

دراسة صوتية عن استخدام متعلمي اللغة الانجليزية... أحباب لازم و زياد قاسم

دراسة صوتية عن استخدام متعلمي اللغة الإنجليزية كلغة أجنبية لطموح اللغة الإنجليزية

An Acoustic Study of Iraqi EFL Learners' Utilization of English Aspiration

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المخلص

تتاولت العديد من الأبحاث زمن الجهر بالصوت (VOT) Voice Onset Time في اللغتين الإنكليزية والعربية. لكن وعلى وجه التحديد لم تبحث أي من هذه الدراسات كيفية استخدام المتعلم العراقي لظاهرة النَّفَس (aspiration) الخاصة باللغة الإنكليزية. يهدف هذا البحث الى إقامة صلة بين الجانب النظري لظاهرة النَّفَس (عن طريق التحليل الصوتي لقيم زمن الجهر بالصوت للأصوات الانفجارية النَّفَسِيَّة الإنكليزية فيما يخص بعض المتغيرات التي تؤثر على زمن الجهر بالصوت) وتعلم ظاهرة النفس في اللغة الإنكليزية. شارك في هذه الدراسة ثمانية عشر طالبا عراقيا متعلماً للغة الإنكليزية بحيث تم اختيارهم بصورة عشوائية من طلاب المرحلة الرابعة في قسم اللغة الإنكليزية في كلية التربية للعلوم الإنسانية في جامعة الموصل. تم قياس قيم زمن الجهر بالصوت للأصوات الانفجارية النَّفَسِيَّة الإنكليزية والمتنوعة بثلاث أصوات متحركة طويلة في بداية ووسط ونهاية الكلمات الموجودة في داخل العبارة " قل---مرة ثانية". أظهرت النتائج ما يلي: تزداد قيم زمن الجهر بالصوت للأصوات [p^h, t^h, k^h] بصورة تدريجية ويبدو ان قيم زمن الجهر بالصوت متساوية في كل المواقع. بالإضافة الى ذلك فقد كان لفظ المتعلمين بنفس اقل من المتحدثين الاصليين للغة الإنكليزية وذلك لان قيم زمن الجهر بالصوت لهذه الاصوات اقل من قيم زمن الجهر بالصوت

الإنكليزية. والأكثر من ذلك، فإن لفظهم للأصوات الانفجارية النَّفسِيَّة الإنكليزية كان بنفس حالة اللفظ للأصوات الانفجارية العربية. وبذلك فإن أخطاء اللفظ للأصوات النَّفسِيَّة للمتعلم العراقي للغة الإنكليزية مشابهة لأخطاء اللفظ للأصوات النَّفسِيَّة للمتعلم العربي ذو اللهجات العربية المختلفة، وبالتالي يحتاج المتعلم العراقي الى المزيد من التدريب للأصوات الانفجارية النَّفسِيَّة الإنكليزية لتحسين اللفظ مما يؤدي الى لفظ متقن ومن ثم استخداما ناجحا للأصوات الإنكليزية النَّفسِيَّة.

Abstract

Many researches have dealt with Voice Onset Time (VOT) in English and Arabic. However, none of these researches have investigated the utilization of the phenomenon of aspiration in English language related to Iraqi EFL learners. This study aims to make a connection between the theoretical aspects of aspiration (acoustic analysis of VOT of English aspirated plosives in relation to certain variables affecting VOT values) and learning English aspiration. Eighteen Iraqi EFL learners who are randomly selected from fourth year students, English Department, College of Education for Humanities, University of Mosul have participated in this study. VOT values of the English voiceless plosives are measured as far as aspiration is concerned followed by the three long vowels /i:, u:, a:/, in initial, intervocalic and final positions in the carrier phrase " *say---again*". Results show the following: VOT averages of [p^h, t^h, k^h] in carrier phrase increase gradually and their VOT values seem to be equal in all positions. In addition, they display less aspiration than English native speakers do. This is due to VOT values that are lower than the the English VOT values. Moreover, they produce English voiceless aspirated plosives in the same manner of producing Arabic voiceless plosives. Iraqi EFL learners' mispronunciation is similar to the mispronunciation of other Arab EFL learners of different mother tongue accents. Thus, Iraqi EFL learners need further training of the voiceless plosives to enhance intelligibility and hence successful utilization of plosives as far as English aspiration is concerned.

1.Introduction

English is regarded as a foreign language in Iraq. Due to the interests of the Iraqi government in teaching English language as a pedagogical process in schools and universities, learning of such language attracts the attention of many researchers. Thus, the present study aims to investigate how Iraqi EFL learners produce English aspirated voiceless plosives via a particular phonetic feature of plosives known as Voice Onset Time (VOT). Many researches have tackled VOT of plosives in their studies, since it correlates with aspiration, and tried to give such term its appropriate definition. One of these studies, which is regarded as a pioneer study, is Lisker and Abramson (1964). Other studies have adopted and analyzed the VOT of English plosives (Klatt, 1975; Docherty, 1992; Ladefoged and Johnson, 2015). As to Arabic, several studies analyzed the VOT of Arabic plosives (Al-Ani 1970, Al-Ghamdi, 1990; Mitleb, 2009; Rahim and Kasim, 2009; Al-Tai and Kasim, 2021). Thus, the study is going to tackle an acoustic description of the English voiceless aspirated plosives related to Iraqi EFL learners and learning of English aspiration to see how Iraqi EFL learners utilize English aspiration that they had attained in their academic study and examine whether it is sufficient or they need special training.

