



THE PRONUNCIATION OF ENGLISH MONOPHTHONGS BY IRAQI EFL LEARNERS

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ABSTRACT

The study examines L1 transfer and proficiency level effects on the production of English monophthongs by Iraqi EFL learners. It reports on the production test performed by four groups of Iraqi learners who speak Baghdadi Arabic as their native language and differ in their level of proficiency in English as measured by a placement test. Descriptive and statistical analyses of data collected from the production test revealed that Iraqi learners face considerable varying degrees of difficulty in the production of most English monophthongs. They all follow certain prominent erroneous trends regardless of their proficiency level. The proficiency level effect is found in the perception of the low proficient (elementary) group compared to the other three high proficient groups. This effect is also noticed in the comparison between lower intermediate and advanced groups' performance, yet this effect is no longer noticed when comparing between the upper intermediate and the advanced groups. Some of the results of this study are accounted for within SLM, yet the model fails to account for some others. The study concluded that the pronunciation abilities of EFL learners can be improved with more experience and exposure to the L2. Some confusing pairs of vowels indicated by the bi-directional production relations found in this study should be taken account of by teachers and learners of English as well. These relations indicate that learners' errors are not random, but rather systematic.

Key words: speech production, pronunciation problems, English monophthongs, L1 transfer, L2 experience, intelligibility

1. INTRODUCTION

One of the main aims of many second language (L2) learners is to be fluent speakers or at least to speak the L2 intelligibly. Gilakjani (2011) affirms that pronunciation is by far the most significant languages skill. It is by good pronunciation a speaker is intelligible in spite of other types of errors. Similarly, it is by poor pronunciation communication failure happens. Munro (2010) stresses that lack of intelligibility often results in communication breakdown. In language pedagogy, Munro elaborates, intelligibility is not a new concept; nor is researcher's interest in it a passing fad. It is rather empirically the concept that will provide a basis for an inclusive domain of pedagogically-oriented investigations in the future. Since the main purpose of a language is communication, intelligible pronunciation is required. Several researchers such as Ellis (2003); McMahon (2002); Meyer (2010); and Saville-Troike (2010) emphasize that correct

pronunciation starts naturally with the language; however, like other language skills a learner needs to learn how to pronounce L2 sounds correctly.

Although investigations of L2 accents have always been present in the field of second language acquisition, the study of pronunciation has been marginalized in the field of applied linguistics (Derwing & Munro, 2005). Huq(1990), cited in Imam, Ropum & Arif (2015), assumes that researchers generally have less concern in pronunciation. Moreover, teachers of L2 and the texts they teach typically evaluate the reading and writing skills and neglect listening and speaking skills practice. Underhill (2010) states that tremendous changes have taken place in the last few decades concerning methods of teaching grammar, vocabulary and meaning. Nevertheless, pronunciation is still placed in a basically behaviorist model of listen, identify and repeat. This area still needs to be investigated with regard to L2 pronunciation by learners from different linguistic backgrounds.

Learners of L2 are usually classified into three main groups. The first group comprises L2 learners who have the chance to acquire the language in a natural setting over a considerable time such as immigrants, while the second group comprises foreign learners who have no experience with L2. The third group includes foreign learners who are exposed to L2 in an institutional setting where local teachers are their only models. The majority of L2 learners in general and English in particular fall under the third group. Millions of foreign learners of English, including the informants of this study, are taught in their home country by non-native teachers where the L1 dominates the environment and the L2 is available mostly inside the classroom. According to Albark (2012), the third group is the least researched in terms of speech perception and production. Accordingly, the present study targets a group of Iraqi EFL learners who belong to this group.

Khan and Qader (2012) report that English is absolutely the most prevailing medium of language communication around the world today since it is spoken by more than one billion people as an L1 or an L2. At is the case in many countries, learning English as a foreign language was incorporated in the education system in Iraq many years ago. So far, Iraqi learners' proficiency in English after eight to fifteen years of formal education is not up to the desirable level, especially with regard to L2 pronunciation. The difficulty is clearly observed in the persistent accented pronunciation these learners show. It is commonly believed that there are some L2 sounds that require higher priority than others with regard to segmental teaching and learning. Munro (2010) claims that statistically high functional load sounds such as vowels, Brown (1988), must have priority due to their maximum communicative impact. Thus, one of the aims of this study is to identify the vowels that are more problematic and require more of teachers', learners' and textbook designers' attention. The need for empirical works that aim at identifying phonetic properties of L2 speech that reduce intelligibility and comprehensibility has been stressed by Munro (2010), who assumes that such works will lead to improvement that really makes a difference for communication.

It is fairly sensible to claim that the nature of a foreign accent is determined to a great extent by a learner's L1 (Avery & Ehrlich, 1992). Consequently, the pronunciation errors made by L2 learners are regarded as reflections of the sound inventory, rules of sounds clustering, the syllable and stress and intonation patterns of learners' L1. These errors are not to be considered as random attempts to produce new sounds (Swan & Smith, 2001). Identifying L1 interference in L2 acquisition has been often based on conducting a contrastive analysis of the languages involved. Such an analysis can predict transfer errors and also explain potential of learners' errors that teachers face in their regular practices (Celce-Murcia & Hawkins, 1985). Swan and Smith (2001) believe that the comparison between English and the relevant features of the learner's native languages can assist teachers to predict and understand the problems their students

