



IRAQI  
Academic Scientific Journals



العراقية  
المجلات الأكاديمية العلمية

ISSN: 2663-9033 (Online) | ISSN: 2616-6224 (Print)

**Journal of Language Studies**

Contents available at: <https://jls.tu.edu.iq/index.php/JLS>



## Intelligibility Issues Caused by Arabic Phonology in English Pronunciation

Jihan Kareem Abdullah\*

English Department, College of Education, Samarra University, Samarra, Iraq  
[jihan.kareem@uosamarra.edu.iq](mailto:jihan.kareem@uosamarra.edu.iq)

Received: 19/01/2026, Accepted: 16/03/2026, Online Published: 30/06/2026

### Abstract

This study examined phonological factors affecting the intelligibility of English pronunciation among native speakers of Arabic learning English as a foreign language (EFL). In most cases, second language pronunciation is determined largely by the first language's phonological system; this influence has been variously referred to as L1 interference or negative transfer. For learners of Arabic, since the differences between Arabic and English are quite marked with respect to their phonological features, there exist systematic and predictable patterns of mispronunciations which render comprehensibility difficult for both native and non-native interlocutors with them in English. The primary aim that this study sought was major phonological differences between Arabic and English through an analysis of how these differences manifest

\* **Corresponding Author:** Jihan Kareem Abdullah, Email: [jihan.kareem@uosamarra.edu.iq](mailto:jihan.kareem@uosamarra.edu.iq)

**Affiliation:** Samarra University – Iraq.

© This is an open access article under the CC by licenses <http://creativecommons.org/licenses/by/4.0>



systematically as common errors in consonants, vowels, stress and intonation; then consideration about their effect on clarity in oral communication.

The study was descriptive-analytical in nature, and (20) Arab EFL learners were selected using purposive sampling. The major tool for data collection was a specially prepared word list containing English phonemes and phonological structures known to pose problems for Arabic speakers, the participants' (Iraqi undergraduate students) reading of which was recorded, hence audio-recorded readings. The recordings were subsequently analyzed using both perceptual analysis by a control group, who listened for error patterns, and acoustic analysis using Pratt software that objectively measured phonetic properties.

The results revealed the presence of regular, systematic errors in the production of English consonants that do not exist in Arabic, for example /p/, /v/, and /ŋ/; even extreme difficulty in distinguishing English short and long vowels-for instance, /ɪ/ versus /i:/-transfer of syllable-timed stress patterns from Arabic onto the stress-timed rhythm of English. Finally, this research offered pedagogical implications for EFL pronunciation teaching through focused practice and learner awareness, and suggested future study in Arabic-English comparative phonology.

**Keywords:** comprehensibility, English pronunciation performance, segmental features of Arabic, L1 phonological transfer, Arab EFL learners

## مشاكل الوضوح الناتجة عن الفونولوجيا العربية في نطق اللغة الانكليزية

جيهان كريم عبد الله

قسم اللغة الانكليزية، كلية التربية، جامعة سامراء، سامراء، العراق

### المستخلص

يسعى هذا البحث إلى معالجة مشكلات الفهم السمعي ذات الأساس الفونولوجي التي يواجهها الناطقون الأصليون باللغة العربية عند نطق اللغة الإنجليزية كلغة أجنبية. ففي أغلب الحالات، يتأثر نطق اللغة

الثانية بشكل كبير بالنظام الفونولوجي للغة الأولى، وهو ما يُعرف في الدراسات اللغوية بمصطلحات مثل تدخل اللغة الأولى أو الانتقال السليبي.

وبالنسبة لمتعلمي اللغة الإنجليزية من الناطقين بالعربية، ونظرًا للفروق الواضحة والمميزة بين اللغتين العربية والإنجليزية من حيث الخصائص الفونولوجية، تظهر أنماط منهجية ومتوقعة من أخطاء النطق، الأمر الذي يؤدي إلى صعوبة الفهم لدى كل من المتحدثين الأصليين وغير الأصليين عند التواصل معهم باللغة الإنجليزية.

ويتمثل الهدف الرئيس لهذا البحث في الكشف عن الفروق الفونولوجية الجوهرية بين العربية والإنجليزية، وذلك من خلال تحليل كيفية تجلي هذه الفروق بصورة منهجية على شكل أخطاء شائعة في نطق الصوامت والصوائت، إضافة إلى النبر والتنغيم، ثم دراسة أثر هذه الأخطاء في وضوح التواصل الشفهي.

تعتمد الدراسة المنهج الوصفي التحليلي، حيث تم اختيار عينة قصدية من متعلمي اللغة الإنجليزية كلغة أجنبية من الناطقين بالعربية. وتتمثل الأداة الرئيسة لجمع البيانات في قائمة كلمات أُعدت خصيصًا لهذا الغرض، وتتضمن فونيمات وبنى فونولوجية إنجليزية معروفة بصعوبتها لدى المتعلمين العرب. وقد جرى تسجيل قراءات المشاركين صوتيًا تمهيدًا لتحليلها.

بعد ذلك، تم تحليل التسجيلات بطريقتين؛ الأولى هي التحليل الإدراكي، من خلال مستمعين ذوي خبرة قاموا بالاستماع إلى التسجيلات بهدف تحديد أنماط الأخطاء الشائعة، أما الطريقة الثانية فهي التحليل الصوتي باستخدام برنامج Pratt Software ، الذي يتيح قياس الخصائص الصوتية بشكل موضوعي ودقيق.

