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THE REALIZATION FOR THE ENGLISH  
VOICELESS POSTALVEOLAR AFFRICATE  
/tʃ/ IN NAJDI SAUDI ESL LEARNERS  
PRODUCTION

Abdullah Ahmed Alqarni

*Southern Illinois University Carbondale*, alqarni86@hotmail.com

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THE REALIZATION FOR THE ENGLISH VOICELESS POSTALVEOLAR AFFRICATE /tʃ/  
IN NAJDI SAUDI ESL LEARNERS PRODUCTION

by

Abdullah Ahmed Alqarni

English Language Education  
B.A., King Khalid University, 2008

A Thesis

Submitted in Partial Fulfillment of the Requirements for the  
Master of Arts Degree

Department of Linguistics  
in the Graduate School  
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May 2013

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THESIS APPROVAL

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Abdullah Ahmed Alqarni

A Thesis Submitted in Partial  
Fulfillment of the Requirements  
for the Degree of  
Master of Arts  
in the field of Applied Linguistics

Approved by:

Dr. James A. Berry, Chair

Dr. Karen Baertsch

Dr. Krassimira Charkova

Graduate School  
Southern Illinois University Carbondale  
April 2<sup>nd</sup>, 2013

## AN ABSTRACT OF THE THESIS OF

ALQARNI, ABDULLAH AHMED, for the Master of Arts degree in Applied Linguistics, presented on April 2<sup>nd</sup>, 2013, at Southern Illinois University Carbondale.

TITLE: THE REALIZATION FOR THE ENGLISH VOICELESS POSTALVEOLAR AFFRICATE /tʃ/ IN NAJDI SAUDI ESL LEARNERS PRODUCTION

MAJOR PROFESSOR: Dr. James A. Berry

The current study investigated the realization for the English voiceless postalveolar affricate /tʃ/ in Najdi Saudi ESL learners' production. The goal of the study was to investigate whether Najdi Saudi ESL learners have difficulties in pronouncing /tʃ/. Both linguistic and extra-linguistic factors were taken into consideration. Eighteen Najdi ESL learners' with different length of residency in the US were the sample of the study. Sixteen English words with /tʃ/ in initial and final position represented the instrument of the study. Data were analyzed using both SPSS and Speech analyzer software. The results showed that Najdi ESL learners have difficulties with /tʃ/, and they pronounced it as /ʃ/. Pronunciation for /tʃ/ was more difficult in word-final position than word-initial. The study also, found that learners with longer LORs produced more accurate pronunciation than learners with shorter LORs. Commonly used words were not a variable of interest, however the study showed that learners had fewer errors with commonly used words, than uncommon ones. Finally, the results provided support for theories and hypotheses such as the CAH (Lado, 1957), MDH (Eckman, 1977), and LTT (Gass and Selinker, 1994).



In the name of Allah, the Most Gracious, the Most Merciful.

#### DIDICATION

To my parents, mother Faizah and father Ahmed, who stayed up nights praying and wishing me nothing but the best in life. To my brother Abdulrahman, my sunshine since I was a child, without his support and encouragement I would never be who I am today. To the rest of my brothers Saleh, Saad, and Abdualziz, and to my sisters Aidah and Husah. To my best friend Bandar Alghmaiz who is indeed a friend and without his suggestions, everything would have been harder. Finally, endless thanks and appreciations to my sweetheart wife Maram, where words fall short on describing her patience, support, understanding, and love. She spent nights lonely waiting me to finish my unfinished work. She motivated, supported and encouraged me and without her support, this work would not be completed. To the beauty of my life, I dedicate this work.

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## CHAPTER 1

### INTRODUCTION

Second language learners try hard to achieve a native-like pronunciation. Most of them encounter several embarrassing situations when they are misunderstood due to their pronunciation. Beside linguistic abilities, there are several factors affecting second language pronunciation accuracy should be taken into consideration such as exposure to a second language, first language influence, age, and motivation (Wong, 1987). However, pronunciation is not the only factor that second language learners struggle with. Vocabulary, grammatical features, phonological features, morphological features, and syntactic features are considered obstacles in the process of second language learning (Messiha, 1985). This study is focused on pronunciation and phonological features that second language learners struggle with, but other difficulties were worth mentioning.

This study will focus on the realization of the English voiceless postalveolar affricate /tʃ/ in Najdi Saudi ESL learners' production. In the following part, a brief introduction will be given regarding the two languages.

#### **1.1. Overview of Arabic and English Phonology**

Arabic is spoken by more than 422 million people around the world. It is descended from the Afro-Asiatic Semitic language family (Katzner, 2002). Through out the Middle East, most countries use Arabic as the official language. The Arabic language has a quite different language system from the English language; hence Arabic speakers encounter many learning difficulties when learning English. According to Wilkins (1972) when the second language system differs from the learner's first language system, learning difficulties and errors in performance are highly expected.

On the other hand, English is from a separate language family. English is from the Indo-European (Germanic) language family (Fulk, 2008). Some linguists think that the English language is not culturally exclusive to English native speakers anymore, but it is more of a language for a worldwide culture as it continues to grow (Graddol, 1997). Nevertheless English second language learners must pronounce its sounds as native English speakers would in order to be clearly understood. For that reason, Arabic speakers have to understand the pronunciation differences when learning English as a second language to avoid being misunderstood.

Within Arab countries, different dialects of Arabic are being spoken. One of these dialects is the Najdi dialect, which is spoken in the central area of Saudi Arabia. Speakers of Najdi Arabic whose their second language is English will be the main interest of the current study. Since the current study is focused on Najdi Arabic (Najdi dialect) ESL learners, a definition for dialects must be introduced. Lado (1957) defined dialects as “a manner of speaking showing pronunciation, words, expressions, and grammatical constructions used more or less uniformly throughout an area or a group of speakers, which manner differs from those of other speakers of the same language” (p. 22).

Najdi Arabic is one of the most popular Arabic dialects, and it is mainly spoken in the capital city of Saudi Arabia, Riyadh. It is considered the closest dialect to standard Arabic (Abboud, 1979). It is the royal family dialect, which gave it power over other dialects (Omar, 1975).

The Najdi Arabic phonemic inventory lacks several sounds that exist in the English language inventory and vice-versa. Najdi Arabic speakers have difficulties in the acquisition of English sounds that are absent in their inventory. In such cases, Najdi Arabic ESL learners might substitute for the new sounds with the most harmonic sounds from their native language system.

The Najdi Arabic consonant inventory lacks six consonant sounds that the English language consonant inventory has, which are /p/, /v/, /tʃ/, /ʒ/, /ɹ/, and /ŋ/ (Al-Feneekh, 1983; Al-Sweel, 1981). The rest of the sounds exist in Najdi Arabic consonants inventory; however some of them have different distribution than the sounds in the English consonants inventory. These sounds are considered to be the hardest to acquire by Najdi Arabic ESL speakers due to their absence in their consonant inventory. Hence, in the language learning process, Najdi Arabic ESL learners might substitute these sounds by similar ones that do exist in the Arabic language inventory.

A brief introduction about Najdi Arabic and English was given above. Also, an introduction about the main interest of this study, which is the realization of the English voiceless postalveolar affricate /tʃ/ in Najdi Arabic ESL learners' production, was given. In the following part, an explanation for the significance of this study, and how it is related to the current literature, will be introduced.

