversed* in the Kurdish students' articulation.

Kurdish students also differ from native English speakers in the lowest and highest durations given to vowels in the voicing context. In the voiceless context, although the lowest duration is given to the same vowel, / ɪ / of *hiss*; however, it is 131.3 msec in the native articulation, but 92.5 msec in the Kurdish students' articulation. By contrast, in the voiced context, the lowest vowel duration scored by the native speaker is 228.2 msec, of the short vowel / ɪ / of *his*, whereas the lowest vowel duration scored by Kurdish students is 70.2 msec, of the long vowel / i: / of *leave*. On the other hand, within the voiceless context, the highest duration in the native speaker's articulation is 290.5 msec, given to the long vowel / ɜ: / of *search*, while in the Kurdish students' articulation, it is 397.3 msec, given to the diphthong / eɪ / of *safe*. Within the voiced context, by contrast, the highest duration in the native speaker's articulation is 454.8 msec, assigned to the diphthong / əʊ / of *robe*, whereas the highest duration in the Kurdish students' articulation is 400.7 msec, assigned to the long vowel / ɜ: / of *surge*.

Unlike native speakers, Kurdish students produced vowels, in 84 cases out of 176, shorter before voiced consonants than before voiceless consonants.

These findings indicate clearly that Kurdish students deviate significantly from the native articulation of vowels. In most cases, they either neutralize the effect of voicing context on vowel duration or reverse it. (See figure: 10)

Figure: 10

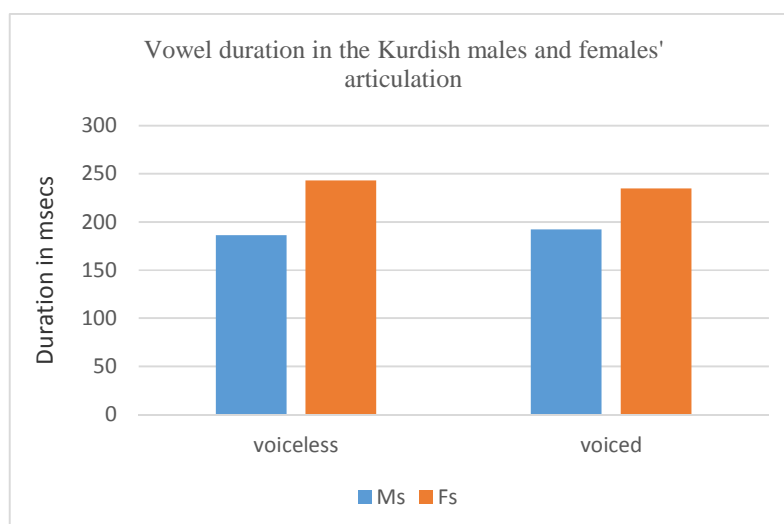


Comparison between native English speaker's articulation and that of each subject in the Kurdish students group.

### 3.2.5. Males' vs Females' Articulation of Monosyllabic Words

In the voiceless environment, the average duration of vowels is 184.7 msec in the males' articulation, while in the females' articulation it is 242.9 msec. By contrast, in the voiced environment, the average duration of vowels is 192.3 msec in the males' articulation, whereas it is 234.5 msec in the females' articulation (figure 11). These vowel duration values indicate that females on average produced vowels before voiceless consonants *longer* than before voiced consonants, whereas males produced vowels before voiceless consonants slightly shorter than before voiced consonants.

Figure: 11



Comparison between average durations of vowels in the males and females' articulations of English monosyllabic words

The ratio of the effect of voiceless to voiced consonants on vowel duration is 0.96:1 in the males' articulation and 1.04:1 in the females' articulation.

In the males' articulation, there are 36 cases out of 86 where the vowel before voiced consonants is *shorter* than the same vowel before voiceless consonants. However, in the females' articulation, there are 48 cases out of 90 where the vowel before voiced consonants is *shorter* than the same vowel before voiceless consonants. Males gave the least vowel duration (70.2 msec) to the long vowel / i: / of *leave*, while females gave the least vowel duration (126 msec) to the short vowel / ɪ / of *rich*. However, both males and females assigned the highest

vowel duration to the long vowel / ɜ: / of *surge*, but the value was 344.8 msec in the males' articulation and 400.7 msec in the female articulation.

Within the voiced context, females devoiced final consonants in 9 articulations out of 90, and males devoiced them in 7 articulations out of 88. Moreover, females failed to realize the quality of the vowel in 30 out of 180 articulations, and males did so in 27 out of 178 articulations.

#### 4. Conclusions

The findings of the study indicate that there are clear differences between vowel durations in the native English articulation and that of Kurdish university students of English. That is to say, the Kurdish subjects of the study failed to realize vowel durations, in voicing context, in a native-like manner; they produced vowel durations *little* longer before voiced consonants than before voiceless consonants in 52.3% of the total articulations, compared to native speakers. This finding is on a par with the findings of previous research on vowel length in interlanguage consonantal context (Crowther and Mann, 1992; Dawson, 2003; Flege et al., 1992; Mack, 1982; Mitleb, 1981).