ومن المتوقع أن تكشف نتائج البحث عن وجود أخطاء منهجية في نطق بعض الصوامت الإنجليزية التي لا وجود لها في اللغة العربية، مثل الأصوات /p, v, η/ فضلاً عن وجود إشكاليات كبيرة في التمييز بين الحركات القصيرة والطويلة في اللغة الإنجليزية، مثل /i:, I/. كما يُتوقع ملاحظة انتقال أنماط الإيقاع القائم على المقطع من اللغة العربية إلى الإيقاع القائم على النبر في اللغة الإنجليزية.

ويخلص البحث إلى أن هذه الأخطاء الناتجة عن النقل الفونولوجي تمثل سبباً رئيساً في انخفاض مستوى الوضوح والفهم في التواصل الشفهي. وأخيراً، يتجه هذا البحث بشكل جزئي نحو الجانب التربوي، إذ يقدم لمعلمي اللغة الإنجليزية كلغة أجنبية مجموعة من المقترحات التي تتضمن تمارين نطق مركزة وأنشطة تعليمية تهدف إلى رفع مستوى الوعي الصوتي لدى المتعلمين.

**الكلمات المفتاحية:** قابلية الفهم، أداء نطق اللغة الإنجليزية، السمات الصوتية المقطعية في اللغة العربية، الانتقال الفونولوجي من اللغة الأم (L1) ، متعلمو اللغة الإنجليزية كلغة أجنبية من العرب

## **Introduction**

### **1.1 Background of the Study**

English has become a global language for communication among nations in international contexts, as in conferences, where participants may not share the same native language. As a result, non-native speakers are expected to fulfill a high level of linguistic competence. Among the important components of effective oral communication in English is obvious and intelligible pronunciation, which is in general considered as basic for productive interaction.

Intelligibility, by which (Jenkins, 2000) means the degree to which a listener successfully understands a speaker's utterance, is central to any discussion of pronunciation. An important distinction needs to be made between intelligibility and accent-the particular manner of speaking resulting from regional or learner's own first language influence. Effective intelligibility among a wide range of interlocutors rather than natively like mastery remains the realistic and desirable goal for most EFL learners.(Munro, Murray J & Derwing, Tracy M., 1995). Pronunciation instruction should prioritize achieving intelligibility rather than eliminating foreign accent. Accordingly, instruction should concentrate on pronunciation aspects that obstruct comprehension, concentrating on improving intelligibility in lieu of suppressing foreign accent.

For the millions of Arabic speakers learning English, there are certain specific and predictable difficulties on their way to intelligible pronunciation. These difficulties systematically arise out of the basic differences between the phonological systems of Arabic and English: "The inventory (set) of speech sounds, the phonotactic rules-permissible combinations- and suprasegmental features of a learner's native language create a 'phonological filter' through which they perceive and produce the sounds and patterns of an L2" (Ladefoged & Johnson 2011). Where systems so markedly different as those in Arabic and English occur parallel to each other within one speaker, negative transfer or interference is likely to take place. It results in pronunciation habits that may severely hamper intelligibility.

## **1.2 Describing the Issue**

There are considerable differences between the phonological systems of Arabic and English. These differences can be categorized into two groups: segmental features (the consonants and vowels that make up a language) and suprasegmental features (the intonation, stress, and rhythm of a language). For example, there are no consonant phonemes, such as /p/ or /v/, that exist in standard Arabic. Consequently, students learning English use the closest Arabic phonemes, /b/ and /f/, as substitutes for these consonant phonemes (e.g., saying "bark" instead of "park"). In addition, the English vowel system includes twelve monothongs and multiple diphthongs, whereas the Arabic vowel system only has six distinct vowels (three short and three long). Therefore, this vowel system results in the most common type of vowel confusion for students, i.e., merging each distinct pair of English vowels (such as /i/-/i:/ - ship-sheep).

There are significant distinctions between the prosody of both the English and Arabic language. English being classified as a language with a predominant stress-timed system where Arabic is classified as a language that is primarily syllable-timed in much of its variations (ABUAKEL, 2000). The rhythm of speech produced in stress-timed languages is determined by the amount of time that elapses between stressed syllables whereas the duration of producing each syllable (as produced in syllable-timed languages) is roughly equal. This missing information about the prosody of their L1 is carried over into the students' speech in their target language (English), resulting in a tendency to produce monotonous speech and obscuring the phonemic function of stress in English. Examples of the effect of this can be seen when comparing the English words "REcord" (noun) to "reCORD" (verb). Errors made by EFL learners as a result of using a phonological framework characteristic of the Arabic language are clearly affecting the intelligibility of their speech at both levels of clarity and comprehensibility. Their clarity deficiencies are made even more pronounced due to the errors made from using an Arabic phonological framework when producing suprasegmental features.

## **1.3 Research Questions**

In this paper, we are attempting to answer the following three research questions:

\* Which phonetic features are the most distinctive between English and Arabic in terms of their potential to create pronunciation issues for Arabs' English ?

\* How do these phonetic features appear as specific recurring pronunciation errors at the level of English consonants, vowels, and intonation when produced by Arabs ?

\* How does interference from the first language contribute to poor communication through reduced intelligibility by Arabs communicating in English ?

What teaching techniques and treatments can help improve learners' understanding of phonology, allowing them to better pronounce sounds correctly? The objective of the research is to find answers to these questions.

The objectives of this study, which focuses on the errors made by native Arab speakers when using English, will establish the following.

First, they will be involved in conducting a contrastive analysis of the phonological systems of English and Arabic in order to discover significant differences between the two languages.

Second, identification of the most common mispronunciation of sounds made by the Arab learners of English, focusing on both segmental and suprasegmental levels.