## **1.2. Significance of the Study**

There is a substantial body of research discussing pronunciation difficulties by ESL learners. Most studies that researchers (e.g. Al-Jasser, 1978; Altaha, 1995; Binturki, 2008) have done on Saudi ESL learners' pronunciation difficulties were focused on making an analysis of learners' mistakes to spot areas of difficulties. Moreover, further studies have focused on certain sounds like the voiceless labiodental stop /p/. However, none of the studies that can be found in the literature have discussed in depth all factors that might lead to pronunciation difficulties. In other words, there is no previous study in the literature that has focused on the production problems for the /tʃ/ sound by Najdi Arabic ESL learners. At the same time several studies have suggested that /tʃ/ would be problematic for Saudi ESL learners (Al-Braik, 1982; Ammar, Alhumaid, 2009; Huthaily, 2008), due to the non-existence of such a phoneme in both Najdi

Arabic and Modern Standard Arabic (MSA). Moreover, when reviewing the literature it is notable that there are several studies (e.g. Al-Jasser, 1978; Huthaily, 2008; Kopczyński & Meliani, 1993) stating that certain sounds are problematic for Saudi speakers, but there is not much focus on analyzing all the factors influencing learners' pronunciation.

The current study is aimed at answering some issues which are missing in the literature. By achieving the proposed goal of the present study, this would fit well with the previously discussed literature by other researchers.

As already noted, the investigated sound /tʃ/ has no equivalent in the Arabic language phonemic inventory, thus most Saudi ESL learners substitute for it with the most closely-related one that Arabic has, which is the voiceless postalveolar fricative /ʃ/. The substitution phenomenon is a common pronunciation strategy for second language learners. This study aimed at investigating the /tʃ/ sound in word initial and word final positions in order to provide a better explanation for the problem that Saudi ESL speakers encounter with the pronunciation of this particular sound. An extra-linguistics factor (length of residency) may influence the Najdi ESL learners' productions and this was a point of interest in the present study to fully cover the pronunciation difficulties with the English voiceless postalveolar affricate /tʃ/ by Najdi Saudi ESL speakers.

After discussing how the current study would fit with the previous literature, the following section will introduce the status of both postalveolar fricatives and affricates in Arabic and English. Moreover, a detailed description for the sounds involved in this study will be introduced to help in analyzing results, and to provide further information about the status of the sounds of interest in world languages.

### 1.3. Postalveolar Fricatives and Affricates in Arabic and English

The English postalveolar affricate has two versions, the voiced version /dʒ/, and the voiceless version /tʃ/. The voiceless postalveolar affricate /tʃ/, which is the main interest of the current study, is the most popular affricate sound across the world's languages. In one survey, it was found in 141 out of 317 languages (44.5%) studied (Maddieson, 1984). However, the voiceless postalveolar affricate does not exist in either Najdi or Standard Arabic phonological systems (Al-Braik, 1982; Ammar, Alhumaid, 2009; Huthaily, 2008). Despite this, the voiceless postalveolar affricate /tʃ/ does exist in some varieties of Arabic like the Iraqi dialect, the Jordanian dialect, and the Khaliji dialect, which is spoken in gulf countries and the east of Saudi Arabia, where the /k/ sound in certain environments is pronounced as /tʃ/ (Al-Braik, 1982; Qafisheh, 1977). Arabic ESL learners who came from one of these areas are not expected to have difficulties in pronouncing the /tʃ/ since it does exist in their Arabic dialect (Al-Braik, 1982). There are other Arabic dialects that have the /tʃ/ sound (e.g. Egyptian Arabic), but speakers of such dialects treat this sound as two phonemes by breaking it with epenthetic vowel (Watson, 2002).

The English postalveolar fricative also has two versions, the voiced version /ʒ/, and the voiceless version /ʃ/. The voiceless postalveolar fricative /ʃ/ is the second most frequent fricative sound found in world languages. In the same survey of world languages mentioned above, it was found in 146 out of 317 languages (46%) around the world (Maddieson, 1984). The voiceless postalveolar fricative /ʃ/ is not a problematic sound for Arabic ESL learners, because it exists in both Arabic and English (Al-Braik, 1982; Huthaily, 2008). In general, affricate sounds have less existence in world languages, and the postalveolar fricatives are somewhat more frequent in world languages, than the postalveolar affricates (Maddieson, 1984).

The affricate consonants are sounds that start with a stop and end with a fricative release. According to Nathan (2008), affricates are produced by combining a complete closure with a slow release of that closure, resulting in “hissing” instantly following the release. On the other hand, fricatives are produced when the vocal tract is neither closed, nor open. The vocal tract closure must be incomplete by placing two articulators (e.g. tongue and alveolar ridge) close to each other, which results in a turbulent airstream and “hissing” noise (Nathan, 2008). Sound voicing depends on the shape of the vocal cords, when producing certain sounds. The voiced version of certain sounds is produced when the vocal cords vibrate, and when there is no vibration, the voiceless version is produced.

Since the voiceless postalveolar affricate /tʃ/ and fricative /ʃ/ are the focus of the current study, a detailed description of the articulation for these two sounds must be presented. Both sounds’ place of articulation is postalveolar. Rogers (2000) described the articulation of postalveolars by saying, “postalveolar sounds are made with the blade of the tongue articulating at the back of the alveolar ridge and the front of the tongue raised towards the palate” (p. 7). When producing postalveolars, the air is directed toward the lower teeth.

The investigated sound’s /tʃ/ manner of articulation is affricate. Combining a stop and fricative together produces sounds categorized as affricates. The investigated sound is a combination of the voiceless alveolar stop /t/, and the voiceless postalveolar fricative /ʃ/, but it acts as a single phoneme in English. This sound is articulated by placing the tip of the tongue on the alveolar ridge to form a complete closure, so that air cannot escape the mouth. After that, speakers pull the tongue away from the roof of the mouth in order to let the air flow through a small opening between the lower and the upper articulators, producing a friction-like sound (Rogers, 2000).



As a result of having the two sounds in English as two separate phonemes, the occurrence of minimal pairs, two words that are identical unless for one phoneme, is highly expected (Nathan, 2008). Therefore, Arabic learners may make mistakes in English minimal pairs like the words *share* /ʃɛəɪ/ vs. *chair* /tʃɛəɪ/. In the previous example, making mistake in pronunciation would lead to semantic ambiguity. Table 1 shows the status of postalveolar fricatives and affricates in Najdi Arabic and English (Al-Feneekh, 1983; Al-Sweel, 1981).

Table 1

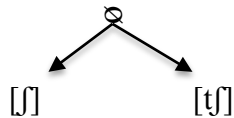
*Postalveolar Fricatives and Affricates in Najdi and English*

	Najdi Arabic Postalveolar		English Postalveolar	
	Voiceless	Voiced	Voiceless	Voiced
Fricative	ʃ		ʃ	ʒ
Affricate		dʒ	tʃ	dʒ

Najdi Arabic ESL speakers may find it difficult to make a distinction between above-mentioned English minimal pairs due to the absence of /tʃ/ in their phonemic inventory. In such a case, a negative transfer occurs, where they transfer /ʃ/ from Arabic in place of English /tʃ/ as language transfer theory implies (Gass & Selinker, 1994). Table 2 shows the phonemic status for sounds of interest in the English native speakers' minds, and Najdi Arabic speakers' minds.

Table 2

*Phonemic Status of /ʃ/ and /tʃ/ in Both English and Najdi Arabic*

Language	Voiceless Postalveolar Fricative	Voiceless Postalveolar Affricate
English	/ʃ/ ↓ [ʃ]	/tʃ/ ↓ [tʃ]
Arabic	/ʃ/ ↓ [ʃ]	

The present study will be presented in five chapters. Chapter one included introduction to the research issue, a brief overview on the Arabic and English languages, the significance of the study, and the status of postalveolars fricatives and affricates in Arabic and English. Chapter two will include a discussion of theories, hypothesis, and empirical literature in relation to the present study issue. Chapter three will include a detailed explanation for the methodology of this research. Chapter four will show a detailed account for the results of the data analyses. Chapter five will include a discussion for the current study findings, and relate the results with the current body of literature. Also, it will provide some limitations, future recommendations, and some pedagogical implications for the current study.