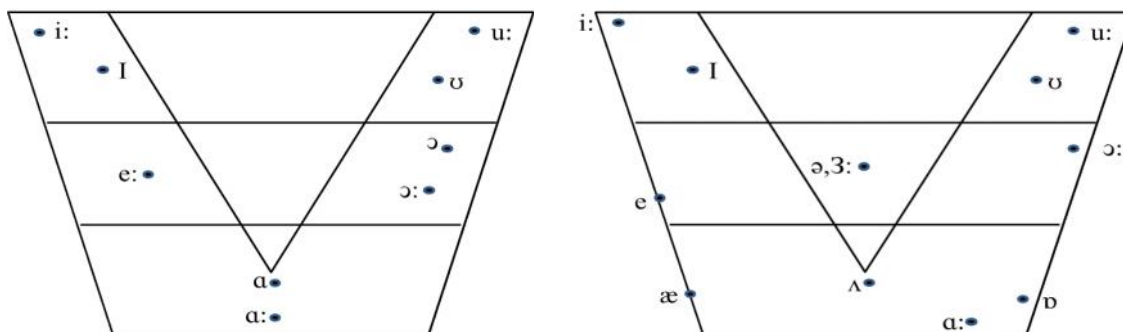
have. Rauber, Escudero, Bion and Baptista (2005) state that within the Speech Learning Model (SLM, henceforth) L1 and L2 speech sounds do occur within the same phonological space, thus learner's ability to categorize L2 sounds will be affected by L1 phonetic categories and L2 speech sounds will be filtered by L1 speech sounds. One of the aims of the present study is to identify L1, Iraqi Arabic (IA), interference in the pronunciation of English monophthongs by Iraqi EFL learners.

L1 interference is not the only predictor of learners' problems in L2 acquisition, other factors such as experience in L2 are also influential (Baker & Trofimovich, 2006; Cebrian, 2006; Fabra & Romero, 2012). Most models of speech learning such the Motor Theory, (MT), the Perception Assimilation Model (PAM), and the Speech Learning Model (SLM) assume that learners' perception and production abilities improve with more exposure to the L2; yet, this assumption has not been tested before in terms of Iraqi EFL learners. Consequently, the present study will also investigate the role of learners' proficiency level on their production abilities.

2. IA and RPE Vowel Systems

The complicated sound system of English that shows various vowels and consonants is difficult to master by most ESL learners, especially those whose languages display different sound systems. The English vowel system, mainly, American and British, has been widely investigated (Chomsky & Halle, 1968; Hillenbrand, Getty, Clark & Wheeler, 1995; Labov, Ash, Baranowski, Nagy, Ravindranath & Weldon, 2006; Watt, 2002) and is described as a large system containing simple vowels as well as diphthongs. In comparison, Arabic is much less studied (Al-Ani, 1970; Alghamdi, 1998; Alotaibi & Hussain, 2010). Saadah (2011) remarked that English and Arabic are languages with phonological contrasts based on vowel quality and quantity, respectively. English is a 12-vowel system that contrasts tense long vowels and lax short vowels, whereas Modern Standard Arabic (MSA) is a 6 vowel system that contrasts short and long vowels. English and Arabic are not only differentiated in terms of the size of their vowel systems but also in the phonetic qualities of the vowels. These differences along with major distinctions in vowel quality and quantity allow us to describe English and Arabic as languages that have notably distinct vowel systems. Moreover, as stated by Kopczynski and Meliani (1993), Arabic has length only as a discriminating principle among vowels. Other principles such as roundness, tenseness, etc., are irrelevant, while in English all these criteria should be taken account of in perceiving and producing vowels. This indicates that Arab learners of English might take length only into consideration and neglect other factors.

IA has a more complex vowel system compared to MSA. It shows five long and four short simple vowels. The differences in the vowel systems of IA and RPE are illustrated in **Figure 1**.



IA vowel chart adapted from Al-Bazi (2006) RP vowel chart adapted from Roach (2004)**Figure 1 IA and RP vowel charts**

Based on **Figure 1** above, the following three types of contrasts can be identified:

- (1) The vowel sounds which are existent in the L1 and the L2 (/i:/, /I/, /u:/, / /)
- (2) L1 vowel sounds have similar counterparts in the L2 (/o:/, / /, /æ/, /a:/, /e:/)
- (3) The vowel sounds are existent in the L2 but not in the L1 (/ /, /ʌ/, / /)

According to the Speech Learning Model (SLM) proposed by Flege (1995), the acquisition of L2 sounds may take three possible courses; entirely different sounds are thought to be easy to acquire assuming a positive transfer, identical sounds are thought to be the easiest to acquire assuming a highly positive transfer, and similar sounds are thought to be the most difficult to acquire assuming a highly negative transfer. Hence, Iraqi EFL learners are supposed to acquire the vowels in (1) and (3) above with ease, whereas the vowels in (2) are predicted to be the most difficult. Learners are supposed to encounter less difficulty with the pronunciation of long English vowels as they have the short long distinction in their L1; yet, they might encounter much difficulty with the pronunciation of vowels that are spectrally different from the ones existent in their native vowel system. These predictions will be tested in this study, and the discussion presented here will be based on the three contrasts stated above to describe L1 interference.

3. Previous Studies of Arab Learners' Production of English Sounds

Difficulties Arab ESL/EFL learners encounter in the production of English sounds are well stated in the literature of second language research (Flege & Port, 1981; Joseph & Odisho, 2005; Smith, 2001). Obviously, L1 negative transfer has been reported to be the main predictor and the main cause behind these difficulties. The Contrastive Analysis Hypothesis (CAH) by Lado (1957), for example, refers to learners' tendency to transfer the forms and meanings of their L1 and culture to the L2 language and culture. Nevertheless, errors in learning L2 sounds cannot be exclusively accounted for by L1 transfer. The issue is much more complicated than it has been postulated in the CAH. The consistency and constancy of L1 transfer in L2 speech learning have been also acknowledged by other models such as PAM and SLM. However, these models have also investigated the effects of various other variables on L2 speech learning. Of them are, Age of Arrival (AOA), Age of Learning (AOL), L1/L2 dominance, and motivation. Few researches have examined difficulties Arab ESL/EFL of English face in the pronunciation of English segments, specifically simple vowels. These studies have set different aims and follow different procedures. More often, these studies address both perception and production such as Nikolova (2010) Almbark (2012), while some others have addressed production only such as Hassan (2014), Ali (2013), Hubais and Pillai (2010) and Munro (1993).