The Kurdish group in the study violated the phonological rules of English, producing vowels longer before voiceless consonants than before voiced consonants in 47.7% of their English monosyllabic words articulation. This finding cannot be related to transfer from L1 to L2 since the influence of voicing on a preceding vowel is a phonological feature, as Delattre (1962) claims, existing in all languages. In addition, there is no evidence in the phonetic literature of a language where voiceless consonants lengthen a preceding vowel and voiced consonants shorten it. Thus, the researchers, depending on their experience in teaching, relate this finding to the little practice students receive in pronunciation lessons.

It seems that Kurdish university students of English are unaware of the influence of voicing on the preceding vowel. They pronounce "English vowels irrespective of their different durations in various contexts" (Rahimpour and Dovaive, 2011: 80).

#### 5. Recommendations:

Students should spend more time practicing the production and perception of English sounds before proceeding to the technical terms of phonetics and phonology. Such terms should be given at more advanced stages of the students' learning process. Reviewing 25 studies on the effect of pronunciation instruction, Pardo (2004) concludes that well-planned pronunciation lessons, together with specific teaching techniques and training lead to improvement in the L2 learners' pronunciation



Furthermore, the assessment system followed in Iraqi universities in general, and Kurdistan universities in particular, does not test the students' ability in producing and perceiving sounds. It consists entirely of written tests which measure the students' recognition ability only. The researchers believe that oral tests should be incorporated into the assessment system so that the students' production and perception of sounds can be assessed. This will help teachers provide the students with feedback and extensive exercises on the problematic sounds.

## References

- Chen, M. (1970). "Vowel length as a function of the voicing of the consonant environment". *Phonetica* 22, pp. 129-159.
- Crowther, C & Mann, V (1992). "Native language factors affecting use of vocalic cues to final consonant voicing in English". *Journal of the Acoustical Society of America*. 92, 711 – 722.
- Dawson, J. E. (2003). An Acoustic analysis of obstruents and vowel durations in the interlanguage English of native speakers of Modern Greek. In *Proceedings of the 6<sup>th</sup> international conference on Greek linguistics*, University of Crete, 18-21 September 2003.
- Delattre, P. (1962). Some factors of vowel duration and their cross-linguistic validity. *Journal of the Acoustical Society of America*, 34 (8), 1141-1143.
- Flege, J E; Murno, M. J. & Skelton, L. (1992). Production of the word-final English / t /- / d / contrast by native speakers of English, Mandarin, and Spanish. *Journal of the Acoustical Society of America*, 92, 128-143.
- Gimson, A. C. (1980). *An introduction to the pronunciation of English*, 3<sup>rd</sup> edition. London: Edward Arnold.
- Al-Hamadi, H. M. & Ali, F. F. (2012). Acoustic analysis of English pure vowels in clear and conversational speech: An experimental study at the University of Basra". *مجلة الخليج العربي* (المجلد) 40(العدد) 3-4
- House, A. S. (1961). On vowel duration, *Journal of the Acoustical Society of America* 33, 1174-1178.
- Klatt, D. H. (1973). Interaction between two factors that influence vowel duration. *Journal of the Acoustical Society of America* 54.4: 1102-1104.

- Lehiste, I. (1976). Suprasegmental features of speech. In: Norman L. Lass (ed) *Contemporary issues in experimental phonetics*. London: Academic press. Pp. 225-239
- Lisker, L. (1974). On “Explaining” vowel duration variation. *Haskins Laboratories: Status Report on Speech Research*, SR – 37/38, pp. 225 – 232.
- Luce, P. A. and Charles-Luce, J. (1985). Contextual effects on vowel duration, closure duration, and the consonant/vowel ratio in speech production. *Journal of the Acoustical Society of America* 78 (6), December 1985.
- Mack, M. (1982). Voicing-dependent vowel duration in English and French: Monolingual and bilingual production. *Journal of the Acoustical Society of America* 71.1: 173-178.
- Malécot, A. (1970). The lenis-fortis opposition: Its physiological parameters, *Journal of the Acoustical Society of America*, 47, 1588-1592.
- Mitleb, F. (1981). Timing of English vowels spoken with Arabic accent. *Research in Phonetics* 2, Department of Linguistics Indiana University, 193-225.
- O'Connor, J. D. (1980) *Better English Pronunciation 2<sup>nd</sup> edition*. Cambridge: Cambridge university press.
- Pardo, D. B. (2004). Can pronunciation be taught? A Review of research and implications for teaching. *Revisita Alicantina de Estudios Ingleses* 17, 6-38.
- Peterson, G. E. & Lehiste, I. (1960). Duration of syllable nuclei in English. *Journal of the Acoustical Society of America* 32.6: 693-703
- Roach, P. (2009). *English phonetic and phonology: A practical course 4<sup>th</sup> edition*. Cambridge. Cambridge university press.
- Steinlen, A. K. (2005). *The influence of consonants on native and non-native vowel production*. Germany: Gunter Narr Verlag Tübingen.
- Stevens, K. N. (1998). *Acoustic phonetics*. Cambridge: The MIT press.
- Strange, W.; Verbrugge, R. R.; Shankweiler, D. P. & Edman, T. R. “Consonant environment specifies vowel identity”. *Journal of the Acoustical Society of America*. 1976, 60, 213~224.

Treiman, R.; Kessler, B.; & Bick, S. (2003). Influence of consonantal context on the pronunciation of vowels: A comparison of human readers and computational models. *Cognition* 88 (2003) 49–78

Warsi, J. S. (1992) *Effects of Visual Feedback on Second Language Productive Phonology*. M A thesis. California State University.