## CHAPTER 2

### LITERATURE REVIEW

This chapter discusses the literature related to pronunciation difficulties second language learners encounter. Second language learners have difficulties with different sounds depending on their first language and the second language they are pursuing. For that reason, this chapter is organized into four sections to create a more relevant discussion of the literature. The first section presents theories and hypotheses related to the current study. These theories served as a theoretical framework for the present study and were used to interpret its results. The second section presents pronunciation difficulties for ESL learners with different first languages. The third section presents pronunciation difficulties for Arabic ESL learners. The fourth section presents common phonological processes in relation to the current study. The discussion of the literature was focused on those aspects that mattered the most to the current study.

#### **2.1. Related theories**

**2.1.1. The Markedness Differential Hypothesis (MDH).** According to Gass and Selinker (2008), markedness has two levels: marked and unmarked sounds. Marked sounds are less common in the languages of the world, whereas unmarked sounds are more common. Eckman (1977) proposed The Markedness Differential Hypothesis (MDH) that suggested the acquisition of marked sounds such as aspirated stops would be harder for second language learners than the acquisition of unmarked sounds such as unaspirated stops. In other words, features of a target language that are different from a learner's first language but more common in the majority of the world's languages, i.e. features that are less marked, should be easier for a learner to acquire. However, features of a target language that are different from a learner's first language but less common in most languages, i.e. features that are more marked, should be

harder for learners to acquire.

This hypothesis was essential to this study since the investigated sound /tʃ/ is considered to be a more marked sound than /ʃ/. Therefore, applying the hypothesis helped in describing the phonological difference between Arabic and English, and how the differences affected learners' pronunciation. The hypothesis suggested that learners would find it difficult to acquire the English voiceless postalveolar affricate /tʃ/.

**2.1.2. The Language Transfer Theory.** According to Gass and Selinker (1994), during a second language acquisition process, there is interference from a learner's first language. The interference has two types: positive interference and negative interference. Positive interference is interference that does not cause errors in the learner's second language production as a result of successful transfer. On the other hand, negative interference is stated as interference that causes errors in the learner's second language production as a result of unsuccessful transfer of some of the features of the learner's first language. The transfer not only occurs with linguistic features, but can also be applied to meanings, forms, and understanding when learners try to produce the second language using their first language abilities (Lado, 1957). Moreover, Gass and Selinker (1994) stated that similarities between a learner's first language and the target language would result in fewer difficulties in the acquisition process, and vice-versa.

This theory was necessary to this study because of its importance to the process of second language learning. The theory suggested that learners were not producing the English voiceless postalveolar affricate /tʃ/ because of interference (negative transfer) from their first language. First language interference would be clearly shown if learners produced the Arabic voiceless postalveolar fricative /ʃ/ instead of producing the English voiceless postalveolar affricate /tʃ/.

**2.1.3. Contrastive Analysis Hypothesis.** The Contrastive Analysis Hypothesis (CAH), proposed by Lado (1957), stated that in a foreign language learning process, elements that are different from a learner's native language are the most difficult to learn, while elements that are similar to a learner's native language are easier to learn. He claimed that in order to understand difficulties a second language learner might encounter, structural descriptions of both the learner's first and second languages should be compared to predict the areas of greatest divergence and focus on them since those elements are the cause of most difficulties for the learner. Lado (1957) also stated that elements shown to be different between first and second language systems using contrastive analysis should not be considered valid areas of difficulty unless proved to be so by the actual speech of second language learners. Using phonological interference, Erdmann (1973) provided evidence supporting CAH when he stated that English speakers of German often mispronounced the word *Volkswagen*, since in German the graphic symbol *w* represents the phoneme /v/, while in English it represents the phoneme /w/.

The criticism from most linguists regarding this hypothesis was that learners' problems were not predictable and that not all elements shown to be different by the contrastive analysis of the first and second language systems became problematic for learners and vice-versa. Moreover, Brown (1987) suggested that when elements to be learned were similar, interference technically occurred more, while if the elements to be learned were completely different, interference occurred less. In other words, items that are different between two languages are easier to learn than ones that are similar.

Applying the CAH to the current study helped in predicting Najdi ESL learners' mistakes by examining the different elements of the Arabic and English phonological systems. It also helped in explaining the substitution phenomenon displayed by Najdi ESL learners by

substituting the Arabic /f/, which was the closest phoneme to the target sound in their sound inventory, for the English /tʃ/.

**2.1.4. Length of residency (LOR) in the target language community.** The current study took into consideration the effect on pronunciation accuracy of the extra-linguistic factor LOR in the target language community; therefore, some discussion of LOR must be introduced. Second language researchers investigated the effect of LOR in the target language community on the acquisition of second language features. Several studies (Asher & García, 1969; Flege & Fletcher, 1992; Flege & Liu, 2001; Fu, 2010) showed that the more time second language learners' spent in the target language community, the more their second language skills improved. In other words, there was a positive significant relationship between LOR in the target language community and the acquisition of second language features.

Asher and García (1969) carried out a study with Cuban second language learners (both children and adults) and investigated the effects of age, LOR in the target language community, and gender on the goal of achieving native-like pronunciation. The study involved forming two groups. The first group was the experimental group, consisting of 71 male and female Cuban immigrants between 7 and 19 years of age, whose LOR in the US ranged from 1 to 8 years. The second group was the controlled group, and consisted of 30 American children, who were native speakers of English. The study involved recording the participants uttering English sentences followed by an evaluation for their pronunciation accuracy.

The results of that study showed that none of the participants achieved native-like pronunciation. Only 15% of the participants who had spent between 1 and 4 years in the US showed near-native pronunciation, while 51% of the participants who had spent between 5 and 8 years in the US showed near-native pronunciation. In other words, participants who had spent

less time in the US showed a pronunciation that was less native-like compared to those who had spent more time in the US. By the end of the study, the researchers stated that LOR in the US was an important factor affecting pronunciation accuracy. The results of the study supported the notion that LOR in the target language community had a positive effect on learners' pronunciation of a second language.

More support for the positive effect of LOR in the target language community on second language pronunciation came from a study conducted by Flege and Fletcher (1992) where they examined several issues for second language learners, one of which was LOR in the target language community. Specifically, they examined the English pronunciation of 30 Spanish native speakers. The study involved two groups of Spanish learners of English living in the US. The first group consisted of learners who had spent an average of 14.3 years in the US. The second group consisted of learners who had spent an average of 0.7 years in the US. The results showed that Spanish learners who had spent a longer time in the US showed a more accurate pronunciation compared to those who had spent less time in the US. These results supported those of Asher and García (1969) and provided further support for the notion of LOR and its positive effect on the accuracy of learners' production.

Flege and Liu (2001) also investigated the effect of LOR on second language acquisition. Specifically, they examined the effect of LOR on Chinese native speakers' acquisition of English. The Chinese participants were divided into four groups of 15 participants each based on their LOR in the US, a short residency being 0.5 to 3.8 years compared to a long residency of 3.9 to 15.5 years, and their occupation (students vs. nonstudents). The participants were subjected to three different tests for the purpose of investigating their knowledge of English sentence structure, English comprehension, and identification of English stop consonants. Several

materials were used including grammatical sentences, ungrammatical sentences, and The University of Michigan Language Institute Listening Comprehension Test.

The study results revealed that the scores for students with long LORs were significantly higher than the scores for students with short LORs. On the other hand, the scores for nonstudents with different LORs were not significant. In addition, the researchers stated that the reason behind the significance of LOR for students could have been the kind of input students had from native speakers. The results of Flege and Liu's (2001) study supported some of the previously mentioned results in the literature and contradicted others, and therefore contributed to the current study.