1.1 Statement of the Problem

English is an Indo- European language and Arabic is a Semitic language, hence the two languages belong to two different families (Na'ama, 2011). VOT is language specific and it occurs in languages like English and Arabic (Odisho,1976: 103). Thus, there are differences between the VOT values of voiceless aspirated plosives in English and in Arabic. The present study deals with the production of the plosives problem which investigates whether English voiceless plosives produced by Iraqi EFL learners will display less aspiration or more aspiration than the ones produced by the English speakers. In other words, whether Iraqi EFL learners whose first language is Arabic are going to produce English voiceless aspirated plosives correctly or not. Another problem is related to the pedagogical aspect of aspiration; since there are differences between the sound systems of the two languages (Carter and Nunan, 2001), it is expected that some Arab learners will face certain problems in learning English language. By comparing Iraqi EFL learners' VOT values with other VOT values related to the two languages, we can see whether students are making aspirated plosives similar to the Arabic ones or to the English ones; i.e. whether their pronunciation is correct or incorrect.

1.2 Aims of the Study

Firstly, the study aims at analyzing the English voiceless plosives produced by Iraqi EFL learners as far aspiration is concerned. This will be accomplished by performing an acoustic analysis of VOT and identifying factors that have effects on production of Iraqi EFL learners such as: place of articulation, position of the sound in a word, vowel context and the context in the carrier phrase.

Secondly, another aim is related to learning aspiration; this study aims to find out how Iraqi EFL learners are going to utilize aspiration of English voiceless plosives that they had attained in their academic as well as practical study. Either there will be a successful utilization of aspiration or they need further awareness of aspirated plosives. This can be achieved by comparing the VOT of voiceless aspirated plosives of the present study with all previous studies.

1.3 Limits of the Study

There are certain prosodic and temporal factors that might affect VOT as far as aspiration is concerned such as: number of syllables in the word, speech rate, speech task, fundamental frequency, stress, intonation and phonemic environment (Clark and Yallop, 1990). In addition, there are the physiological differences which include the form of the glottis, the size of the vocal tract, the thickness of the vocal folds, as well as other differences like speaking styles (Shue and Iseli, 2008), and pathological status such as: hearing impairment and depression (Listiana, 2019). All these factors are excluded.

There are also other factors affecting learning English as far as aspiration is concerned such as: students positive and negative attitude towards the target language (Elliot, 1995), experience and positive orientation to language (Moyer, 2007), exposure to the target language day-to-day as well as effective oral communication in daily life (Gilakjani, 2012) and finally, instructions provided to students in order to speak English language in and outside classroom fluently (Elliot, 1995). All such factors are also excluded.

Finally, another type of limits of this study is the curfew as a result of (Covid -19) and (Covid-20), hence students 'adaption of the electronic study (e-learning). Thus, there was certain difficulty in finding sufficient number of students to take part in the present study.

1.4 Procedures and Data Collection

1. The subjects of this study are 18 (9 males/ 9 females), fourth-year students, English Department, College of Education for Humanities, University of Mosul. All of them are native speakers of Mosuli Iraqi Arabic.

2. The test of this study examines twenty one tokens containing the three English voiceless aspirated plosives [p^h, t^h, k^h], followed by the three long vowels /i:/, /u:/ and /a:/ in initial, intervocalic as well as final positions in a carrier phrase (see Table 1). Table 2 illustrates the different positions and contexts (where C plosive represents one of the plosive consonants). Each token is put in the carrier phrase "sayagain".

Table (1)
The words of the test in different positions and vowel context with their transcriptions.

sounds		Vowel contexts					
Voiceless plosives	positions	/i:/	Trans.	/u:/	Trans.	/a:/	Trans.
/p/	initial	peace	/pi:s/	pool	/pu:l/	pass	/pa:s/
	intervocalic	repeat	/ri'pi:t/	harpoon	/ha:'pu:n/	depart	/di'pa:t/
	final	weep	/wi:p/	-----	-----	-----	-----
/t/	initial	teen	/ti:n/	tool	/tu:l/	tars	/ta:z/
	intervocalic	fourteen	/fɔ:'ti:n/	cartoon	/ka:'tu:n/	guitars	/gi'ta:z/
	final	feet	/fi:t/	-----	-----	-----	-----
/k/	initial	keen	/ki:n/	cool	/ku:l/	card	/ka:d/
	intervocalic	zookeeper	/zu:'ki:pə/	raccoon	/rə'ku:n/	becalm	/bi'ka:m/
	final	week	/wi:k/	-----	-----	-----	-----

Table (2)
The different patterns of test data.

Contexts	Initial	Intervocalic	Final
Carrier phrase "say...again"	CV 'CplosiveVC VCVC	CV CV'plosiveVC VCVC	CV CV'plosive VCVC

- The tokens are printed on flash cards (8cm x 12cm) with a font size of "100" by using English script printed in "Times New Romans". All words are read by all the participants in a carrier phrase.
- The recording sessions take place in the "Multi-Media Language Lab, within the Korean Gift" which belongs to the Computer-Center in the Students-Center, University of Mosul.
- The elicitation method or as Lisker and Abramson's (1964:389) call it "elicitation procedure" is adopted in which aspiration is measured from the release of the plosive to the beginning of the voicing of the following vowel or sonorant.

6. There is no difference in the way of analyzing as well as measuring initial and intervocalic aspirated plosives in the carrier phrase (see Figure 1).