Nikolova (2010) investigated L1 transfer in the production of American vowels by Saudi learners of English. The study reported substantial difficulties especially in the pronunciation of similar sounds as well as new ones which are non-existent in Arabic but frequent in English. Descriptive and statistical analyses were adopted to analyze the result of a production test. The study did not support a positive effect of experience on the production of English vowels. Both groups of beginners and advanced learners committed most errors in the production of /r/. The problem in this study is that it used two different wordlists in the perception and production test, which might well decrease the effect of learning from one test into another, but definitely affect the validity of the perception-production correlation results.

Almbarak (2012) examined the perception and production of Standard Southern British English (SSBE) vowels by Syrian Arabic (SA) EFL learners. The study claims that it is true that FL learners do not have enough exposure to the L2; yet, they can access the phonology, syntax, and structures of the L2 by means of formal teaching. The results of a production test supported the hypothesis that the productions of L2 English vowels shared some acoustic properties with their L1 categories and with the target native English categories. Moreover, most production errors committed were perceptually motivated assuming a direct perception-production relationship.

Three studies were conducted to examine problems encountered by Sudanese learners of English in the production of English vowels. Two of these studies, namely Mohammed (2014) and Hassan (2014), were concerned with vowels production in addition to several other aspects. Whereas Ali's (2013) was mainly interested in identifying causes of errors in the production of English vowels. Mohammed's (2014) was rather speculative in nature while Hassan's (2014) and Ali's (2013) were based on experimental work. Mohammed (2014) targeted secondary school Sudanese learners; Hassan (2014) targeted University Sudanese teachers and learners of English, while Ali (2013) focused on Sudanese university learners only.

Mohammed (2014) aimed to identify the differences between the sound system of Arabic and English that cause difficulties for Sudanese learners of English. The study compared the vowel systems of Arabic and English, and formulated some predictions which were basically motivated by orthography. The study concluded that Sudanese encounter difficulty when pronouncing English letters that are recognized differently in pronunciation in various contexts. The vowels which are not found in Arabic are the most difficult for the Sudanese learners to produce. It is not clear how did Mohammed (2014) collect or analyze the data. No specific model or theory was used in the interpretation of the results.

Hassan (2014) investigated problems in English pronunciation faced by Sudanese learners of English. The subjects for the study were fifty students from University of Sudan of Science and Technology (SUST), and thirty university teachers of English language from the same university. Observation, recordings and a structured questionnaire were three instruments utilized to collect data for this study. Data were analyzed both statistically and descriptively to reveal that Sudanese students of English had problems with the pronunciation of English vowels that have more than one way of pronunciation. The findings of this study showed that L1 interference

represented in dissimilarities in the sound systems of the two languages, and inconsistency of English sounds and spelling stand against Sudanese's attainment of accurate pronunciation of English. The study also concluded that errors in pronunciation are systematic rather than random. A conclusion also stressed by Moosa (1979) and Homeidan (1984).

Ali (2013) aimed to offer empirical proof on some linguistic reasons behind production errors of English as spoken by Sudanese learners. The study informants were anticipated to encounter difficulties with the pronunciation of English vowels in both isolated words and connected real speech. Participants were ten Sudanese university learners of English who mainly speak Arabic. Based on acoustic analysis of the English vowels produced by both Sudanese and RPE native speakers, the acoustic differences that might offer insights into the issue under concern were identified. The results showed that most of the differences were associated with the area of central and back vowels of English. Yet, some of English tense-lax vowels posed no serious problems possibly due to the correspondence between English and Arabic long/short vowel distinction. Besides, the production errors detected in this study followed different directions that referred to the various difficulties Sudanese learners of English encounter in learning the English vowels. The major linguistic reasons of these production errors, according to Ali (2013), were related to L1 interference and the insufficient knowledge Sudanese learners have of L2.

Al-Dilaimy (2012) and Hubais and Pillia (2010) both targeted Omani learners of English aiming to identify the problems these learners encounter in the production of English. The former is rather general and speculative while the second is experimental and more focusing on vowels production. Hubais and Pillia (2010) investigated the pronunciation of English simple vowels by ten male Omani speakers. Vowel quality was measured based on F1 and F2. Vowel duration was also measured to identify and scrutinize length contrasts between typical vowel pairs. The findings indicated that the vowels produced by the Omani speakers occupied a similar vowel space as British English vowels; however, individual vowels have dissimilar qualities. Vowel pairs with quality contrast were less distinctive compared to pairs with length contrast. The study results provided support to the concept of Arabic-accented English as vowels produced by the Omani speakers were similar to those produced by Arabic speakers from different regions. This concept was emphasized by Flege and Port (1981), Mitleb (1981) and Munro (1993) who all suggested that speakers from Arab regions show similar features in their production of English sounds such as the lack of vowel length contrast and the tendency to produce diphthongs as monophthongs.

A scientific examination of problems Iraqi EFL learners of English encounter in the pronunciation of English simple vowels has not been investigated before; therefore, the present work endeavors to fill in this gap. The results of the production test conducted in this study will be basically processed to identify L1 interference and any possible positive effects of experience in L2 in the production of English simple vowels. The postulation that EFL learners encounter different levels of difficulty in acquiring L2 phonology depending on their experience in the L2 will be tested. This postulation is tested with regard to the number and nature of errors made by learners from four proficiency groups.