Further support for previously illustrated results came from a study conducted by Fu (2010). Through both perception and production tasks, Fu examined the effect of LOR in the US on the accuracy of Taiwanese ESL learners' pronunciation of English interdental fricatives. A sample of thirty-six Taiwanese ESL learners was divided into three groups; the first group had an average LOR of 1 year, the second group 3 years, and the third group 7 years. The study results showed a positive correlation between LOR in the US and accuracy of pronunciation. In other words, the more time learners had spent in the US, the fewer pronunciation errors they made. The study results added further support to the current body of literature and supported the positive effect of LOR on pronunciation.

There were several studies in the literature that supported the positive effect of LOR in the target language community on second language pronunciation; however, there were some studies that did not support the idea. Flege (1988) contradicted previously mentioned studies when he examined two groups of Taiwanese ESL learners. The first group had an average LOR in the US of 1.1 years, while the second group had an average of 5.1 years. All participants had



come to the US after the age of 20. The results showed no significant difference between the scores of the two groups. The results of Flege's (1988) study contradicted the results of several studies in the literature, and at the same time supported others.

In the literature, several studies discussed LOR, and most of them found it positively significant while a few did not. Since LOR was a variable of interest in the current study, the current study examined the relation between participants' pronunciation accuracy and the period of time they had spent in the target language community (LOR). Therefore, the current study adds to the existing body of empirical literature regarding LOR and its influence on second language learners' pronunciation accuracy. The next part provides a discussion of studies that investigated pronunciation problems encountered by ESL learners of first languages other than Arabic.

## **2.2. Related Studies**

**2.2.1. Pronunciation difficulties of ESL learners whose first language was not Arabic.** The current study investigated the pronunciation difficulties posed by the voiceless postalveolar affricate /tʃ/ for Najdi Arabic ESL learners. Since not all languages have the same sound system, many languages besides Arabic lack /tʃ/ in their phonological systems. As a result, ESL learners encounter difficulties in learning English sounds that are absent from their first languages.

Tiono and Yostanto (2008) investigated errors Indonesian ESL learners tend to make with new phonemes that do not exist in the Indonesian phonemic inventory. The study focused on the phonemes /v/, /θ/, /ð/, /ʒ/, /dʒ/, and /tʃ/ in 3 word positions (initial, middle, and final). Twenty-five Indonesian university students who had taken English speaking classes for six

semesters constituted the sample of the study. The subjects were recorded reading a word list, and then their recordings were transcribed using the IPA.

The study revealed several types of substitution processes. All the investigated sounds were replaced by other sounds. /tʃ/ was replaced by 5 different phonemes: /c/ word-initially and medially and /k<sup>h</sup>/, /h/, /s/, and /ʃ/ in word-medial position only. Interestingly, none of the participants substituted /tʃ/ in word-final position. The researchers stated that the dominant substitution pattern for /tʃ/ was the voiceless palatal stop /c/. Moreover, the researchers concluded that /tʃ/ was a problematic sound for Indonesian ESL learners, unless in word final position. The fact that all the sounds that CAH predicted to cause problems for Indonesian ESL learners did cause problems in the above study strongly supported the CAH. Moreover, the results also further supported LTT since the investigated sounds were substituted with phonemes that existed in the Indonesian sounds system.

Further support for the CAH came from a study conducted by Chan (2010) who investigated sounds found in the literature to be problematic for Cantonese ESL learners. Fifteen consonants, including /tʃ/, and eight vowels in word-initial and final positions were the focus of the study. Forty advanced Cantonese learners of English constituted the sample of the study. Sounds were investigated through a word list, minimal pairs, and connected speech.

The results of Chan's (2010) study supported previous studies on Cantonese ESL learners. The CAH was supported by the finding that sounds that did not exist in the Cantonese sound system were found to be problematic for ESL learners. Moreover, most difficult sounds were replaced with similar sounds from the Cantonese sound inventory. /tʃ/ did not cause much difficulty for Cantonese ESL learners (error rate 1%), and when it did cause difficulties, it was replaced with either /ʃ/ or /ts/ without regard to word position. In addition, these results

supported the LTT since learners transferred phonemes from their first language to their second language. The results of the study also partially supported the MDH because some marked sound that did not exist in the Cantonese sound system did not cause problems for learners, and due to the high success rate in pronunciation, the researcher considered them to be slips of the tongue on the part of the learners and therefore insignificant to the overall results.

A recent study that provided more empirical support for the MDH was conducted by González Johnson (2012). Her study focused on native Panamanian Spanish ESL learners and investigated their realization of both English /f/ and /tʃ/. Panamanian Spanish is a dialect of Spanish, in which /tʃ/ has two allophonic variations, [tʃ] and [ʃ], which occur in free variation. In the study, 25 native Panamanian Spanish speakers who had never been abroad were asked to read a word list containing 7 words with /f/ word-initially, 7 with /f/ word-finally, 7 with /tʃ/ word-initially, and 7 with /tʃ/ word-finally.

González Johnson (2012) showed that /f/ was pronounced correctly significantly more often than /tʃ/ and that the mispronunciations of /tʃ/ were primarily its replacement with /f/. Thus, Panamanian Spanish speakers transferred the /f/ phoneme from their dialect into English. With regards to sound position within a word, both /tʃ/ and /f/ were pronounced slightly more accurately when in word-final position. The results strongly supported the MDH since /tʃ/ is considered to be more marked than /f/, and the results showed more difficulties with /tʃ/. Moreover, the results also supported the CAH, as /tʃ/ was predicted to be a difficult sound for Panamanian Spanish learners of English as shown by learners' tendency to transfer the dominant allophone [ʃ].

Using the CAH, Rehman, Khan, and Bukhari (2012) studied consonants problematic for Pashto ESL learners. Fifteen native Pashto college students were randomly chosen for the

sample. The researchers used word lists and sentences containing the investigated sounds /f/, /v/, /θ/, /ð/, and /ʒ/ in initial, medial, and final word positions. The participants were recorded with PRAAT software and later analyzed using spectrograms.

The analysis of the data showed that Pashto ESL learners substituted all the investigated phonemes with similar sounds from Pashto's consonant inventory, therefore supporting the LTT. The participants substituted /p/ for /f/, /w/ for /v/, /t/ for /θ/, /d/ for /ð/, and /dʒ/ for /ʒ/. The position of investigated sounds within words did not significantly affect the results, although word-final position was slightly more difficult than the other positions. The researchers concluded that Pashto speakers of English replaced sounds that did not exist in Pashto's consonant inventory with similar sounds in the same place of articulation that did exist in Pashto and without regard to the manner of articulation.

This part shed light on several studies discussing pronunciation problems encountered by ESL learners of first languages other than Arabic for the purpose of giving a background from different languages. In the next part, studies focused on Arabic ESL learners are discussed in order to narrow the focus of the discussion and to investigate what other researchers have discussed regarding pronunciation difficulties specifically encountered by Arabic ESL learners.

**2.2.2. Arabic ESL learners' pronunciation difficulties.** Both Arabic and English have the voiceless postalveolar fricative /ʃ/ as a separate phoneme. While the Arabic sound system does not have the voiceless postalveolar affricate /tʃ/, it is found as a phoneme in English. As a result of the dissimilarity between the Arabic and English sound systems, learning difficulties occur. Altaha (1995) stated that there were studies in the literature investigating several linguistic issues regarding Arabic ESL learners, although pronunciation problems were not fully investigated yet. This study strongly supported Altaha's observation, and after looking at the

current body of literature, it was clear that there were few studies about the pronunciation problems of Arabic ESL learners. More specifically, most studies focused on grammatical issues or provided a general overview of pronunciation problems without deeply investigating the reasons behind these problems or recommending possible solutions.