Third, explanation of how those errors impede the ability to correctly communicate meaning. Fourth, Provide appropriate recommendations and examples for teachers and students to address issues of intelligibility due to mispronunciation.

### **1.5 Significance of the Study**

This study's main audience is English language teachers in the Arab World. The outcomes help English language teachers develop and use more effective, research-based instruction strategies because they offer a clear, specific, and research-supported framework that gives an understanding of why students struggle with pronunciation. Teaching resources should focus on the pronunciation needs of Arabic-speaking learners. In addition, when students know about phonological errors that affect pronunciation, they will be able to consciously correct themselves later on. For researchers of Applied Linguistics/Phonetics/SLA, there are currently few studies on L1 transfer to L2 (Arabic

to English) and how this affects intelligibility. This adds to the research that is existing on L1 transfer into L2 phonology.

### Scope and Limitations

This research examines the influence of Modern Standard Arabic on pronunciation within both General American English (GAE) and British English (BE), across national varieties, respectively. Participants in this study will be Arab students who are enrolled in universities within a non-Arab country and are taking classes in English as a foreign language.

This analysis will focus on segmental features of speech, including vowels and consonants. In addition to the above, the analysis will also include a few selected primary suprasegmental features, such as word stress. Other more complex prosodic phenomena, such as intonation at the level of the sentence and connected speech, are outside the scope of this study.

There is one possible limitation of this study: that speakers have different dialects of Arabic. However, the emphasis of this study was on phonological characteristics that are present across most Arabic dialects. In addition, because the number of people in the sample was limited, it will be difficult to generalize the findings to the larger population but will still provide valuable information about common pronunciation problems.

## **2. Literature Review**

### **2.1 Theoretical Background**

In order to understand the problem of pronunciation, it is suitable to make a distinction between phonetics and phonology. Phonetics has been defined by Ladefoged (2001) as the scientific study of speech sounds in their physical production (articulatory phonetics), acoustic properties (acoustic phonetics), and perception or how they are heard as sounds within the ear itself or auditorily perceived (auditory phonetics). That is, it deals with raw sound phones. On the other hand, what concerns us for our present purposes is that branch known technically as ‘phonology’, which studies how these articulated sounds are

organized into patterns within some particular language structure so as to yield meaning. As noted by Avery and Ehrlich (1992), the error is essentially a phonological substitution of an L2 phoneme with the nearest L1 phoneme because the learner's L1 phonological system does not recognize the particular L2 sound as distinct. Therefore, this study can also be described within a basically phonological framework since it studies how the Arabic phonological system interferes with acquiring English as another system.

#### Understanding Intelligibility in Second Language Acquisition

The final aim of pronunciation is for the message to be understood, or what is referred to as intelligibility. This has been a key concept widely discussed within research on Second Language Acquisition (SLA). According to Munro and Derwing (1995), "intelligibility" refers to "the extent to which a listener actually understands an utterance" (p. 289). Frequently associated with this term are comprehensibility -defined as perceived ease or difficulty by a listener in understanding the utterance- and accent level -perceived degree of foreign accent-. Most studies provide evidence that even though the accent may be quite strong, it does not necessarily mean that communication has been hampered at the level of intelligibility.[1] Specific 'global' errors particularly in prosody(stress & rhythm)and certain segmental ones appear much more negatively effective on intelligibility than general 'foreign' accent (Derwing&Munro 2005).

It was Jennifer Jenkins (2000) who took yet another revolutionary turn in this area by work based on English as a Lingua Franca (ELF). She proposed the "Lingua Franca Core" that singled out certain phonological features without which mutual intelligibility among non-native speakers would hardly be possible. Her research showed that while one may articulate vowels in any quality desired, most of the English consonants—with some exceptions such as 'th' sounds—must be correctly articulated and distinctive length preserved between two kinds of vowels, for example /i:/ versus /ɪ/. This study develops from an assumption widely shared within applied linguistics: not all mispronunciations equally hamper understanding; some do much more damage because they are phonologically salient.

## 2.2 Overview of Arabic Phonology

The phonological system of Modern Standard Arabic (MSA) contains features that are radically different from English. It is this difference that will help in anticipating the errors made by Arab learners.

### 2.2.1 Arabic Consonants

There are 28 phonemes in the Arabic consonant inventory. One of its main features is in the emphatic (pharyngealized) consonants /s<sup>ʕ</sup>/, /d<sup>ʕ</sup>/, /t<sup>ʕ</sup>/ and /ð<sup>ʕ</sup>/ (ص, ض, ط, ظ), with no equivalents in English. Several uvular and pharyngeal sounds such as /q/ (ق), /χ/ (خ), /ʁ/ (ع), /ħ/ (ح) and /ʕ/ (ع) are also found further back in the vocal tract than any English sound can be produced (Watson 2002). On the other hand, quite a few English consonants do not occur or are simply absent from Arabic—most notably /p/, /v/, /ŋ/ (as in 'ing'), 'sing', and /tʃ/ (as in 'church') in some dialects. The learner consequently tends to substitute these by their nearest articulatory equivalent available within Arabic: /p/ → [b], /v/ → [f], [n] or [ŋ], and /tʃ/ → [tʃ]. [Wahba 1998]

### 2.2.2 Arabic Vowels

The Arabic vowel system appears relatively simple compared to English: three short vowels /a/, /i/, /u/ and their long equivalents /a:/, /i:/, /u:/. The narrow vowel inventory of Arabic represents a principal source of difficulty for Arab learners of English. In contrast to Arabic, which has a comparatively small number of vowel phonemes, English exhibits a significantly larger and more complex vowel system, comprised of approximately twelve monophthongs and eight diphthongs in many dialects (Received Pronunciation). This structural disparity contributes significantly to pronunciation challenges among Arab learners.