4. Method

A production test was conducted in this work to achieve the objectives set and answer the questions raised in this study. The test is described below explaining the sampling method, the stimuli used and methods of data collection and data analysis adopted.

4.1 Participants

The participants in this study were eighty-five Iraqi EFL learners of English who are currently under/postgraduate students in several Malaysian universities. A purposive sampling technique was employed in the selection of learners who fit with the purposes of the study. A demographic questionnaire was used to eliminate informants who are not native speakers of IA, learners who spent a substantial period of time in an English speaking country and learners who speak other languages in addition to IA and RPE. This demographic questionnaire was adapted from Lai (2008) and Nikolova (2010). Later, participants were reclassified into groups in accordance to their scores in the Oxford online placement test (OPT). Participants examined fell in four groups: elementary (A2), lower intermediate (B1), upper intermediate (B2) and advanced (C1).

Participants' age ranges from 22-42 years with a mean of 32 years. All participants had a non-naturalistic exposure to the L2 which is basically available in English language classes. Moreover, all participants should speak the same dialect (IA) and Iraqi EFL learners who do not speak this particular dialect were excluded to attain realistic results. Learners who had been extensively exposed to languages rather than English were also eliminated to evade any possible interference of these languages. The rationale behind eliminating learners who speak a different Arabic dialect was that different Arabic dialects may have vowel systems that are different from that of IA. Only Iraqi Baghdadi speakers were allowed to participate in this study to avoid any possible dialectal diversity that might influence the reliability of the results.

4.2 Material

A list of 48 real English words was used in the production test. These words provide each of the 12 English simple vowels four times in the test. The list consists of 40 mono-syllabic words that present 11 vowels, while 4 disyllabic words provide the schwa which occurs in monosyllabic words only in continuous speech when function words have their strong vowels weakened into a schwa. Including mono-syllabic words in the stimuli was meant to evade having more than one vowel in a word which can be confusing to participants. The words selected for the test were familiar with consonants that are existent in IA. This excluded the effect of having queer words that are difficult to produce and the consonants that are not realized by L1 speakers. Words of initial clusters were also avoided, while words of two consonant final clusters were included as they are possible in Arabic. The list of words used in the test was adapted from Nikolova (2010) and Almbark (2012). The pronunciation considered for these words was the RPE one as it is the accent of interest here in this study. It is the accent targeted by Iraqi EFL learners at several departments of English in most universities in Iraq.

4.3 Procedure

The production experiment was a task that measured students' production of the monophthongs of English. Psychopy software (Peirce, 2007) was used to design the experiment. The test was conducted in various places such as UPM, UKM and UNITEN libraries. Informants were instructed on how to start the experiment in their computers via guidelines as well as three trials given before the actual task started. Participants were supposed to listen to the words using headphone sets and pressed the letter that represents the word that they thought carried the vowel they heard. Four distracting options were displayed on the screen as soon as the word was produced by the native speaker. Two seconds after the pressing, the next word was pronounced and the new four options were displayed. Participants were given the time they needed to press their choices, as the next item would not be given unless the pressing was done. Repetition of the test was not permissible, yet no one of the participants asked for that. The test flew until the end with "Thank You" message shown on the computer screen.

5. Results

5.1 Difficulty Rank Order

Various production errors were made by subjects of the four groups. These errors are described stating the most and the least problematic vowels for learners to produce. The rank order, error counts and error percentages of each group are tabulated in **Table 1**.

Table 1 Rank order, error counts and error percentages of the production test for the four groups

Vowel	A2 (25R,100T)		B1(25R,100T)		B2(24R,96)		C1(11R,44T)	
	Rank Order	Error Percentage	Rank Order	Error Percentage	Rank Order	Error Percentage	Rank Order	Error Percentage
/ /	1	62%	1	45%	1	47.82%	1	43.18%
/ʌ/	2	58%	3	37%	2	27.08%	5	15.90%
/æ/	3	52%	2	40%	3	26.04%	2	38.63%
/ /	4	46%	8	15%	9	10.41%	9	6.81%
/e:/	5	41%	5	30%	5	23.95%	7	9.09%
/o:/	6	39%	4	34%	4	26.04%	3	34.09%
/ɪ/	7	34%	6	21%	6	18.75%	10	6.81%
/ /	8	28%	7	21%	7	15.62%	4	18.18%
/i:/	9	27%	10	10%	12	6.25%	12	0%
/a:/	10	23%	11	5%	10	8.33%	6	11.36%
/u:/	11	21%	9	13%	8	11.45%	8	9.09%
/ /	12	9%	12	4%	11	8.33%	11	4.54%

Learners in the four groups encountered the greatest degree of difficulty in the pronunciation of / /. Apart from the vowel / /, A2, B1 and B2 groups showed marginally varying difficulty rank ordering for the vowels /ʌ/ and /æ/ which were ranked in 2nd and 3rd for A2, 3rd and 2nd for B1, 2nd and 3rd for B2. The rank order was somehow different for the C1 group where /æ/ and /o:/ occupied the 2nd and 3rd ranks respectively. The vowel /o:/ however, was ranked 6th, 4th and 4th in A2, B1 and B2 groups respectively. Even though, this vowel was ranked 6th by the A2 group, it was considerably difficult for participants to produce with 39% error percentage. Then again, patterns of errors shown by the four groups were really similar with regard to the easiest vowels to produce. The three vowels / /, /a:/ and /i:/ were every time ranked at the bottom of the difficulty rank order list.

Overall description of learners' rank order, error counts and error percentages is provided in **Table 2**. In this collapsed table, the rank order is also given starting with the most difficult vowel to produce.