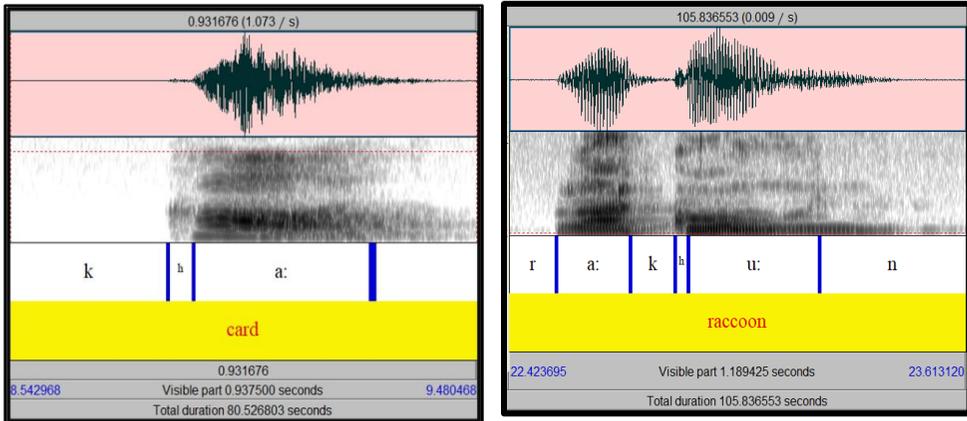


Figure (1)

Waveforms of initial /k/ of card and intervocalic /k/ of ‘raccoon’.

7. In final position in carrier phrase, the plosives are followed by a vowel, e.g. ‘say week again’ /seɪ wi:k ə'gen/. It is noticed that there would be a kind of an obvious aspiration after the release of /k/ sound as it is clearly presented in Figure 2 which shows the highlighted waveform of the final /k/ in a carrier phrase ‘say week again’.

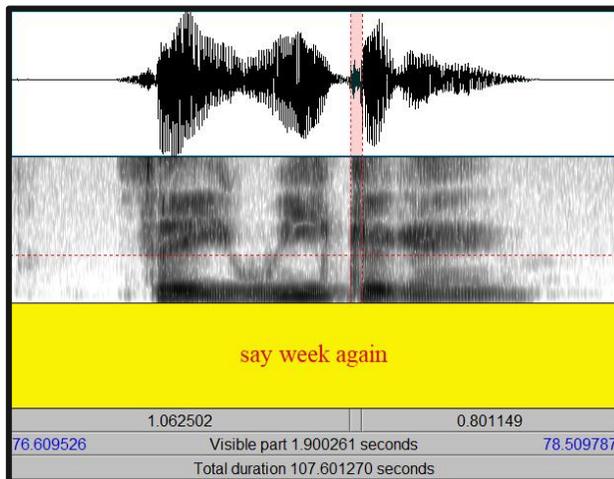


Figure (2)

The waveform of final aspirated /k/ in the carrier phrase ‘say week again’.

1.5 The Model Adopted

The easiest way to visualize VOT is by reference to the waveform of a sound. Phoneticians starting with Lisker and Abramson's (1964) classic study have described VOT as a continuum. Since aspiration is connected with VOT, the model adopted in the present study for describing and analyzing aspiration of Iraqi EFL learners will be Lisker and Abramson's (1964) study using the three criteria of VOT: voicing lead, short lag and long lag.

2. Theoretical Part

2.1 Background

This section presents some definitions of VOT as well as some variables affecting VOT such as: place of articulation, vowel context and in carrier phrase. Besides, various previous studies of aspiration, viz., English previous studies of aspiration, Arabic previous studies of aspiration and Arab EFL learners' previous studies of aspiration are also presented in subsequent sections.

2.2 Voice Onset Time

Voice Onset Time (VOT) has been used mainly as a distinction between plosive consonants (Khattab, 2002: 1 and Al Shareef, 2015: 1). It is regarded as a temporal acoustic parameter which was first defined by Lisker and Abramson (1964) as the time between the release of the oral constriction for plosive production and the onset of vocal fold vibrations. If voicing starts before the release, i.e., during the closure, VOT has a negative value, -VOT, and it is called "voicing lead". "Short lag" refers to VOT when the voicing starts up to 25ms after the release. "Long lag" is when voicing starts after more than 25ms of the release. Alanazi (2017:10) adds that Arabic is a language which has voicing lead in addition to short/long lag plosives, while English has only short and long-lag plosives. Thus, languages of the world are divided into 'voicing' and 'aspiration' languages where Arabic is a voicing language and English is an aspiration language. If the VOT value is greater than 30 ms, there will be a period of h-like sound and the stop is regarded as aspirated; thus, the duration of the burst of noise may be more than 50ms (Ashby and Maidment, 2005: 92).

2.3 Factors Affecting on the Voice Onset Time

There are many factors that may have their effects on the value of VOT. Some of them are related to inherent properties of sounds as the following:

2.3.1 Place of Articulation

Lisker and Abramson (1964) and Port and Mitleb (1983) assert that VOT is to be longer in velars than in alveolars and bilabials. Thus, English initial aspirated bilabial plosive [p^h] has a VOT value of 28 ms, while initial aspirated alveolar plosive [t^h] has VOT value of 39 ms and 43 ms for aspirated velar plosive [k^h] in carrier phrase (Lisker and Abramson, 1964: 410).

2.3.2 Vowel Context

Some studies, including Lisker and Abramson (1967), state that the following vowel has no influence on the VOT values. But others, like Klatt (1975) and Weismer (1979), conclude that a voiceless plosive has a longer VOT when it is followed by tense high vowels /i:/, /eɪ/ and /u:/ than tense low and mid vowels /ɪ/, /æ/ and /ɛ/. Further, Rochet and Yanmei (1991) who tackles Mandarin plosives, have the same results in the sense that vowels affect the VOT values of the preceding plosive.