Most Arabs simply collapse several English vowels into one Arabic category. For instance, all three -æ- as in cat, -ʌ- as in cut, and -ə- as in about are perceived and produced by most speakers as instances of /a/ (Al-Ani, [2] 1970). In addition to being difficult for learners to articulate correctly consistently even though a similar length distinction does exist within Arabic because 'the qualities' [3] of the vowels are so different.

## 2.3 English Phonology Overview

### **2.3.1 English Consonants and Vowels**

As previously mentioned, the English consonant inventory contains phonemes such as /p/, /v/, and /ŋ/ that are entirely lacking from the Arabic sound system. The distinction between voiced and voiceless consonants in word-final position ( cab vs cap ) is a crucial phonemic distinction in English. In Arabic this contrast is not so strong in final positions, there is general devoicing among learners(Weinberg 1982).

The English vowel system is considered one of the major challenges. There are so many vowels, most of them tend to be realized as shorter and more centralized in unstressed syllables-the schwa /ə/-a feature does not exist in Arabic . The distinction between tense and lax vowels -a very core feature of English phonology-is apparently difficult both for perception and production by learners from the Arabic side for instance “beat /i:/ versus bit /ɪ/”.(Swan & Smith, 2001).

### **2.3.2 Syllable Structure and Stress**

English permits the formation of complex consonant clusters at both syllable-initial (for example, straight) and syllable-final positions (for instance, lps in helps). Arabic has much simpler CV(C) or CVC(C) syllable structure possibilities. Carlisle (2001) notes that there are virtually no initial consonant clusters in Arabic; therefore, a vowel is inserted as in the common mispronunciation of school as “ischool” . Another difference is that English turns out to be a stress-timed language with variable stress assignment which can be phonemic in distinguishing between a noun and verb form of a word such as “import versus import” while most varieties of Arabic are syllable-timed having more predictable rule-based system for assigning lexical or emphatic stresses.

### **Previous Studies**

Extensive research has been devoted to the documentation of pronunciation errors made by Arab learners of English. Al-Ani (1970) and other early contrastive analyses, based on theoretical comparisons between the two phonological systems, provided an understanding at a deep level of potential problem areas. More recent empirical studies have largely confirmed these predictions. One such study found that native listeners

perceived the production by Arab speakers of what was intended to be /p/ as /b/ because the VOT was not correctly implemented (Flege and Port, 1981).

Badr (2013) found among Egyptian learners pairs such as /i/-/i:/, /æ/-/e/ in addition to consonant sounds /p/, /v/, and /θ/ very difficult, directly attributing these errors to L1 interference and recommending explicit phonetic instruction. Al-Jarf (2009) analyzes the problems her Saudi female students have with pronunciation and finds consonant clusters, stress, and particular vowel sounds to be most persistent. Her research highlighted the impact of these errors on listening comprehension. Learners who mispronounce words fail to recognize them when spoken by native speakers.

Although numerous studies have identified these errors, few have examined their impact on intelligibility. Derwing, Munro and Wiebe (1998) found that prosodic errors—stress, rhythm or intonation—were more serious to listener comprehensibility than most segmental errors. For Arab learners, therefore, transfer of a syllable-timed rhythm and stress misplacement may be more significant barriers to intelligibility than substitution of individual consonants. This paper reports an attempt made to fill this gap by conducting a systematic analysis of both segmental and suprasegmental errors as well as their total effect on clarity and comprehensibility.

### **3. Methodology**

#### **3.1 Research Design**

A descriptive-analytical approach was adopted for the present research. The descriptive part aimed at a systematic identification, classification, and description of the pronunciation errors made by Arab EFL learners while the analytical part provided an interpretation of these errors within a contrastive phonological (Arabic vs. English) framework besides evaluating their effect on intelligibility. This was regarded as suitable as it allowed for a thorough observation of the situation in its natural environment. Both perceptual (qualitative) examination of mistakes, and acoustic (quantitative) analysis of phonetic characteristics were used to triangulate data toward a full comprehension of the issue.

#### **3.2 Participants**

A specific group of participant students was purposefully selected from an undergraduate student population studying English at the university in Iraq (N = 20). All participants were selected based on their position as native speakers of an Iraqi dialect of Arabic.

\* Proficiency: All participants demonstrated proficiency in English at the B1-B2 level (Common European Framework of Reference for Languages), either by means of a standardized placement test or based on their academic record. This was an adequate level because they had enough exposure to notice similarities in sounds/phonological patterns, but there was still a significant amount of first language interference. \* Exposure to English: Their primary exposure to English was through formal education in Iraq. They had never been exposed to an environment of native speakers or close to such an environment. This would help, at a later stage, in discussing the variable of L1 interference on the output due to immersion effects.

The respondents were informed that their responses would remain confidential and anonymous.

### **3.3 Instruments**

Two instruments were used for collecting the data:

\* A Diagnostic Wordlist and Sentence List: A list of English words and short sentences were specifically designed for this study. The list included items that target the phonological features known to be problematic for Arab learners, as identified in the literature review. This included:

\* Minimal pairs that were used to test consonant distinctions absent in Arabic (e.g., 'pan' vs. 'ban', 'vest' vs. 'fest').