Table2: Overall Rank Order, Error Counts & Error Percentages of the Production Test

Rank	Vowel	Error Counts	Error Percentage
1	/ /	172	16.68%
2	/æ/	134	12.99%
3	/ʌ/	128	12.41%
4	/o:/	116	11.25%
5	/e:/	98	9.50%
6	/ɪ/	76	7.37%
7	/ /	74	7.17%
8	/ /	72	6.98%
9	/u:/	49	4.75%
11	/i:/	43	4.17%
10	/a:/	41	3.97%
12	/ /	28	2.71%
Total		1031	

It shows that the most difficult vowel to produce was the / / followed by /æ/, /ʌ/ and /o:/which were also considerably difficult to produce. Two vowels, namely /e:/ and /ɪ/, were of medium difficulty to produce. The vowels / / and / / were easier compared to the aforementioned vowels, yet the vowels /u:/, /a:/, /i:/ and / / were found to be much easier for learners to produce.

5.2 Types of Errors by Confusion Matrix

The confusion matrix provided in this section is meant to present an overall picture of the nature of errors made by participants of the four groups. Overall numbers of errors made together with the distribution of the errors in terms of the vowels produced instead of the targeted ones are all indicated in this matrix. The number of mispronunciation instances between targeted and produced vowels will identify the production trends which are later compared among the four groups to pin point any possible effect of proficiency level on these trends. **Table 3** presents a collapsed confusion matrix that accounts for the overall errors made by participants of A2, B1, B2 and C1 groups indicating the overall number of participants and the overall number of trials. The correct production of vowels is highlighted in bold while the most frequent mispronunciation of each vowel is made in red.

Table 3 Confusion Matrix for the four Groups' Production of English Vowels (No. respondents 85, No. trials for each vowel 340)

T \ P	/ɪ/	/æ/	/ʌ/	/ /	/ /	/a:/	/ /	/i:/	/e:/	/o:/	/u:/	/ /
/ɪ/	264	3	1	1	1		60	18	1		1	
/æ/	4	206	7		7	6				1		20
/ʌ/	3	110	212	12	69	9	1		3	3		
/ /			28	268	79				1	2	19	
/ /		4	76	23	168	2			6	15	3	
/a:/		6	3		1	299		1	24	25		
/ /	48	3	4	6			266	19	6		1	1
/i:/	10					1	10	297	18		1	
/e:/		1		1	2	23	2		242	7		
/o:/			2	8	8				33	224	10	
/u:/		1	5	20	2				2	4	291	
/ /		1		1					1			314
/ei/		5			2			4				1
/au/										56		
/ u/			2		1					1	3	
/ai/	11							1	3			
/oi/											11	

It is worth noting that there were four instances of / / deletion and two instances of /o:/ deletion in the production test. It is clear that no one of the vowels have been 100% correctly produced, yet vowels such as / /, /a:/, /i:/ and /u:/ were produced with a considerable degree of success with 8.23%, 12.05%, 12.64% and 14.41% error percentages respectively. The vowel / /, on the other hand was the most difficult with 50.58% error percentage. Vowels that came second, third and fourth in terms of difficulty were the /æ/, /ʌ/ and /o:/ with 39.41%, 37.64% and 34.11% error percentages respectively. On the other hand, the vowels /e:/, /ɪ/, / / and / / were produced with medium degree of difficulty with 28.82%, 22.35%, 21.76% and 21.17% error percentages respectively. Based on the confusion matrix above, the pronunciation trends shown by learners in the production test are summarized in

The Vowel	Mostly produced as			
	A2	B1	B2	C1
/ɪ/	/ /	/ /	/ /	/ /
/æ/	/ʌ/	/ʌ/	/ʌ/	/ʌ/
/ʌ/	/ /	/ /	/ /	/ /
/ /	/u:/	/ /	/ʌ/, / /	/ /
/ /	/ /	/ʌ/	/ʌ/, / /	/ʌ/
/a:/	/e:/	/e:/	/æ/	/ʌ/
/ /	/ɪ/	/ɪ/	/ɪ/	/ɪ/
/i:/	/ɪ/	/ /	/ /	0
/e:/	/o:/	/a:/, /i:/	/i:/	/i:/
/o:/	/au/	/au/	/au/	/a:/
/u:/	/ /	/o:/	/ /	/ /
/ /	/æ/	/æ/	/æ/	/æ/

Table 4 Production trends of English vowels by the four groups

The four groups of learners have shown very similar pronunciation trends. The five vowels /ɪ/, /æ/, /ʌ/, / / and / / were similarly mispronounced by participants of the four groups as / /, /ʌ/, / /, /ɪ/ and /æ/ respectively. Four other vowels were also similarly produced by three of the four groups. The vowels /o:/, /a:/, / / and / / were most frequently produced as /au/, / /, / / and /ʌ/ respectively, yet /o:/ was produced as /a:/ by the C1 group and /u:/ as /o:/ by the B1 group, / / as /u:/ by the A2 group and / / as / / by the A2 group. The production of the other three vowels showed a considerable variation among the four groups, as they were produced differently by participants of the four groups. There were few differences in the pronunciation confusion patterns shown by learners of the four groups. These differences were basically noticed between the elementary group A2 and the other groups. The vowel /i:/, for example, was mostly confused with the vowel /ɪ/ which is its immediate neighbor in the L2 vowel space. Learners tended to modify their behavior to misproduce this vowel as / / which is spectrally and temporally different from the intended vowel /i:/. The same is applicable to the production of the vowel / / which was misproduced by A2 group as its immediate neighbor /u:/. Learners with more L2 exposure misproduced this vowel as / /. Learners also showed two similar bi-directional misproduction relations, as they have mutual confusion between the vowels in the pairs /ɪ/-/ / and / /-/ʌ/.

5.3 L1 Effect on Vowel Production

This section is concerned with identifying the level of difficulty encountered in the production of vowels of the three contrasts stated earlier to show whether the production of these vowels is accounted for via the proposed models or not.