2.4 Previous Studies of VOT of English Plosives

The first study that has tackled VOT of plosives in different languages is Lisker and Abramson's (1964) classic study. They measure the VOT of the plosives of eleven languages including English in a carrier sentence. The VOT values of English voiceless plosives in carrier sentence are (28, 39, 43) ms. Another important study on American English plosives is Klatt's (1975). The VOT values of word-initial plosives [p^h t^h k^h] in carrier sentence are (47, 65, 70) ms. Another and more comprehensive study on British English is Docherty's (1992) study. He measures the VOT of plosives belonging to five adult males' speech in carrier phrase. VOT results of word-initial English plosives [p^h, t^h, k^h] in carrier phrase are (42, 65, 62) ms. Khattab (2002) conducts an auditory as well as acoustic study of six British native speakers producing English plosives in initial position. Her VOT results for English word-initial plosives [p^h, t^h and k^h] in carrier sentences are (63,

70, 80) ms. Table 3 gives a summary of the VOT values found in the studies reviewed above.

Table (3)

Summary of English VOT values, in ms., for word-initial voiceless plosives in carrier phrase found in different studies.

English plosives in carrier phrase	[p ^h]	[t ^h]	[k ^h]
Lisker and Abramson (1964)	28	39	43
Klatt (1975)	47	65	70
Docherty (1992)	42	65	62
Khattab (2002)	63	70	80

2.5 Previous Studies of VOT of Arabic plosives

Yeni-Komshian et al (1977) investigate plosives in Modern Standard Arabic (MSA) which is used in some religious ceremonies, in media and in education. The VOT values for word initial plosives [t^h, k^h] in sentences are (25, 28) ms. Flege and Port (1981) make three experiments to examine the voicing contrast of plosives in Arabic and American English. VOT values of Saudi Arabic plosives in initial position in carrier sentences of /t, k/ are (37, 52) ms. Alghamdi (1990) gives the VOT values of Saudi Arabic dialect. VOT values of initial /t/ in sentences show slight aspiration (32ms) and slightly greater (42ms) for /k/ in the same context. In addition, Jesry (1996) adopts a cognitive approach to voicing by seeing VOT values of three Syrian adult speakers reading in Modern Standard Arabic in carrier sentence. The VOT values for the Arabic word initial plosives /t, k/ in sentences are (28, 32) ms. Khattab (2002) investigates VOT values of initial voiceless plosives of 23 Arab adults. VOT values for Arabic word-initial plosives in carrier sentences for / t, k / are (28) ms. Tamim (2017) measures the VOT values of plosives in the Palestinian Arabic dialect. VOT values of initial /t, k/ followed by /i:, u:, a:/ in carrier phrase are (25, 41) ms, while VOT values of medial /t, k / followed by the same vowels are (17, 28) ms. In the same context, Al-Tai and Kasim (2021), make an acoustic study by describing Iraqi Arabic plosives acoustically and link the utility of this description with language teaching. The subjects of their study are Mosuli Arabic

educated native speakers. The VOT values of the same plosives with carrier phrase in initial position are (20, 44, 51) ms. and their VOT values in a carrier phrase in medial position are (15, 44, 28) ms. Table 4 gives a summary of the VOT values found in the studies reviewed above.

Table (4)

Summary of Arabic VOT values, in ms., for the voiceless plosives in different positions in carrier phrase found in different studies.

Ar. Previous Studies	Position	[p ^h]	[t ^h]	[k ^h]
Yeni- Komshian et al (1977)	Initial	-----	25	28
Flege and Port (1981)	Initial	-----	37	52
Algamdi (1990)	Initial	-----	32	42
Jesry (1996)	Initial	-----	28	32
Khattab (2002)	Initial	-----	28	31
Tamim (2017)	Initial	-----	25	41
	Medial	-----	17	28
Al-Tai and Kasim (2021)	Initial	20	44	51
	Medial	15	44	28

2.6 Previous Arab EFL learners Studies

Flege and Port (1981) examine VOT values of Saudi students in English and Arabic. The subjects of this study consist of two groups; six Saudi subjects who stayed for 39 months in America and six American ones who stayed for 8 months in America. VOT results for word-initial English plosives [p^h, t^h, k^h] in carrier sentences for Saudi subject are (14, 35, 41). In addition, Khattab (2002) concludes that Lebanese EFL learners produce Arabic VOT pattern, in the sense that they produce short lag VOT with slight aspiration for voiceless aspirated English plosives. VOT results for word-initial English plosives in carrier sentences are (28, 34, 38). Al Shareef (2015) measures VOT values of nine native English speakers and eleven Saudi Arabic speakers. The VOT results of their production of the English

plosives /t, k/ in initial position are (35, 47) ms. and in intervocalic position are (34, 45) ms., and in final position are (30, 32) ms. Abdalaal (2017) investigates VOT values of ten Arabs in university of Putra Malaysia. The VOT values of plosives initially in carrier phrase are (52, 45, 59) ms. Alanazi (2017) measures the VOT values of the voiceless plosives related to thirty one adult advanced Saudi learners of English followed by three different vowels in sentence. VOT result of English word initial voiceless plosives in sentence are (41, 63, 70) ms. (see Table 5).

Table (5)

Summary of VOT values related to Arab EFL learners for [p^h t^h k^h] found in different studies.

Previous Ar. EFL studies	Position	[p ^h]	[t ^h]	[k ^h]
Flege and port (1981)	Initial	14	35	41
Khattab (2002)	Initial	28	34	38
Al Shareef (2015)	Initial		35	47
	Intervocalic		34	45
	Final		30	32
Addelaal (2017)	Initial	52	45	59
Alanazi (2017)	Initial	41	63	70

3. Data Analysis and Discussion

3.1 Data Analysis

Appendix 1 presents details of VOT values of the three voiceless aspirated plosives [p^h, t^h, k^h] with essential reference to the effects of vowel context; high, low, front and back vowels; /i:/, u:/, a:/, and position of the sounds in a word; initial, intervocalic and final positions in carrier phrase. Table 6 below, which is extracted from Appendix 1, can be used as a co-reference from time to time in the following sections.