\* Words ending with the final nasal velar /ŋ/ (e.g. sing, thinking)

\* Minimal pairs that were used to test distinctions of vowel quality and length (e.g. ship/sheep, pull/pool, bat/but)

\* Words having complex consonant clusters (e.g. street, splash)

\* Words showing variable lexical stress (e.g. nouns versus verbs such as produce and produce)

\* For example, one part of the test concentrated on “hVd” words (heed, hid, head, had, hod, hud, hood, who’d) to systematically check the production of vowels.

\* Acoustic Analysis Software (Pratt): Pratt was used as a widely popular freeware program for carrying out phonetic analyses, which formed the main basis for objective data analysis. Spectrograms and waveforms of the participants’ speech were created using this tool. Specific acoustic measurements were then taken;

\* Voice Onset Time (VOT) in the distinction of voiceless stops such as /p/ and voiced stops such as /b/.

\* The first two formants, F1 and F2, provide a means of plotting the quality of the acoustic vowel space against the standard norms of acoustic vowel spaces as determined by the native speaker population data. \* Vowel length was examined by measuring the duration of long versus short vowels. \* The use of both the fundamental frequency (F0) and intensity values were analyzed for determining stress placement.

### 3.4 Data Collection Process

The data collection process required that each of the participants come individually into a quiet room in order to obtain high-quality audio recordings. The researcher explained the purpose of the study to the participants and provided them with a feeling of comfort.

\*Participants were asked to read aloud the prepared wordlist and sentence list at a natural pace. The words appeared clearly either on a computer screen or flashcards so that they were not misread.

\* Their speech were recorded by means of a high-fidelity microphone connected directly to a computer, with minimal background noise, clear enough for clarity in acoustic analysis.

\* Each recording was saved as a separate digital audio file in WAV format and coded in keeping with the anonymity of the participant.

### **3.5 Data Analysis Procedure**

The analysis of the collected data was conducted in two phases:

\* **Perceptual Analysis:** the researcher and another experienced EFL instructor listened to all the recordings. Both of them separately transcribed, in IPA symbols, the pronunciations made by participants. They marked errors and classified them according to an already prepared classification scheme (for example, consonant substitution, vowel merger, stress misplacement). Inter-rater reliability was then computed to check the consistency of error marking.

\* **Acoustic Analysis:** the recordings were transferred into Pratt software for a detailed analysis of the targeted phonological features.

-**Consonants:** the VOT of initial stops like /p/ and /b/ was measured. A short VOT for /p/ acoustically confirmed its production as [b].

F1 and F2 were measured at the midpoint of the target vowels. A visual representation of the vowel space for each participant alongside the target English vowel space was then constructed. The checking of maintenance length contrast also necessarily involved a measurement of duration.

\* **Stress:** measurements of fundamental frequency (F0), intensity (dB), and duration were obtained for stressed and unstressed syllables in polysyllabic words. Accurate stress production was generally associated with increased F0, intensity, and syllable duration.

Results of perceptual and acoustic analyses were used in triangulation to show comprehensively the patterns of pronunciation by the learners and their deviation from target English norms. The frequencies of each type of phonological errors were counted to determine which errors appear most frequently in the speech of the participant group.

### **4.1 Data Analysis and Discussion**

This chapter analyzed the data of (20) Arab EFL learners in response to the research questions, and discussed key findings. The analysis was presented according to three main phonological categories assumed as possible sources of intelligibility problems: consonants, vowels, and stress.

#### **4.1.1 Analysis of Consonant Errors**

Consonant production yielded the result that there were systematically traceable errors direct to the non-existence of certain phonemes within the Arabic phonological inventory. Salient among these errors was in their attempt at producing English stops /p/, /v/ and velar nasal /ŋ/.

#### **4.1.2 The /p/ vs. /b/ Distinction**

The /p/, a voiceless bilabial stop, was mostly replaced by the /b/ sound, its voiced counterpart. In regards to hearing the pronunciation of certain words (/park/, /people/, and /pay/) , most people's perceptions of those words were /bark/, /beoble/ , and /bay/. Based on the count of the participants, this occurred with a majority of 85%.

Acoustic Analysis: Pratt analysis objectively substantiates the contrast used above. The mean native English VOT for the initial consonantal sound (place of articulation) [stop] in "park" (50 ms) is greater than the average reading from the recordings made of the participants (10 ms). Thus, the mean peak VOT of their stopping consonants fell clearly within the range recognized for the English voiced stop, [b], as it is in Arabic phonologically. Therefore, the mean VOT for the stopping consonants in the participants' recordings illustrates they were making un-aspirated [b] and thus, not creating aspirated sounds, which they produced as aspirated stops (so that would have been the phonetic representation two ways) as per phonetic representation is concerned with utterances of the words.

The negative impact on intelligibility from this change greatly increased confusion because there were so many different minimal pairs that were confused (pack/back, pin/bin, pear/bear). As a result, there would be instances where the listener would understand 'Would you bark the car?' rather than 'Would you park the car?' which would cause a significant, albeit short-lived, breakdown in the communication process.

#### **Minimal Pair Frequency**

There were around 128 minimal pairs existing between English words due to this distinction. /v/ in initial position and /f/ in initial position made up only 1.7 percent of all

English vocabulary (/f/-final vs./v/-final) . Appendix 2 provided frequency wordlists among minimal pairs analyzed automatically within CELEX by Position-in-Word Fricative Phonemes. However, random collocations involving function words or content words, as well as constructions from free discourse that could create new minimal pairs unattested experimentally before, were not included in the analysis.