1. Vowels Found in both L1 and L2 (/i:/, /ɪ/, /u:/, / /)

The vowels of this contrast are expected to be easily produced as they are found in the phonological space of L1 and L2. Besides, they are found in almost very similar positions presuming similar phonetic features. Based on SLM, a positive L1 transfer is supposed to occur in the production of these vowels making them easy for Iraqi EFL learners to produce. The results showed that the vowels /i:/, / / and /u:/ were easily produced by participants as they were ranked 10th, 8th and 9th respectively in terms of difficulty encountered. However, the vowel /ɪ/

was produced with medium difficulty as it was ranked 6th. **Table 5** shows the numbers and percentages of errors made in the production of vowels of this contrast:

Table 5 First contrast vowels' number & error percentages-production

No.	Vowel	No. of errors (340 trials)	Error percentage	Rank order
1	/i:/	43	12.64%	10
2	/I/	76	22.35%	6
3	/u:/	49	14.41%	9
4	/ /	72	21.17%	8

2. Vowels Similar in L1 and L2 Phonemic Systems (/o:/, / /, /æ/, /a:/, /e:/)

The vowels of this contrast are phonologically found in the two languages, yet they differ phonetically, as they share some features and lack some others. These vowels are supposed to be the most difficult vowels to produce. Results showed that the production of the vowels / / and /æ/ was very difficult with 1st and 2nd ranks respectively. The production of the vowels /o:/ and /e:/ was found difficult with 4th and 5th ranks respectively. The vowel /a:/, on the other hand, was found to be very easy to produce with 11th rank order. **Table 6** shows the numbers and percentages of errors made in the production of this contrast's vowels.

Table 6 Second contrast vowels' number and error percentages-production

No.	Vowel	No. of errors (340 trials)	Error percentage	Rank order
1	/o:/	116	34.11%	4
2	/ /	172	50.58%	1
3	/æ/	134	39.41%	2
4	/a:/,	41	12.05%	11
5	/e:/	98	28.82%	5

3. Vowels Found in L2 but Absent in L1 (/ /, /ʌ/, / /)

The third contrast found between IA and RPE includes vowels that are found in the L2 but not found in the L1. Based on SLM, these vowels are predicted to be the easiest vowels to produce as they are considered new for Iraqi EFL learners. Results extracted from the production test showed that these three vowels have been differently produced in terms of difficulty encountered. The vowel /ʌ/ was found difficult to produce with 37.64% error percentage. The other two vowels in this contrast, / / and / /, were easy and very easy to produce with 7th and 12th rank orders respectively. **Table 7** below illustrates the numbers and percentages of errors made in the perception of these vowels.

Table 7 Third contrast vowels number and error percentages-production

No.	Vowel	No. of errors (340 trials)	Error percentage	Rank order
1	/ /	74	21.76%	7
2	/ʌ/	128	37.64%	3
3	/ /	28	8.23%	12

5.4 Proficiency Level Effects

To identify any significant differences in Iraqi EFL learners' overall mean scores in the production test, the null hypothesis that there is no significant difference in the mean scores of A2, B1, B2 and C1 groups in the English vowel production test on the basis of their level of general proficiency in English was formulated. To validate the hypothesis above, One-Way analysis of variance [ANOVA] was conducted. The mean scores of the subjects of the four groups was the dependent variable in this analysis, while the level of proficiency was the independent variable. Before using ANOVA for analysis, relevant tests were conducted to ensure that assumptions required were satisfied.

There was a statically significant difference in the production scores for the four levels of proficiency, $F(3, 81) = 17.59, P = 0.00, \eta^2 = .395$. Therefore, the null hypothesis was rejected. The magnitude of the difference in the means and the effect size was strong. The power of the analysis is 1.00, with group factor accounting for 39.5% of the variance of the dependent variable. Consider **Table 8** below:

Table 8 One-Way ANOVA of Variance for Production Scores by Group

One-Way ANOVA									
Descriptives									
Dependent variable (Score)					Independent Variable (Group)				
Group	N	Sum	Mean	Median	Std. Deviation	F	d.f.	P	Eta
A2	25	753.00	30.1200	31.0000	4.99433	17.59	84	.000	.395
B1	25	924.00	36.9600	39.0000	5.72626				
B2	24	947.00	39.4583	41.0000	4.78202				
C1	11	435.00	39.5455	40.0000	3.20511				
Total	85								

Follow up tests were conducted to evaluate pairwise differences among the means. The Tukey HSD post hoc test, that was selected here because equal variances were tenable, revealed significant differences between A2 group and the three other groups B1, B2 and C1, with $p < .05$. These differences were in favor of the higher proficient groups over the elementary group. However, differences among the other three groups were insignificant. **Table 9** below shows the detailed results of multiple comparisons with the Tukey HSD post hoc test.

Table 9 Multiple comparisons, Tukey post hoc test

Comparison		MD	Std. Error	P value
A2	B1	-6.840-*	1.410	.000*
A2	B2	-9.338-*	1.425	.000*
A2	C1	-9.425-*	1.804	.000*
B1	B2	-2.498-	1.425	.303
B1	C1	-2.585-	1.804	.483
B2	C1	-.087-	1.816	1.000

Statically significant differences in the mean scores of each of the twelve simple English vowels were also identified. Twelve One-Way ANOVA tests were conducted here to find out any significant differences in the performance of EFL Iraqi learners in the production of the twelve English monophthongs on the basis of proficiency level. Since equal variances assumption was

met in all these tests, Tukey HSD post hoc test was utilized whenever there was a significant difference among groups.