Table (6)
The averages of VOT values of voiceless aspirated plosives in carrier phrase

Position	[p ^h i:]	[p ^h u:]	[p ^h a:]	[t ^h i:]	[t ^h u:]	[t ^h a:]	[k ^h i:]	[k ^h u:]	[k ^h a:]
Initial	14	25	12	44	35	19	55	47	40
Intervocalic	16	33	14	42	36	17	43	42	35
Final	16	-----	-----	26	-----	-----	40	-----	---

3.1.1 Initially followed by Vowels

The VOT average of initial aspirated [p^h] followed by /i:/, u:/, a:/ are (14, 25, 12) ms. respectively. The VOT average of initial aspirated [t^h] followed by /i:/, u:/, a:/ are (44, 35, 19) ms. respectively. While the VOT average of initial aspirated [k^h] followed by /i:/, u:/, a:/ are (55, 47, 40) ms. respectively. Figure 3 below presents the numerical results of EFL learners initial voiceless aspirated plosives [p^h, t^h, k^h] in a carrier phrase.

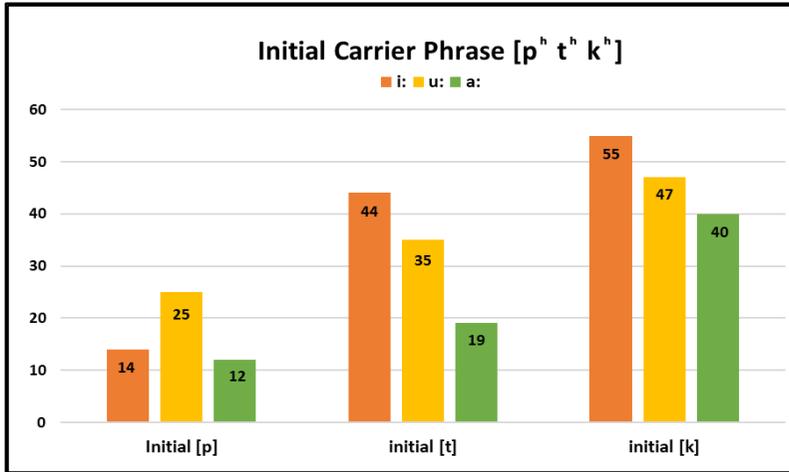


Figure (3)

Results of initial [p^h t^h k^h] followed by /i:/, u:/, a:/ in carrier phrase.

3.1.2 Intervocally

The VOT average of intervocalic aspirated [p^h] followed by /i:/, u:/, a:/ are (16, 33, 14) ms. respectively. The VOT average of intervocalic aspirated [t^h] followed by /i:/, u:/, a:/ are (48, 36, 19) ms. respectively. While the VOT average of intervocalic aspirated [k^h] followed by /i:/, u:/, a:/ are (43, 42, 35) ms. respectively. Figure 4 below presents the numerical results of EFL learners intervocalic voiceless aspirated plosives [p^h t^h k^h]. in carrier phrase.

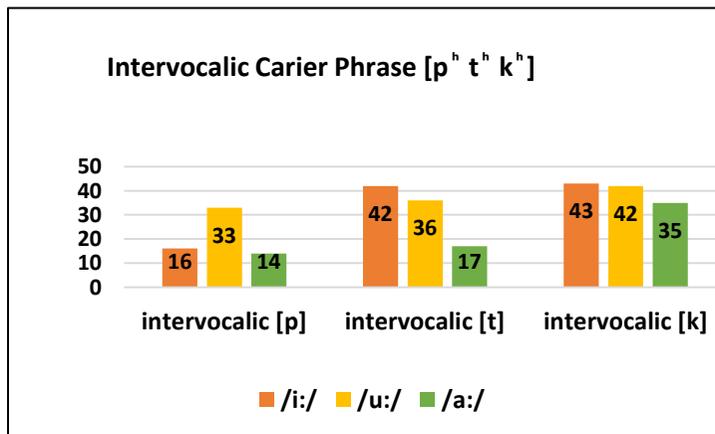


Figure (4)

VOT results of intervocalic [p^h t^h k^h] followed by /i:/, u:/, a:/

3.1.3 Finally followed by Vowels

In final position, the three aspirated plosives [p^h, t^h, k^h] are followed by /ə/ in the phrase “say---again”. Accordingly, most participants’ final results in carrier phrase have obvious VOT values of released voiceless aspirated plosives and few individual cases have unreleased voiceless plosives, hence there is no VOT values (see Appendix 1). Thus, the VOT average of final aspirated [p^h] is 16 ms. and the number of final unreleased [p^ʔ] is 6 out of 18 tokens. And, the VOT average of aspirated [t^h] in final position is 26 ms. and the number of final unreleased [t^ʔ] is 2 out of 18 tokens. While the VOT average of final aspirated [k^h] is 40 ms. in which obvious VOT values of aspirated plosive [k^h] related to all participants are noticed in this study. Figure 5 below shows the VOT results of plosives in final position in carrier phrase, while Figure 6 shows the number of the unreleased voiceless plosives in a carrier phrase.