The change was also true for the voiced labiodental fricative /v/ to its voiceless counterpart /f/, as in more than 90% of them, 'very', 'voice', and 'have' were pronounced 'fery', 'foice', and 'haf'. Spectrograms: There was clearly no presence of a voice bar-the low-frequency band showing vocal fold vibration during the production of /v/ in the participants' speech (of) voiceless fricatives such as /f/.

Intelligibility Impact: This error created ambiguity too, affecting minimal pairs such as 'van/fan, vine/fine, leave/leaf'. Context always helped a listener get at the intended meaning, but comprehensibility was reduced when cognitive effort on the part of the listener increased.

#### **4.1.3 The Velar Nasal /ŋ/**

The production of the velar nasal /ŋ/ in word-final position (e.g., sing, going, thing) was another major area of difficulty. Two main error patterns were identified:

\* Substitution with /n/: about 40% of them simply substituted /ŋ/ with the alveolar nasal /n/. In other words, they pronounced 'sing' as 'sin'.

\* Addition of a plosive [g]: much larger group about 60% pronounced/ŋ/as a sequence[ŋg]in 'thin-g' or 'sin-g'. This was a typical interference error since this phonetic sequence happened to be common in some dialects of Arabic.

\*Intelligibility Impact: the first type of error resulted in minimal pairs at the lexical level-for example, 'sin' for 'sing', 'win' for 'wing'-but the second type of error ([ŋg] addition) made comprehensibility less likely and was perceived as a strong foreign accent, which drew attention away from the message toward the speaker.

## 4.2 Analysis of Vowel Errors

The most widespread problem noted was the reduction of the English vowel system to a much smaller Arabic-like vowel inventory. The analysis showed a regular merger between several pairs of English vowels.

### 4.2.1 The /ɪ/ vs./i:/ distinction (lax vs. tense vowels)

Most of participants did not distinguish between the short, lax vowel /ɪ/ as in 'ship' and the long, tense vowel /i:/ as in 'sheep'. They articulated a sound somewhere in between both qualities and lengths. Minimal pairs such as 'sit/seat, live/leave, chip/cheap' became homophonous.

Acoustic Analysis: there was significant overlap in their F1/F2 space for intended /ɪ/ and /i:/ productions. All participants' productions were found to be largely clustered within one area of the acoustic space whereas native speaker data showed two clearly distinct clusters (see Appendix D). In addition, only a small difference in length between the two vowels was measured,

\* Intelligibility impact: this was one of the most serious errors because it eliminated the distinction between a large number of very common words in English. A sentence like "I want to leave" could easily be interpreted as "I want to live," and thus, communication broke down.

-/æ/ versus /ʌ/ and /e/ distinction

Most participants merged the three vowels /æ/ as in cat, /ʌ/ as in cut and /e/ as in ketchup into one single vowel which was very similar to either the Arabic /a/or/e/. For example, cat, cut and even ket(from ketchup) might sound very similar.

Acoustic Analysis: formant plots confirmed this merger, with participant data for these three vowels clustering tightly together, in contrast to the widely dispersed positions for a native speaker.(Instead of providing any summary or inference about the results and leaving it to be understood from the way results were stated. Now because there was no transition provided between two different results, so they appeared as separate fragmented pieces of information.)

\*Intelligibility Impact: this collapse of contrasts made it difficult for a listener to distinguish between words like 'bat', 'but', and 'bet', again increased the processing effort required and potentially led to misunderstanding.

#### **4.3 Stress and Rhythm Issues**

At the sentence level, Arabic syllable-timed rhythm and the regular pattern of stress were mapped predictably onto the more variable English intonation system.

\* Misplaced Stress: in polysyllabic words, especially noun-verb pairs, primary stress placement rules were violated. For example, very frequently the word ‘a record’ was pronounced with second syllable as in the verb to record. This was confirmed by an acoustic analysis which showed that higher pitch , greater intensity and longer duration (the acoustic correlates of stress) were placed on wrong syllable.

Rhythm: They delivered with equal prominence given to each syllable in a sentence because Arabic is basically a syllable-timed language. This delivery contrasted sharply with the stress-timed rhythm of English, where unstressed syllables and function words were reduced and spoken quickly. Hence, there was this so-called staccato or machine-gun-like unnatural rhythm that made it difficult for listeners to identify the most important words within an utterance, since the schwa /ə/, being the most common vowel in unstressed English syllables, was almost entirely absent and replaced by full vowels (e.g., about pronounced as ‘a-bawt’).

#### **4.4 Discussion and Comparison with Previous Studies**

The results obtained in the present study strongly agreed with and provided empirical support to the body of literature on Arab learners’ pronunciation (e.g., Al-Ani, 1970; Badr, 2013; Al-Jarf, 2009). Empirical reinforcement for their works was added herein, since it was also found that specific errors in consonants (/p/, /v/, /ŋ/) and vowels(/I/ vs. /i:/) were quite well documented results of L1 interference.

What acoustic analysis provided to this research was an objective and quantitative dimension that confirmed perceptual judgments with explicit phonetic data, such as VOT and formant values. More significant was the fact that intelligibility extended beyond a

mere identification of errors in discussing their impacts on comprehensibility, thus reflecting works by Jenkins (2000) or Derwing & Munro (2005). The results developed into full support for Jenkins's proposal of a consonantal Lingua Franca Core since disruption was reported to be very high regarding articulation errors in consonants as well as vowel length. Stress, rhythm, and intonation errors had a significant effect in supporting the claim made by Derwing et al.(1998)that prosodic features are most crucial for intelligibility. Arguably, one of the biggest obstacles to effective communication was the transfer of a syllable-timed pattern ,in which intonation took over the entire musical domain and structure of English speech thus hiding meaning behind mask making listener tired trying to get at it. This implied that pronunciation pedagogy for Arab learners should have placed equal emphasis on suprasegmental features or even more compared with correction of individual sound segments.