The series of the twelve One-Way ANOVA tests revealed several relations among the four groups. No significant differences based on group factor were identified in the production of /o:/, /u:/, / /, / / and / / with > 0.05 *P*values. However, statistically significant differences were detected between A2 group in one hand and the other groups on the other hand in the mean scores of the vowels /ʌ/, / / and /i:/, where the significance was in favor of the three groups over the A2 group. Statically significant differences were found between A2 and C1 groups, only, in the mean scores of the production of /I/ and /e:/ with < 0.05 *P*values. This difference was in favor of the C1 group over the A2 group. Statically significant differences were identified between A2 group and B2, only, in the mean scores of the production of the vowel /æ/, whereas the mean scores of the production of the vowel /a:/ indicated to statistically significant difference between A2 group in one hand and B1 and B2 groups on the other hand. The production of the vowels /a:/, / / and /æ/ showed that the performance of groups B1 and B2 was better than that of C1 which is the most advanced group in terms of proficiency level.

6. Discussion and Analysis

6.1 L1 Interference on Vowel Production Results

This section analyzes the errors made by learners in this study based on the non-native contrasts and the predictions stated earlier to identify the extent to which L1 interferes in the production of L2 vowels. Flege (2003) postulates that bilinguals cannot fully separate their L1 and L2 phonetic subsystems; hence problems are expected to take place even at higher levels of L2 acquisition. Learners experienced considerable problems in the production of / /, /ʌ/, and /æ/. These problems persisted in spite of the proficiency level increase. Similarly, vowels such as /I/, /i:/, / /, /u:/, /a:/ and / / were equally easier to produce by learners. Other vowels were of medium difficulty ranging from rank 4 to 6 in difficulty rank order. The various levels of difficulty identified in the production test are discussed on the basis of the three types of contrasts stated earlier in this study.

1. Vowels found in L1 and L2

This type of contrast includes the four vowels /I/, /i:/, / / and /u:/, which are phonologically found in the vowel inventory of the two languages. Their phonetic features are very similar as they occupy very similar positions in the vowel space of the two languages; hence, their production was predicted to be easy. Error counts, error percentages and rank order provided earlier validated the prediction postulated above, as these vowels were easy to pronounce with the ranking 10th, 8th, 9th for the vowels /i:/, / /, and /u:/ respectively. The vowel /I/, however, was ranked 6th indicating a medium level of difficulty.

Two vowels of this type of contrast, namely /i:/ and /u:/, were very similarly perceived and produced occupying almost similar positions in the rank order. The ranking of the vowel / / was somehow different with 8th rank and 5th rank for production and perception respectively. Due to the fact that the informants of this study are EFL learners who lack natural exposure to the L2,

their perception may lag behind their production, especially when considering vowels that are found in the L1 and learners have enough experience with producing them. Thus, the production of such vowels can be better than their perception.

2. Vowels similar in L1 and L2

Vowels in this contrast are phonetically similar in the languages investigated in this study, and based on SLM postulations they are supposed to pose the greatest degree of difficulty to learners. This postulation was applicable to the vowels / /, /æ/, /o:/, and /e:/ as they were found to be difficult to produce with 1st, 2nd, 4th and 5th rank orders respectively. The vowel /a:/, on the other hand, was one of the easiest vowels to produce with 11th rank order. This vowel was equally easy to perceive by learners in this study and this could be the reason that makes it easy to produce as well. Perceptual explanation is again reasonable in this case. Moreover, this vowel is a long vowel usually discriminated and then produced easily by Arab learners in general and Iraqi learners in particular who always make use of durational cues in their perception and production of vowels (Alzahrani, 2014; Munro, 1993). Bohn (1995: 294) argues that "whenever spectral differences are insufficient to differentiate vowel contrasts because previous linguistic experience did not sensitize listeners to these spectral differences, duration differences will be used to differentiate the non-native vowel contrast". This indicates that non-native temporal differences are more salient cues for vowel contrasts than non-native spectral differences, regardless of L1 phonological status of temporal and spectral cues.

3. Found in L2 but not found in L1 (/ /, /ʌ/, / /)

Based on SLM's assumption, the vowels / /, /ʌ/, / /, which are found in L2 but non-existent in L1 are supposed to be easily acquired. They should be easily produced as their acoustic features are unlike any of the L1 vowels'. Accordingly, they are discriminated and realized with comparative ease. Results showed that / /, and / / were easily produced with 7th and 12th rank order respectively. Nonetheless, the vowel /ʌ/ was difficult to produce with 3rd rank order. The difficulty encountered in the production of this vowel can be accounted for in terms of L1 interference and in terms of perception as well. With regard to L1 effect, it is true that this vowel is not found in the vowel system of the L1, but its position in the L2 is very close to two adjacent vowels in L1 which are /æ/ and /a:/. This makes the discrimination of this vowel difficult. Rochet (1995) concluded that some errors in the pronunciation of L2 sounds occur because an L2 sound has been assigned to an L1 category. The vowel /ʌ/ may have been assigned to /æ/ and thus produced incorrectly. Confusing the vowel /ʌ/ with /æ/ was supported by very frequent perceptual and production trends in which the vowel /ʌ/ was misperceived as /æ/, and the vowel /æ/ was mispronounced as /ʌ/. This vowel was equally difficult to perceive and produce occupying 2nd and 3rd rank order in the perception and production tests respectively. Again, this vowel was supposed to be easy to produce, based on contrasts outlined in this study, yet it was found to be the contrary. The perceptual trends shown by learners account for the results and support the assumption that what is easily perceived should be easily produced. On the other hand, the two other vowels in this type of contrast were equally easy to perceive and produce assuming a close link between perception performance and production performance. The vowels / / and / / were ranked 7th and 12th respectively in both tests.