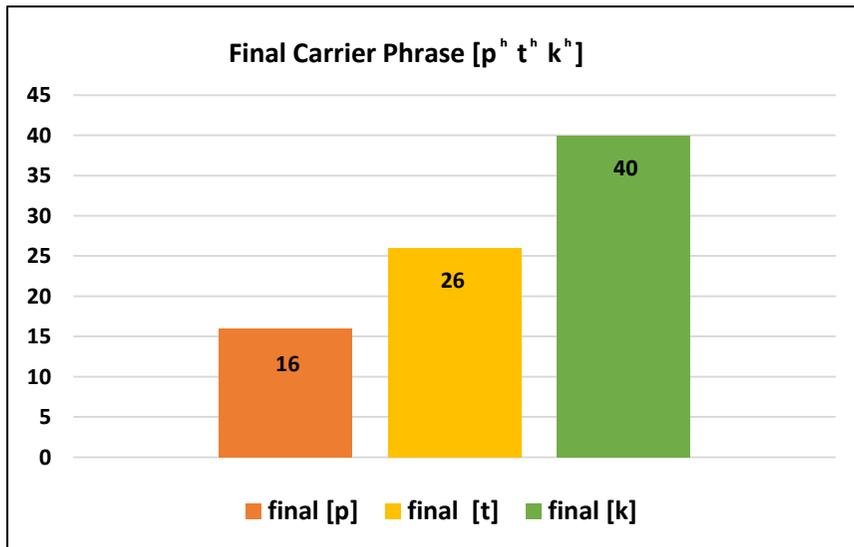


Figure (5)

VOT results of final [p^h t^h k^h] in a carrier phrase.

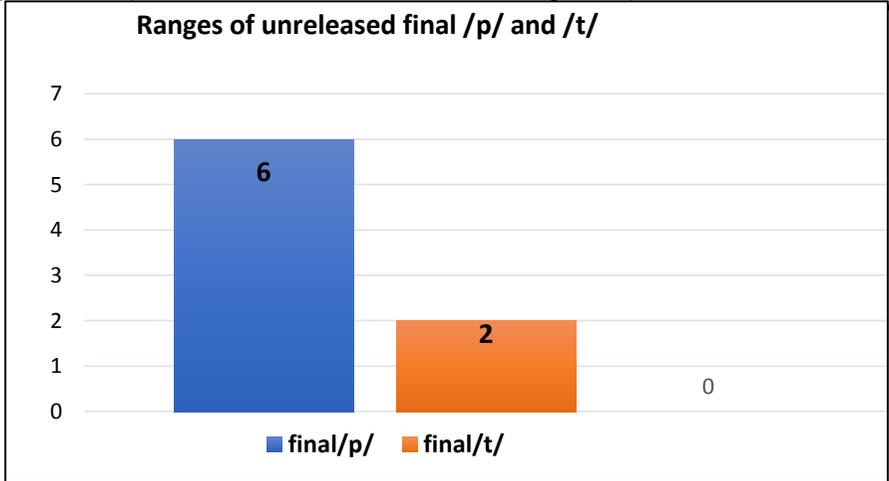


Figure (6)

Number of final unreleased [p^h, t^h, k^h] in carrier phrase.

3.2 Discussion

VOT can be considered a cue that may be affected by certain factors namely, place of articulation, position of the sound in a word, and vowel context in carrier phrase.

3.2.1 VOT Results and Place of Articulation

Results of the averages of VOT values concerning the participants' production of the voiceless plosives [p^h, t^h, k^h] in carrier phrase as far as aspiration is concerned show that [p^h] has the lowest results, [t^h] has the next higher results and voice [k^h] has the highest results (see Appendix 1 and Table 6). Accordingly, VOT averages of the plosives [p^h, t^h, k^h] in carrier phrase increase gradually in the order labial < alveolar < velar (see Figure 7). And, if we compare these results with previous studies such as: Lisker and Abramson (1964), Port and Mitelb (1983), Cho and Ladefoged (1999) which state that VOT values of voiceless aspirated plosives gradually increase, we find a kind of compatibility of the present study and other studies which asserts the relationship between VOT values and place of articulation.

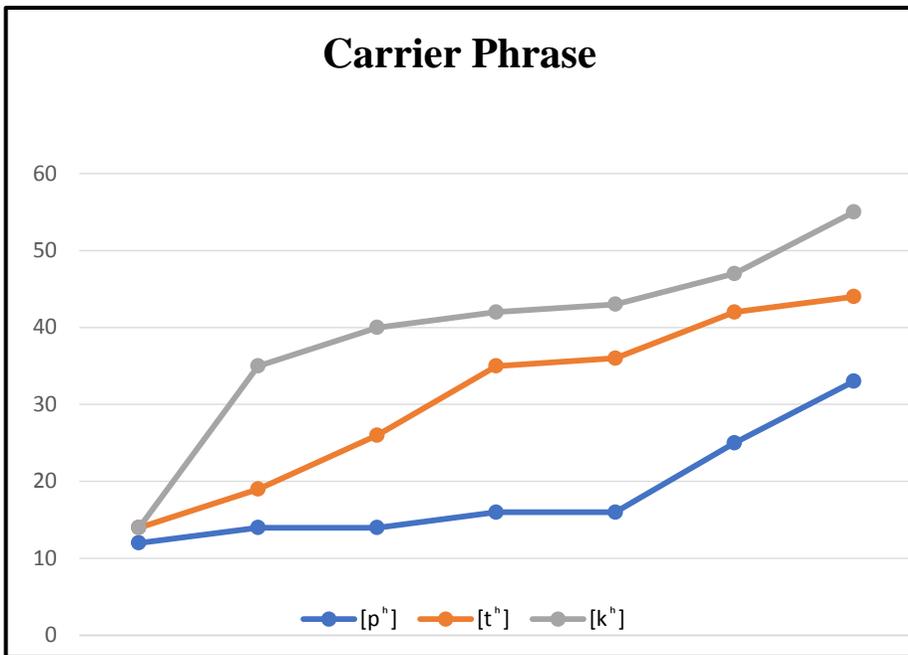


Figure (7)

Gradual increase of VOT averages of [p^h, t^h, k^h] in carrier phrase.