Many researchers used the CAH as a theoretical framework for their studies. A study based on the CAH was done by Al-Jasser (1978) using the consonant inventories of both Arabic and English. The study focused on the phonemic, allophonic, and suprasegmental features of both languages. Lado (1957) stated in his CAH that the comparison of the structures of first and second languages would shed light on areas of difficulty individuals would encounter when learning a second language. Al-Jasser's analysis showed that /p/, /v/, /ŋ/, /g/, /ʒ/, /ɹ/, and /tʃ/ were the sounds that Arabic ESL learners would encounter problems with.

CAH was the cornerstone of Al-Jasser's study, and his results strongly supported the hypothesis since the areas of difficulty the study anticipated were found in the literature to be problematic for Arabic ESL learners. Al-Jasser also stated that Arabic ESL learners might transfer the sounds in Arabic sounds inventory that were most similar to the English target sounds, which would result in a substitution process. The above study was essential to the current research because it explored the main areas of divergence between English and Arabic where phonological errors occurred.

Altaha (1995) investigated pronunciation problems of Saudi ESL learners. The sample was composed of Saudi University students majoring in English who had taken several English courses, one of which was English phonetics. The data was collected through recordings over a period of four years and then analyzed. The results showed that Saudi learners had problems with several consonants, including /p/, /v/, and /tʃ/. In words such as *chair* and *share*, Saudi learners

produced /f/ instead of /tʃ/. Altaha concluded that learners' mispronunciations were a result of differences between the Arabic and English phonetic systems. These results supported the CAH since these difficulties were predicted earlier by the hypothesis. The LTT was also supported in Altaha's study since learners transferred phonemes from their first language to their second language.

Recently, more studies were conducted on Arabic ESL learners' pronunciation errors, and these studies supported the previous studies. Binturki (2008) conducted a study discussing some of the sounds previously marked in the literature as difficult sounds for Arabic ESL learners (Al-Jasser, 1978; Altaha, 1995). The Najdi Arabic dialect and the sounds /p/, /v/, and /ɪ/ were chosen to be the focus of his study. He was attempting to determine whether these sounds were problematic and whether the environment and context of the investigated sounds had any influence on learners' production. The study's sample was made up of 5 Najdi ESL learners that were currently studying in the US. The participants were recorded reading a word list and a passage containing the investigated sounds in different word positions. The recordings were analyzed using Speech Analyzer and then transcribed with the IPA.

The results of Binturki's (2008) study supported the results of Aljasser (1978) and Altaha (1995), where the three investigated sounds /p/, /v/, and /ɪ/ were discovered to be problematic for Najdi Saudi ESL learners. All the investigated sounds were more difficult to be pronounced correctly by the participants in word-final position, and more difficult in context than in isolation. Binturki's study focused on Najdi dialect ESL learners; therefore the results could not be generalized to other Arabic dialects, but it was relevant to the current study since it was focused on Najdi Arabic.

Another recent study on the pronunciation errors of Saudi ESL learners who had never been to any English speaking country was conducted by Ammar and Alhumaid (2009). The study focused on Najdi Arabic's phonetic interference in the acquisition of English by Saudi female undergraduates. In all possible word positions (initial, middle, and final), they examined the sounds /p/, /v/, /ŋ/, /tʃ/, /dʒ/, /ʒ/, /θ/, /ɪ/, /l/, and /ð/, which were previously shown in the literature to be problematic for Arabic ESL learners (Al-Jasser, 1978; Altaha, 1995; Binturki, 2008). Thirteen Najdi Arabic ESL learners studying English in a Saudi Arabian university were the sample of the study.

The results showed that participants encountered L1 interference with all the investigated sounds, supporting the LTT. The total mispronunciation percentages for words in the list were 93.5% for /ŋ/, 69.6% for /ʒ/, 50.8% for /p/, 44.5% for /ɪ/, 19.6% for /tʃ/, 36.6% for /ð/, 26.7% for /l/, 21.5% for /dʒ/, 11.8% for /v/, and 7% for /θ/. The results also showed that there were some variations in the mispronunciation percentages depending on the position of a sound within a word, though the researchers did not consider it to be significant. The sound /tʃ/, which is the main focus of this study, was mispronounced 14.4% word-initially, 31.1% word-medially, and 10% word-finally. In all the cases of mispronunciation, the /tʃ/ was replaced by either /f/, /t/, or /dʒ/.

The results of Ammar and Alhumaid (2009) supported the results of several studies in the literature (Al-Jasser, 1978; Altaha, 1995; Binturki, 2008). Al-Jasser's (1978) contrastive analysis of English and Arabic consonant inventories in an earlier study suggested that 6 out of the 10 investigated sounds in Ammar and Alhumaid's (2009) study would be problematic for Arabic ESL learners. Moreover, the results partially supported Binturki's (2008) analysis, since both studies found sounds were harder to pronounce in connected speech more than in isolation. On

the other hand, Ammar and Alhumaid's (2009) results suggested that the position of a sound within a word was not significant. This suggestion contradicted Binturki's (2008) results, where he stated that the sounds /p/, /v/, and /ɹ/ were harder to pronounce correctly in word-final position than in word-initial.

The position of a sound within a word has attracted the attention of several researchers investigating pronunciation problems. Ahmed (2011) studied the realization of /tʃ/, /ʒ/, /v/, /p/, /t/, /d/, and /ŋ/ in Saudi ESL learners' production in all word positions respectively. Eight Saudi university students from different regions were asked to read a word list while being recorded. None of the participants had traveled to any English speaking country at the time of the study.

The study revealed that Saudi ESL learners encountered minimal difficulties in pronouncing /t/ and obvious difficulties in pronouncing /tʃ/, /ʒ/, /v/, /p/, /d/, and /ŋ/. In the case of difficulties, the participants replaced the investigated sounds with similar sounds from the Arabic's sound system. In several sounds, word position played an important role, but in others it did not. The sound /tʃ/ was mispronounced in all three word positions, and was replaced with /f/. The participants had the most difficulty with /tʃ/ in word-final position (with an error rate of 24.7%) and almost the same error rate between word-medial (12.5%) and word-initial position (12.3%). The results regarding the position of a sound within a word both contradicted and supported previous studies investigating the same issue (Ammar & Alhumaid, 2009; Binturki, 2008). In the current study sound position within a word was investigated since it was shown in the literature to be a controversial issue.

An analysis of the Arabic sound system and a comparison with English phonology could provide a deeper understanding of errors ESL learners might encounter. In the previously discussed literature, it was noticeable that when /tʃ/ was mispronounced, /f/ almost always



appeared as the preferred replacement (Ahmed, 2011; Altaha, 1995; Ammar & Alhumaid, 2009). This kind of substitution was illustrated by the analysis of Kopczyński and Meliani (1993) regarding the Arabic and English sound systems for the purpose of providing more information about Modern Standard Arabic (MSA) and to shed light on some areas of difficulty that Arabic ESL learners might encounter. Their analysis showed that due to the large differences between the two languages' sound systems, Arabic ESL learners would encounter many difficulties in pronunciation. They stated that English /tʃ/ would be simplified by Arabic ESL learners to become Arabic /f/ due to the nonexistence of /tʃ/ in Arabic.

In this section, several studies in the literature were discussed that investigated pronunciation problems encountered by Arabic ESL learners in order to narrow the focus of the literature and to summarize what other researchers have discussed. This allowed for the comparison of the findings of the current study with previous studies. In the next section, brief discussion of phonological processes frequently made by second language learners are introduced.

### **2.3. Phonological Processes**

There are several processes second language learners tend to make when uttering specific target language phonemes. The previously discussed literature showed that ESL learners tended to substitute some new phonemes in a second language with phonemes from their first language, which resulted in a substitution and transfer processes.