### **5.1 Summary of Findings**

This research aims to identify the characteristics of Arabic phonology that severely hinder intelligibility in spoken English from Arab learners, making it nearly impossible to communicate or severely impaired. To achieve this, a descriptive-analytical approach that includes both perceptual and acoustic analysis was utilized. The following key findings were identified through this investigation:

Consonants that are substituted in a systematic manner: The English consonants that are not present in Arabic were substituted systematically and regularly with the closest available phonemes, e.g.: - /p/ → [b] (bark for park) - /v/ → [f] (fery for very) - /ŋ/ → [n] or [ŋg] (sin or sing-g for sing)

/p/ -> [b](park becomes bark)

/v/-> [f](very becomes fery)

/ŋ/-> [n ]or[ŋg](sing becomes sin or sing-g)

The complex vowel system of English has been systematically reduced through a process called the collapse of the vowel system. The greatest impact on speech

intelligibility was caused by the merger of the tense and lax vowels (the long /i:/ and the short /ɪ/) where we could no longer differentiate between two very commonly used words (for example, 'sheep' and 'ship'). The continued merging of different vowel sound pairs such as /æ/, /ʌ/, and /e/ has created considerable additional lexical ambiguity.

\* **Transfer of Suprasegmental Patterns:** the prosodic features in Arabic were directly transferred to English. This provided major support for errors in rhythm and stress. A syllable-timed application from a language considered as stress-timed created monotony in delivery. Hence, explicitly emphasized vowels did not allow the natural prominence of stressed syllables to be detected. Misplacement of lexical stress was also very apparent among most participants.

\* **Cumulative Impact on Intelligibility:** the combined effect of these segmental and suprasegmental errors totally destroyed intelligibility. While the consonant errors could cause confusion over single words, it was noticed that the vowel and prosodic errors had a more global impact. They reduced comprehensibility and added to the listening effort that had to be supplied by the interlocutor in order to achieve understanding.

## **Conclusions**

The paper concluded that phonological transfer errors had a negative impact on intelligibility.

First, Arab EFL students did not pronounce words incorrectly because of random errors, but instead these errors were caused by their native-language interference on the pronunciation of the English language. This interference was primarily caused by predictability. The native phonological system of these students was a constant source of information that provided a means of perceiving and producing English words from their own time frame, as it was very much entrenched.

Secondly, there was a differential effect on communication by the different types of misarticulated or mispronounced words thus affecting communication with varying degrees of severity one of the most damaging types of error would be those errors that destroyed phonemic contrast thus, word pairs like 'lip'/'rip' would be difficult for the listener to distinguish between. On the other hand, some errors were more age-based

rather than phoneme-based in creating difficulty in intelligibility; the former being the case where Arabic syllable timing interfered with the overall intelligibility of the utterance made by the speaker in Arabic (this agrees with literature suggesting intonation is easier to place than phoneme contrast).

In conclusion, traditional methods of teaching pronunciation are being reevaluated in light of research showing that simply working on phonemes alone is not enough to improve intelligibility for Arabic students. Therefore, a more holistic method was created to teach both the individual consonants and vowels as well as have a strong emphasis on using suprasegmentals (i.e., stressed syllables, rhythm, and vowel reduction). These suprasegmental elements make up the foundation of spoken English.

### **Recommendations**

The results of this study offer practical implications to the main participants engaged in the process of EFL learning.

#### **For EFL Teachers and Curriculum Designers:**

Teachers should primarily focus on helping students produce intelligible speech when teaching pronunciation rather than trying to get them to imitate a native speaker's accent. To help create clear and understandable speech, teachers will want to provide systematic back-up for pronunciation errors based on how much a given error affects intelligibility (for example, targeting the /i:/-/ɪ/ difference before the /θ/-/ð/ difference).

\* Incorporate suprasegmental instruction into your syllabus as soon as possible. Suprasegmental instruction typically consists of three specific areas: stress-timed rhythm at the sentence level and the simultaneous reduction of vowel sounds. In order to establish a physical connection between the concept of rhythm and the physical act of producing sound, teachers create a physical connection to rhythm by using either tapping or clapping. \* Contrastive analysis and explicit instruction included: Make it clear to the students (through minimal pair drills) and provide visual aids using phonetic charts, diagrams of the mouth and digital technologies (old language labs/new mobile apps) about differences between Arabic and English language phonology - specifically, that there are phonological features in English that do not exist in Arabic.

Create tailored resources: For Arabic EFL learners, create pronunciation practice activities to address the areas where there are known difficulties with pronunciation – including the /p/ sound and the /b/ sound, the /v/ sound and the /f/ sound; the difference between tense vowel sounds and lax vowel sounds; and producing a schwa in an unstressed syllable (a sound that can be produced by either vowel or consonant letter(s)).

5.3.2 Create Phonological Awareness: For Arabic EFL learners, be proactive in increasing your knowledge regarding the sound systems of Arabic and English. The first step in learning how to produce the sound accurately is understanding what makes the sound challenging to produce.

\* Active listening – Listen to both competent native and non-native speakers. Be aware of the "melody" of the language i.e., how the language's rhythm, stress, and intonation work, and do not just focus on the words spoken. One of the very effective ways in this regard is to shadow; listen to a short phrase one time and then repeat the phrase exactly after it has been said.

\* Use Apps & Websites to Practice: There are many mobile applications and web pages that provide immediate feedback on how well you pronounce words. Record yourself speaking then listen to a model pronunciation to assess how you compare.