3.2.2 VOT Results and Position of [p^h, t^h, k^h] in a Word

Results of the present study notice that the position of the sound in a word does not play a significant role in the results of the present study as far as aspiration is concerned in the sense that VOT results of [p^h, t^h, k^h] related to Iraqi EFL learners equal in all positions, viz. initially, intervocalically as well as finally. In other words, VOT values of [p^h, t^h, k^h] initially in carrier phrase seem to be equal to VOT values of [p^h, t^h, k^h] in intervocalic position and VOT values of [p^h, t^h, k^h] in final position in the same context (see Table 6). Thus, we can say that there is a kind of compatibility between equal results in all positions of the present study and other previous studies such as Tamim's (2017), in which results of her study showed equal values of [t^h] initially and intervocalically in carrier phrase.

3.2.3 VOT Results and Vowel Context

VOT averages of initial and intervocalic [p^h, t^h, k^h] after the three long vowels /i:, u:, a:/ in carrier phrase show the following: [p^h] has the lowest VOT values when it is followed by /a:/, higher VOT values when it is followed by /i:/ and the highest VOT when it is followed by /u:/. While [t^h, k^h] have the lowest VOT values when they are followed by /a:/, higher VOT values when they are followed by /u:/ and the highest VOT values when they are followed by /i:/ (see Table 6). We can say that all VOT results of the present study follow the pattern /i:/> /u:/>/a:/ when they are preceded by /t/ and /k/ and /u:/>/i:/>/a:/ when they are preceded by /p/ in carrier phrase. Lisker and Abramsons (1964) state that the following vowels had no influence on VOT values, but results of the present study show an obvious influence of the following vowel on VOT values of voiceless aspirated plosive in initial and intervocalic positions in carrier phrase. On the other hand, the results of the present study may be compatible with other previous studies such as Klatt (1975) and Weismer (1979) who insist on the following vowel having an obvious influence on VOT values (see 2.3.2).

3.2.4 Iraqi EFL Learners' Production of Aspirated Plosives in Carrier Phrase

Results show that only [t^h] after /i:/ may display equal results and that is compatible with our model; i.e, Lisker and Abramson (1964). And all other participants' averages of all aspirated voiceless plosives are lower than all the results of previous English aspiration studies such as: Lisker and Abramson (1964), Klatt (1975), Docherty (1992) and Khattab (2002). Accordingly, the present study concludes that academic and practical studies are not sufficient for successful utilization of English aspiration. The first problem is related to Iraqi EFL learners who do not have problem in producing such sounds, but they have problem with producing voiceless plosives with appropriate English aspiration.

By comparing VOT results of Iraqi EFL learners with previous VOT results of Arabic aspiration studies, results show that VOT values

of Iraqi EFL learners' production of English voiceless plosives initially followed by /a:/ in carrier phrase are equal with Alghamdi (1990) production of English voiceless plosives. VOT values of Jesry (1996) and Khattab (2002) display equal VOT values with initial [t^h] related to Iraqi EFL learners in carrier phrase. Al-Tai and Kasim (2021) VOT results of initial [p^h, t^h, k^h] are equal to VOT results of Iraqi EFL learners of the present study, viz. medial [p^h, t^h]. Accordingly, the present study concludes that Iraqi EFL learners pronounce English voiceless plosives with aspiration nearer to the Arabic one than that of English. In other words, Iraqi EFL learners lack equivalent, intelligible and comprehensive pronunciation to be compared to the pronunciation of native speakers of English. The second problem is related to Arabic mother tongue effect, viz., 'Mosuli Arabic' which affects learning English aspiration. The first effect is positive (positive transfer: existence of Arabic aspiration which may ease learning of English aspiration), and the second effect is negative (negative transfer: applying Arabic rules in learning English language as far as aspiration is concerned). Table 7 below presents equal VOT values of previous Arabic studies and Iraqi EFL learners of the present study.

Table (7)

Equal VOT results of the present study with previous Arabic VOT studies. AR=Arabic, AV= Averages

Previous Ar. Studies AV.					Present study AV.		
Studies	Context	[p ^h]	[t ^h]	[k ^h]	[p ^h]	[t ^h]	[k ^h]
Alghamdi (1990),	Initial, 3vowels, carrier phrase	----	---	42	---	---	40
Jesry (1996),	Initial,3 vowels, carrier phrase	----	29	----	---	33	----
Khattab (2002)	Initial, 3 vowels, carrier phrase	----	28	----	---	33	----
Al-Tai and Kasim	Initial, /i:/, carrier phrase	20	44	51	14	44	55

Previous Ar. Studies AV.					Present study AV.		
Studies	Context	[p ^h]	[t ^h]	[k ^h]	[p ^h]	[t ^h]	[k ^h]
(2021)	Medial, /i:/, carrier phrase	15	44	----	16	42	----

The VOT results of previous Arab EFL learners studies and VOT results of the present study show the following: initial [p^h, k^h] after /a:/ in carrier phrase related to the Iraqi EFL learners of the present study are equal to VOT values of Flege and Port (1981) in the same context. VOT results of initial [t^h] in carrier phrase related to the Iraqi EFL learners of the present study are equal to VOT values of Khattab (2002). VOT results of initial, medial [t^h and k^h] in carrier phrase related to Iraqi EFL learners are equal to VOT values of Al Shareef (2015) for [t^h, k^h] as well as final [t^h] which is also equal in the same context. Accordingly, the present study concludes that it is not only Iraqi EFL learners that have certain problems concerning the accurate pronunciation of English voiceless aspirated plosives; i.e. problem with appropriate aspiration. So, Iraqi EFL learners' mispronunciation problems are added to mispronunciation problems of other Arab EFL learners of different Arabic mother tongue accents. Such a conclusion leads to infer that all Arab learners have certain problems as far as aspiration is concerned. This is due to the negative transfer of their mother tongue language, in addition to other reasons, which include the non-linguistics factors such as syllabus, methods of teaching, and learners' attitude towards learning English language. Table 8 below presents the equal VOT results.