Lenition is one of the most common processes second language learners make when encountering new or different phonemes in a target language. Lenition was defined by Kirchner (2004) as a process in which the target sound is articulated weaker than usual. This could be the underlying process behind /tʃ/ becoming /f/. Kopczyński and Meliani (1993) previously

suggested that Arabic ESL learners would simplify /tʃ/ to /ʃ/. Moreover, this process is called *deaffrication* since the sound changes from being an affricate to being a fricative (Campbell, 2004). Najdi Arabic learners of English might deaffricate the investigated sound /tʃ/ to a fricative /ʃ/.

The purpose of this study was to investigate the realization of the voiceless postalveolar affricate /tʃ/ in Najdi Arabic learners of English. The previously mentioned theories, hypotheses, and studies served as a theoretical framework for the current study. These theoretical elements will be referred to in the discussion chapter.

## CHAPTER 3

### METHODOLOGY

This chapter presents some essential aspects of how this study was conducted. Detailed information about the research problem, questions and hypothesis, subjects, variables, instrument and procedures, scoring, and analysis of the data are discussed in this chapter.

#### **3.1. Research Problem**

As mentioned above, the current study investigated the production of an absent sound in the Arabic language inventory by Najdi Saudi ESL learners. Specifically, this study investigated the realization of the English voiceless postalveolar affricate /tʃ/ in Najdi Saudi ESL learners' production, and what sounds learners produced when they utter words that have the English voiceless postalveolar affricate /tʃ/. Linguistic factors such as the position of the investigated sound in a word, error types, and substitution processes for that sound were essential to the present study. Moreover, in the present study, the extra-linguistic factor *length of residency* was also focused on.

#### **3.2. Research Questions**

This study was conducted to answer four specific questions in relation to production difficulties that Najdi Saudi ESL learners encounter. The goal of this study was to provide an answer for the following questions.

- 1- Do Najdi Saudi ESL learners experience difficulties producing the English voiceless postalveolar affricate /tʃ/?
- 2- Does the environment (word initial or final) in which /tʃ/ occurs influence the accuracy of its pronunciation?

- 3- What are the main types of mispronunciations of the voiceless postalveolar affricate /tʃ/ and do they differ for initial and final position?
- 4- Is there a significant relationship between participants' length of residency (LOR) in the US and the accuracy of pronouncing the voiceless postalveolar affricate /tʃ/?

### **3.3. Subjects**

The participants in this study included 18 Najdi Saudi ESL learners (9 males and 9 females). All the participants were raised in and lived in Saudi Arabia, specifically in the Najd region, prior to coming to the United States. Najdi Saudi ESL students were randomly chosen from a US university. All participants were living and studying in the United States at the time of the study, and were between 20 and 35 years old at the time of the study, with an age mean of 27. Participants' length of residency was categorized into 2 groups, 6 months and 1 year and more. Each participant has studied English for six years at least (intermediate and secondary school) prior to coming to the US.

### **3.4. Variables**

This study had one dependent variable, and two independent variables. The production errors that participants pronounced in the investigated sound constituted the dependent variable in the current study. The first independent variable was the target sound position in the word, with two levels: initial and final. The second independent variable was the extra-linguistic factor *length of residency* and its influence on the accuracy of the participants' production. Length of residency data was collected using the demographic information form.

### **3.5. Instrument and Procedure**

Since this work focuses on the utterance of the subjects regarding the investigated sound, each one of the subjects was examined individually after agreeing and signing the consent form

in order to participate in this study. The instrument of the present study was divided into two sections, (a) demographic information and (b) production task. Prior to examining the subjects, demographic information was collected through a questionnaire to elicit information that included educational status, age, gender, city of origin, dialect information, length of time spent learning English in Saudi Arabia, length of time spent learning English in USA, length of time spent living in the USA, and other languages spoken besides Arabic and English. The production task included a list of 16 words which contained the phoneme /tʃ/. Eight of them have /tʃ/ in initial position (e.g. *chapter*) and eight in final position (e.g. *speech*). Moreover, the production task included ten more words as distracters (see Appendix for complete instrument).

For the procedures of collecting data, first, an American English native speaker was asked to record the 16 words in order to use his pronunciation as a model for standard correct pronunciation. The American model speaker was a male, 22 years old from Mattoon, Illinois. He described his dialect as a mid western dialect. Later, the subjects were asked to read aloud the previously mentioned list of words and were recorded through *Speech Analyzer Software 3.0.1, 2007* (<http://www.sil.org/computing/sa/>). Participants were asked first to read the list of words to themselves silently for three minutes, to get familiar with the word list. When they were ready they informed the researcher to start recording. They read each word three times and the recording was done only once. Errors were counted as one and a score of zero was given for a correct answer. In addition errors were analyzed for their types. That is, the results were examined for other substitutions and/or omissions. The recorded data and demographic information were connected only by a simple code: "S1, S2" etc.

### 3.6. Data Analysis and Scoring

The procedure of data analysis was as follows. First, the data were recorded and analyzed using Speech Analyzer software. Using the spectrogram, productions for the English voiceless postalveolar affricate /tʃ/ were recognized. On the spectrogram, the /tʃ/ sound was recognized by a closure for the stop part followed by a sharp release for the fricative aperiodic noise part (see Figures 1 and 2). The participants' outputs were transcribed using IPA (International Phonetic Alphabet) symbols (version 2005). As mentioned earlier, errors were assigned a value of one, and correct responses were given zero. Then, the errors were analyzed for their types to check for any patterns that participants tended to make.

Furthermore, the data were analyzed using the Statistical Package for the Social Sciences (SPSS 20.0). Descriptive statistics, dependent t-test, and independent t-test analyses were performed. The dependent t-test was performed to investigate if there was any significant difference between word-initial and word-final positions. The independent t-test was performed to check whether there was any relation between participants' production and their length of residency in the US. The initial alpha level for all statistical tests of significance was set at alpha = .05.

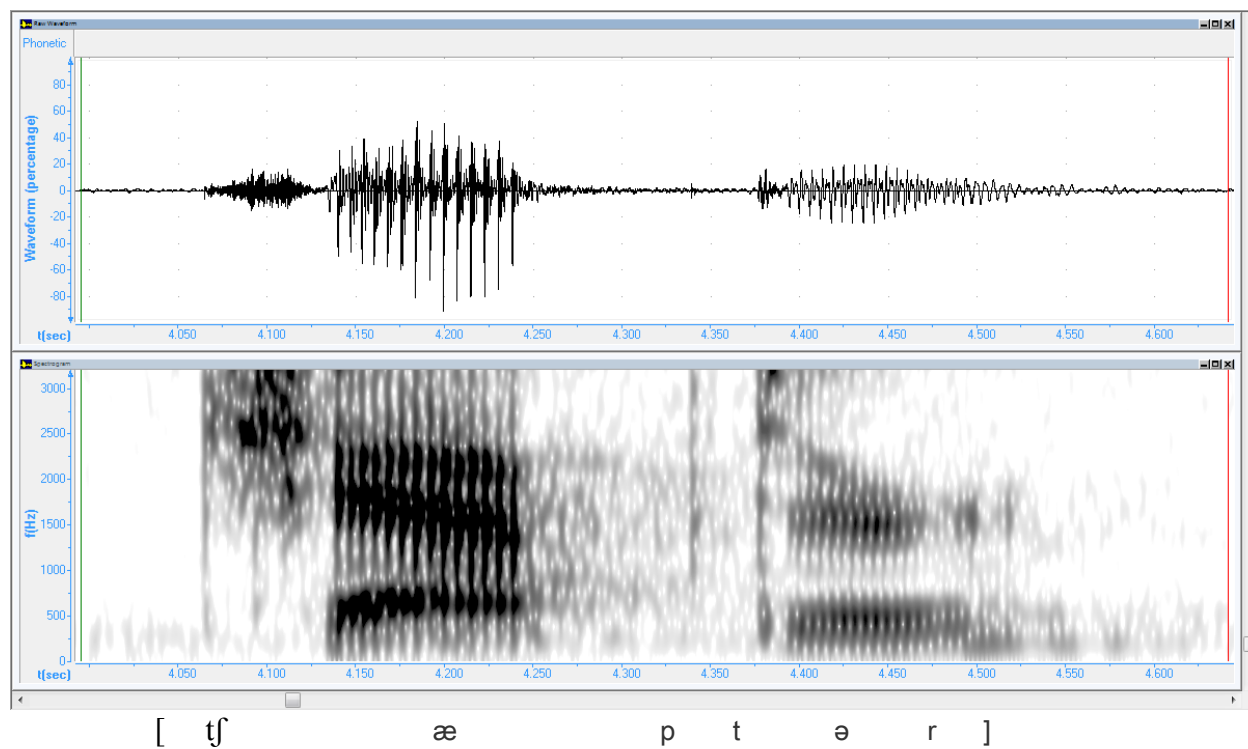


Figure 1. Spectrogram for *chapter* by a native speaker of English.