5.3.3 For Future Researchers:

- Hypothesis Future research could include dialectal differences in Arabic as a variable contributing to variation in the error forms that differ in the patterns of pronunciation errors across the different varieties of Arabic (Levantine vs. Egyptian vs. Maghrebi). · Longitudinal investigation of the accuracy of learners' pronunciation through a cohort study over time will provide more insight into the progress of pronunciation problems and which patterns in pronunciation problems are more resistant to correction through instruction.

The current study limits itself to analyzing and evaluating rhythm and stress in the selected material, but does not offer an analysis of intonation patterns; thus, studying intonation as part of future subsequent research would be an extremely valuable addition to this work.

In general, future studies may focus on exploring how Arabic intonation patterns may affect the interpretation of pragmatic meaning of spoken English. Attention should be given to how such a transfer and the resultant intonation patterns could have an impact on the expression of politeness, sarcasm and the purpose of an interrogative statement. The recommended study shall contain an analysis of how intonation is realized at the sentence level among Arab learners, which will significantly build on the present work.

\*Measure Intelligibility For Direct Measurement: Future studies may explore how intelligibility can be quantified through multiple listeners' assessments of intelligibility and comprehensibility. Each panel's stimuli, both native and non-native will be rated according to a set of criteria. Such tests will generate direct evidence of the effects intended by this study.

## References

- Abu-Akel, A. (2000). *The phonological reality of the syllable*. *King Saud University Journal*, 12(1), 1-17.
- Al-Ani, S. H. (1970). *Arabic phonology: An acoustical and physiological investigation*. The Hague: Mouton.
- Al-Jarf, R. (2009). *Pronunciation problems of Saudi students learning English*. *The JALT CALL Journal*, 5(2), 69-92.
- Avery, P., & Ehrlich, S. (1992). *Teaching American English pronunciation*. Oxford University Press.
- Badr, M. A. (2013). *A contrastive study of some segmental and suprasegmental problems faced by Egyptian learners of English*. Ain Shams University, Faculty of Education.
- Carlisle, R. S. (2001). *The modification of onsets in a second language: A psycholinguistic perspective*. In J. L. Nicol (Ed.), *One mind, two languages* (pp. 209-228). Blackwell.
- Derwing, T. M., & Munro, M. J. (2005). *Second language accent and pronunciation teaching: A research-based approach*. *TESOL Quarterly*, 39(3), 379-397.
- Derwing, T. M., Munro, M. J., & Wiebe, G. (1998). *Evidence in favor of a broad framework for pronunciation instruction*. *Language Learning*, 48(3), 393-410.
- Flege, J. E., & Port, R. (1981). *Cross-language phonetic interference: Arabic to English*. *Language and Speech*, 24(2), 125-146.

- Jenkins, J. (2000). *The phonology of English as an international language: New models, new norms, new goals*. Oxford University Press.
- Ladefoged, P. (2001). *A course in phonetics (4th ed.)*. Harcourt College Publishers.
- Ladefoged, P., & Johnson, K. (2011). *A course in phonetics (6th ed.)*. Cengage Learning.
- Munro, M. J., & Derwing, T. M. (1995). *Foreign accent, comprehensibility, and intelligibility in the speech of second language learners*. *Language Learning*, 45(1), 73-97.
- Swan, M., & Smith, B. (Eds.). (2001). *Learner English: A teacher's guide to interference and other problems (2nd ed.)*. Cambridge University Press.
- Wahba, E. (1998). *The acquisition of the English /p-/b/ contrast by Egyptian Arabic speakers*. *Proceedings of the Annual Boston University Conference on Language Development*, 22, 766-777.
- Watson, J. C. E. (2002). *The phonology and morphology of Arabic*. Oxford University Press.
- Weinberg, B. (1982). *A contrastive analysis of English and Arabic*. University of Texas at Austin.

## **Appendices**

### Appendix A: Sample Wordlist for Data Collection

#### Part 1: Consonant Minimal Pairs

| Pair | Word 1 | Word 2 | Target Phoneme |

| /p/ vs /b/ | pan | ban | /p/ |

| | pull | bull | /p/ |

| | pear | bear | /p/ |

| /v/ vs /f/ | van | fan | /v/ |

| | vest | fest | /v/ |

| | vine | fine | /v/ |

#### Part 2: Words with Final /ŋ/

\* sing, king, ring

\* going, walking, thinking

\* thing, wrong, language

#### Part 3: Vowel Minimal Pairs

| Pair | Word 1 | Word 2 | Target Phonemes |

| /ɪ/ vs /i:/ | ship | sheep | /ɪ/ and /i:/ |

| | sit | seat | /ɪ/ and /i:/ |

| | live | leave | /ɪ/ and /i:/ |

| /æ/ vs /ʌ/ | cat | cut | /æ/ and /ʌ/ |

| | bat | but | /æ/ and /ʌ/ |

| | track | truck | /æ/ and /ʌ/ |

| /ʊ/ vs /u:/ | pull | pool | /ʊ/ and /u:/ |

| | full | fool | /ʊ/ and /u:/ |

#### Part 4: Lexical Stress Pairs

| Word Pair | Noun (Stress on 1st Syllable) | Verb (Stress on 2nd Syllable) |

| record | a record | to record |

| produce | fresh produce | to produce |

| object | a strange object | to object |

#### Part 5: Sentences for Rhythm and Connected Speech

\* I think I will go to the park today.

\* She lives on a very large ship.

\* The professor presented his project.

\* Can you produce the record for me