Table (8)
Equal VOT results of the present study and previous Arabic EFL learners' studies.

Previous Arabic EFL Learners Studies AV.				Present Study AV.			
Studies	Contexts	[p ^h]	[t ^h]	[k ^h]	[p ^h]	[t ^h]	[k ^h]
Flege and Port (1981)	initial, /a:/, carrier phrase	14	----	41	12	----	40
Khatab (2002)	initial, three vowels, carrier phrase	----	34	----	----	33	----
Al Shareef (2015)	initial, medial, final,	----	35	47	----	33	47
	three vowels	----	34	45	----	32	40
	carrier phrase	----	30	----	----	26	----

4. Conclusion

This study concludes the following: VOT averages of the English plosives [p^h, t^h, k^h] produced by Iraqi EFL learners in carrier phrase increase gradually in the order labial < alveolar < velar. The position of the sound in a word does not seem to play a significant role in the results of the present study as far as aspiration is concerned, in the sense that VOT results of [p^h, t^h, k^h] related to Iraqi EFL learners are equal in all positions, viz. initially, intervocalically as well as finally. As to the vowel context, VOT results of the present study follow the pattern /i:/< /u:/</a:/ when they are preceded by /t/ and /k/ and /u:/</i:/</a:/ when they are preceded by /p/. As for the production of aspirated plosives, results show that only [t^h] after /i:/ may display equal results and that is compatible with our model; i.e. Lisker and Abramson (1964). Accordingly, Iraqi EFL learners may display less aspiration than native speakers of English, hence their VOT values do not match or in other words are lower than English VOT values. According to all these detailed discussions, the present study concludes that Iraqi EFL learners produce English voiceless aspirated plosives in the same manner of producing Arabic voiceless plosives. This study concludes that academic and practical studies are not sufficient for successful utilization of English aspiration and they need further training of aspirated plosives in order to gain comprehensive, equivalent and intelligible pronunciation.

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Appendix 1. VOT values and their averages of English voiceless aspirated stops after vowels produced by Iraqi EFL learners in carrier phrase in initial, medial and final positions. All VOT values are in millisecond (ms.); AV. = average, R= released, U= unreleased, S=subject

Sound	Position	Tokens	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	AV.
/p/	Initial	Pease	15	13	29	18	16	15	13	12	11	15	15	28	14	10	07	12	06	10	14
	Intervocalic	Repeat	19	31	16	18	13	12	17	16	10	16	21	18	20	12	10	10	12	08	16
	Initial	Pool	22	33	20	22	12	20	29	36	25	48	17	23	38	24	07	20	20	26	25
	Intervocalic	Harpoon	40	41	34	43	45	42	37	27	18	46	14	43	32	41	24	30	17	20	33
	Initial	Pass	16	11	16	09	12	16	13	10	10	15	19	11	15	11	08	15	11	09	12
	Intervocalic	Depart	09	16	15	25	16	18	07	11	09	16	15	19	11	14	11	09	20	10	14
	Final	Weep	R26	U	U	R12	U	U	R12	R11	U	R18	R17	R19	R07	U	R20	R14	22	R13	16
/t/	Initial	Teen	58	56	61	23	37	38	38	29	39	48	30	44	47	58	25	44	60	60	44
	Intervocalic	Fourteen	38	85	34	42	31	18	40	17	41	62	30	33	51	51	44	50	55	38	42
	Initial	Tool	12	99	40	26	34	30	37	41	28	53	31	40	14	33	17	34	36	23	35
	Intervocalic	Cartoon	28	43	21	33	25	23	28	29	52	48	47	41	48	24	22	40	52	48	36
	Initial	Tars	12	41	21	20	17	21	21	14	08	32	23	31	15	21	10	07	14	16	19
	Intervocalic	Guitars	16	26	18	17	15	17	16	18	09	28	14	28	14	14	10	12	16	13	17
	Final	Feet	R22	R30	R20	R76	U	R37	R34	R21	R13	R21	R26	R24	R11	R17	R18	R19	U	R19	26
/k/	Initial	Keen	70	67	72	56	66	55	70	66	57	65	30	66	51	49	32	61	73	57	55
	Intervocalic	Zookeeper	48	55	38	43	37	39	49	34	44	49	56	40	41	42	35	51	25	42	43
	Initial	Cool	31	67	58	26	30	55	38	43	53	60	25	66	51	61	22	44	44	77	47
	Intervocalic	Raccoon	33	61	38	22	65	30	41	47	44	51	37	52	31	40	39	37	35	44	42
	Initial	Card	26	66	44	28	28	30	41	40	43	53	19	50	53	39	23	50	45	34	40
	Intervocalic	Becalm	23	52	48	34	34	40	40	25	28	50	57	51	38	21	29	36	29	32	35
	Final	Week	R36	R32	R24	R64	R60	R83	R37	R44	R20	R38	R37	R34	R22	R35	R41	R43	R42	R32	40