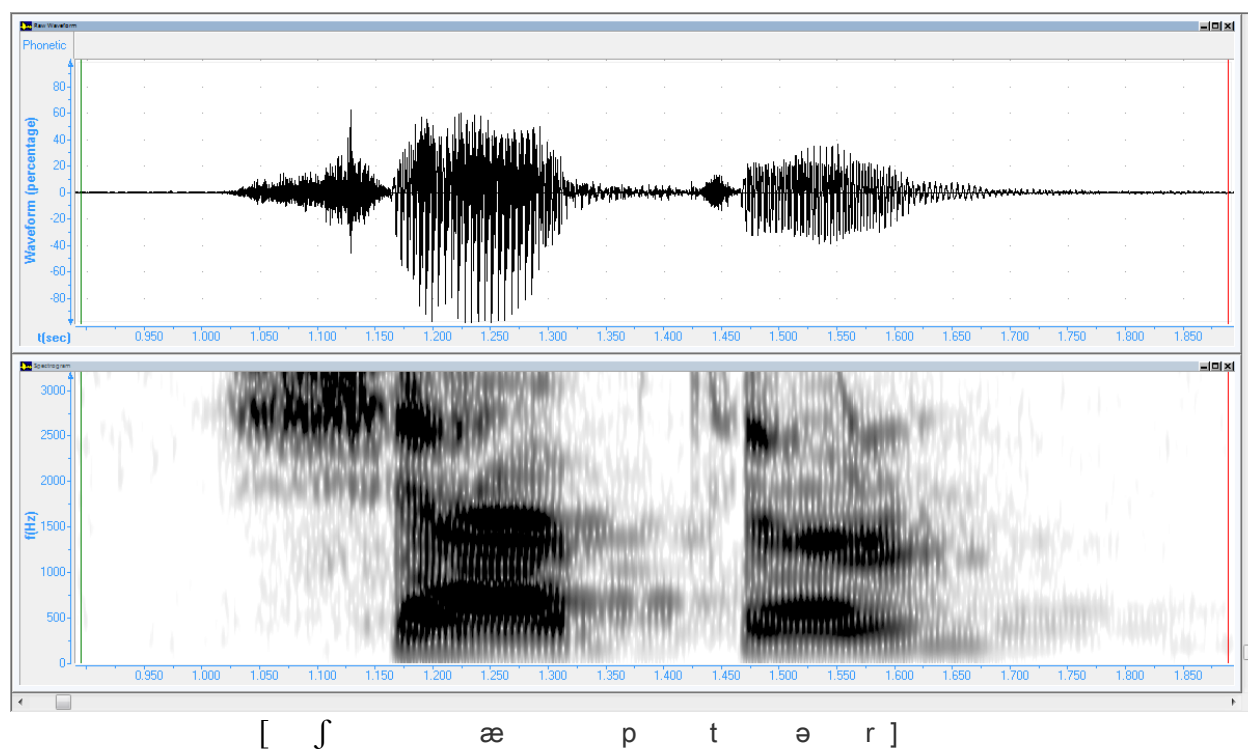


Figure 2. Spectrogram for *chapter* by Najdi Saudi Arabian speaker of English.

## CHAPTER 4

### RESULTS

This study aimed to investigate the realization of the voiceless postalveolar affricate /tʃ/ by Najdi Arabic speakers of English. The present study focused on the /tʃ/ sound in word-initial and word-final positions. Also, it focused on distinguishing production errors that participants made into types. Moreover, the extra-linguistic factor *length of residency* in the US was taken into consideration as an important factor that might influence participants' productions. In this chapter, the results of the study will be presented through descriptive statistics, frequency analysis of the most common errors in both positions, dependent t-test, and independent t-test analyses. The results will be introduced in the same order the research questions were presented.

#### 4.1. Results for Research Question 1

The first research question concerned whether Najdi Arabic speakers of English have difficulties in producing the voiceless postalveolar affricate /tʃ/. The results showed that Najdi Arabic speakers of English have difficulties in pronouncing the /tʃ/ sound. The results showed that every participant mispronounced the investigated sound at least once in words that have that sound. The participants who have spent only 6 months in the US showed significantly more errors in their production for the investigated sound than those participants who have spent one year or more in the US.

#### 4.2. Results for Research Question 2

The second research question concerned whether the environment (word-initial and word-final) in which /tʃ/ occurs influences the accuracy of its pronunciation or not. In order to answer this question, the two word positions (initial and final) were examined through descriptive statistics, and a dependent t-test. Moreover, Cohen's effect size *d* was calculated



following the method for the dependent t-test, that is the difference of means divided by the difference of SDs (Cohen, 1988).

**4.2.1. Dependent t-test results.** The dependent t-test showed a significant difference between errors in word-initial and word-final positions. The dependent t-test results showed that participants produced more errors in word-final position, and fewer errors in word-initial position,  $t(17) = 2.491, p = .023, d = 0.59$ . Also, the results showed that errors in word-initial position were 22% and in word-final position were 35%. According to Cohen (1988), the effect size  $d = .20$  can be interpreted as small,  $d = .50$  can be interpreted as medium, and  $d = .80$  can be interpreted as large. The result showed that the value for the effect size  $d = 0.59$  which offered another evidence that the pronunciation of the /tʃ/ sound is significantly affected by the word position. Table 3 shows the results of the dependent t-test.

Table 3

*Dependent t-test for Errors in Pronouncing /tʃ/ in Word-Initial and Word-Final Positions*

Position	N	M	SD	%	95% CI		t	df	Sig two tailed	Effect Size <i>d</i>
					Lower	Upper				
Initial	18	1.77	1.59	22%	.99	2.57	2.491	17	.023	0.59
Final	18	2.83	1.94	35%	1.86	3.80				

Note. % of errors was calculated by dividing the group error mean by total possible score of 8.

**4.2.2. Error frequencies per word position.** Frequency analysis was done to illustrate error percentages in word-initial and word-final positions. Table 4 shows the results of the frequency analysis that supported the t-test analysis results.

Table 4

*Frequency of Errors in Word-Initial and Word-Final Positions*

Position	0	1	2	3	4	5	6	7	8
	errors	error	errors	errors	errors	errors	errors	errors	errors
Initial	5 (28%)	4 (22%)	3 (17%)	3 (17%)	2 (11%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)
Final	0 (0%)	6 (33%)	4 (22%)	3 (17%)	0 (0%)	3 (17%)	1 (6%)	1 (6%)	0 (0%)

In Table 4 the results of error frequencies per position analysis shows that participants mispronounced /tʃ/ less often in word-initial position, and more often in word-final position. For instance, none of the participants (N=18) had zero errors with the /tʃ/ sound in word-final position versus 28% with zero errors in word-initial position. Furthermore, only 6% of the participants had 5 to 8 errors with the /tʃ/ sound in word-initial position while 29% of the participants had 5 to 8 errors with the /tʃ/ sound in word-final position. Finally, 0% of the participants had 8 errors in both word-initial and word-final positions. Both the t-test and error frequencies per position analyses show that word-final position is associated with significantly more difficulties for participants to produce the voiceless postalveolar affricate /tʃ/ than word-initial position.