To sum up, most of the difficulties identified in the results of the production test can be explained through SLM which assumes that sounds found in the two languages are supposed to be easy to produce, similar sounds usually pose the utmost degree of difficulty, and non-existent sounds in the L1 are also easy to produce. Some of the confusions identified in the production test can be predicted within SLM which assumes the coexistence of L1 and L2 sounds within one phonological space where L1 sounds are used as filters of L2 sounds. Differences between the

vowel spaces of the two languages were also capable of explaining some results that are beyond the scope of the three contrasts outlined above such as the case of the vowel /ʌ/. The heavy employment of temporal cues by Arab learners whose language discriminate phonemically among certain vowels on length grounds can account for the results of the vowel /a:/. This demonstrates that language-independent acoustic factors must also be taken into account in predicting inconsistency in cross-language acquisition of vowels (Strange, Akahane-Yamada, Fitzgerald & Kubo, 1996).

Perceptual results obtained via the perception test can also account for the results of the production of /I/, /a:/ and /ʌ/, which fell out of the scope of the contrasts. Yet, their levels of difficulty were explained perceptually. This conclusion supports the assumption proposed by Flege (1995) that L2 production accuracy is limited by perceptual accuracy. More explicitly, he theorizes that the production of an L2 sound will naturally be no more nativelike than its perceptual representation. However, this hypothesis does not account for all data obtained in this study. The vowels /e:/, /I/ and / / were produced better than perceived.

6.2 Proficiency Effects on Vowel Production

By and large, the ANOVA test of variance results indicated significant differences among the four groups in their production of English monophthongs. This conclusion lined with one of the provocative starting assumptions of SLM reported by Flege (2003:8) "that the capacities underlying successful L2 speech acquisition remain intact across the life span. These capacities include the ability to accurately perceive featural patterns in speech input, to sort a wide range of segments possessing common properties into categories, and to relate vocal output to the properties perceived in speech sounds". The vowels referred to above are expected to be better produced with more segmental training. Consequently, English language teachers may pay more attention to segmental learning, namely production, and anticipate encouraging results on the part of their learners.

However, proficiency positive effects were not present in terms of other vowels. The production results showed similar error percentages and difficulty ranking for the vowels / /, /ʌ/, /I/ and /o:/ as they were difficult to pronounce by learners of the four groups. On the other hand, the vowels /u/, /u:/ and / / were easier to produce by learners of the four groups, as they occupied ranks 7 onwards. C1 group ranking was sometimes different from the other groups possibly due to the limited number of participants available. SLM assumption above seems to be ineffective in this context. Besides, significant differences in the production of most vowels were only noticeable between low proficient group A2 and the other higher proficient groups. No significant differences were found among the participants of lower intermediate, upper intermediate and the advanced groups. Proficiency effects are no longer active when learners reach a certain level of proficiency in the L2.

The similarities in the patterns of production errors made by learners in the four groups referred to the fact that the exposure these learners have to L2 is unable to improve their production abilities, despite the fact their performance in other skills is improving. The effect of L2 experience is not influential in the production of some vowels and does not always result in better performance with level increase. Nevertheless, learners' production behavior witnessed a slight change in terms of cues employed. The patterns of errors shown by participants changed from heavy employment of durational cues to more employment of spectral cues. This was noticed in the production of / /, for example, which was produced as /u:/ by A2 group but as / / by the other three groups.

This can be explained by L1 interference which prevents improvement in the production of these vowels, or by the phonetic distance between these vowels within L2 vowel space which can also

result in persistent difficulties. Perceptual reasons behind difficulties identified in the production test are very likely, as most of the English vowels were equally difficult to perceive and produce by Iraqi learners. A possible explanation is that teachers tend to present these learners with the incorrect pronunciation of these vowels, thus they keep on facing difficulties with these vowels.

7. Conclusions

The analysis of the production test manifested that Iraqi EFL learners encountered varying levels of difficulties in the production of L2 vowels. Problematic vowels should be, according to Hewings (2004), given special attention by learners and teachers. Improving learners' pronunciation abilities will surely improve their speech intelligibility which is recommended as an unavoidable part in teaching and learning. Both teachers and learners need to be encouraged to have a positive attitude for intelligible pronunciation.

L1 interference was found to be the main predictor of difficulties identified in this study. This suggests the critical need for ESL/EFL teachers to become more aware of the influence that learners' L1 backgrounds would bring to the learning of English pronunciation. In order to identify specific areas of pronunciation difficulties caused by L1 phonological transfer, teachers need to nurture a well-founded idea of the dissimilarities between the L2 and L1. However, L1 transfer envisioned in contrasts formulated based on SLM's assumptions was not always successful in explaining the results obtained in this study.

Statistically, there was a significant difference in the analysis of variance of the performance of the four groups of learners based on their level of proficiency. This result is encouraging for both learners and teachers. It reveals that with more experience in the L2, learners' pronunciation abilities can be improved. Yet, this significant difference was not present among all groups and all vowels. This bears a heavy burden on teachers who need to present their learners with more native-like pronunciation as they are mostly the only models for learners to imitate. Moreover, patterns of errors made by learners hinted to considerable similarities among the four groups. Single and bi-directional misproduction relations identified in this study indicated a systematic behavior shown by learners. The confusion matrix of the production errors showed some prominent trends that were shared by the four groups, as 10 of the 12 English simple vowels were frequently produced similarly. Nevertheless, learners' production performance referred to few changes denoting a transition from the utilization of durational to spectral cues.

Moreover, learners have more problems in the production of lax vowels than in tense ones. They have more problems with high vowels than low ones. They showed almost similar degrees of difficulty with back and front vowels and showed a very strong tendency towards producing intended vowels as non-existent vowels in IA. Learners did not show any consistency in terms of the spectral features they depend on in their production. Sometimes, they went to the vowel that is similar in tongue height but different in tongue advancement and sometimes they did the contrary. These general conclusions can be further investigated using differently designed experiments.

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