**4.2.3. Error frequencies per word.** Frequency analysis was done to show the frequency of errors per each word. Table 5 shows the frequency of errors for words that have the /tʃ/ sound in word-initial position.

Table 5

*Errors per Word in Initial Position*

	chapter	cheap	cheese	chicken	chop	church	chunk	chair
Correct	12 (67%)	14 (78%)	15 (83%)	16 (89%)	10 (56%)	16 (89%)	12 (67%)	17 (94%)
Wrong	6 (33%)	4 (22%)	3 (17%)	2 (11%)	8 (44%)	2 (11%)	6 (33%)	1 (6%)

Table 5 shows the correct and incorrect pronunciations of each word that has the investigated sound in word-initial position. This table shows that the three words with the highest number of errors in the word-initial position are *chop* with 44%, and then *chapter* and *chunk* with 33% for both words. Moreover, the table shows that the three words with the least number of errors in the word-initial position are *chair* with 6%, and then *chicken* and *church* with 11% for both words.

Table 6

*Errors per Word in Final Position*

	speech	teach	pinch	arch	belch	brooch	coach	rich
Correct	15 (83%)	17 (94%)	1 (6%)	13 (72%)	8 (44%)	9 (50%)	15 (83%)	15 (83%)
Wrong	3 (17%)	1 (6%)	17 (94%)	5 (28%)	10 (56%)	9 (50%)	3 (17%)	3 (17%)

Table 6 shows the correct and incorrect pronunciation of each word that has the investigated sound in word-final position. This table shows that the three words with the highest number of errors in the word-final position are *pinch* with 94%, *belch* with 56%, and *brooch* with 50%. In addition to that, the table shows that the three words with the least number of errors

in the word-final position are *teach* with 6%, and then *coach* and *rich* with 17% for both words.

Chapter 5 will present further discussion for the factors that may lead to such a result.

### 4.3. Results for Research Question 3

Research question three focused on the main types of mispronunciations of the voiceless postalveolar affricate /tʃ/ and whether they differ for word-initial and word-final positions. The analysis of the participants' utterances (see Table 7) revealed that the dominant mispronunciation pattern was a substitution pattern. That pattern can be explained by saying that participants substituted the voiceless postalveolar fricative /ʃ/ for the voiceless postalveolar affricate /tʃ/. This substitution type occurred 32 out of 144 times (22%) in word-initial position, while the same pattern occurred 51 out of 144 times (35%) in word-final position. There was a single case by one subject where the /tʃ/ got substituted by the /k/ sound in word-final position. This single case did not form a pattern, but it is worth stating.

Table 7

#### *Types of /tʃ/ Mispronunciations*

Word position	/ʃ/ substitutions	/k/ substitutions
Initial	32 (out of 144)	0
Final	51 (out of 144)	1 (out of 144) (In <i>pinch</i> )

### 4.4. Results for Research Question 4

The fourth research question was aimed at investigating the effect of length of residency in the native language society on the /tʃ/ sound pronunciation by Najdi Arabic ESL speakers. Specifically, it investigated whether there is a significant relationship between participants' length of residency in the US and the accuracy of pronouncing the voiceless postalveolar

affricate /tʃ/ or not. Since there were two groups of participants, an independent t-test was done to answer the fourth research question.

**4.4.1. Independent t-test results.** The results revealed that there was a significant relationship between the participants' length of residency in the US and the accuracy of their pronunciation. Prior to the independent t-test, Levene's test showed that the assumption of homogeneity of variances between the two groups was observed,  $F(16) = 2.73, p = .12$ . The independent t-test results revealed that there was a significant difference in the scores of the six-month group ( $M = 6.70, SD = 2.45$ ) and the one-year group ( $M = 2.00, SD = 1.17$ ), therefore  $t(16) = 5.03, p < .001, d = 2.45$ . The effect size  $d$  for the current analysis ( $d = 2.45$ ) was larger than what Cohen's (1988) reported to be interpreted as large effect  $d = .80$ . This provided a further evidence that LOR in the US positively effected Najdi ESL learners pronunciation for the /tʃ/ sound (see Table 8).

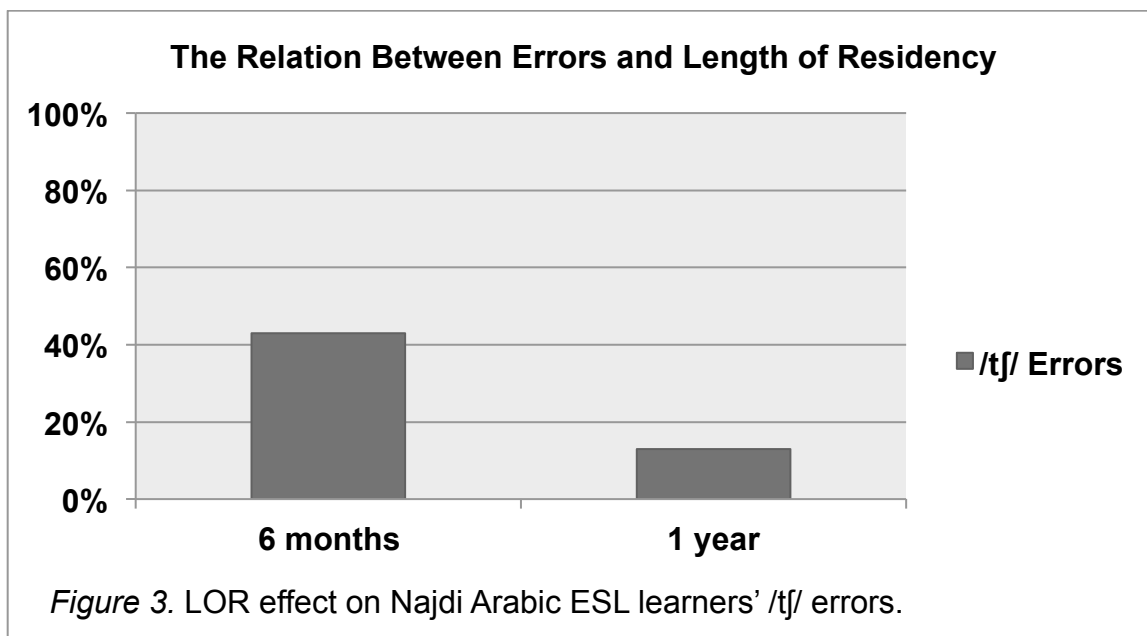
Table 8

*Independent t-test for /tʃ/ Pronunciation Errors and Length of Residency*

Length of Residency	N	M	SD	% Errors	t	df	Sig two tailed	Effect Size $d$
6 months	10	6.70	2.45	42%	5.03	16	.000	2.45
1 year	8	2.00	1.17	13%				

Note. % of errors was calculated by dividing the group error mean by total possible score of 16.

These results suggest that Najdi Arabic ESL learners who have stayed in the US for only six months produced significantly more errors when pronouncing /tʃ/, whereas those who have stayed one year and more produced significantly fewer errors when pronouncing /tʃ/. In other words, Najdi ESL learners' /tʃ/ pronunciation errors significantly decrease as they stay longer in the US (see Figure 3).



#### 4.5. Summary

To sum up, the results have revealed that Najdi Arabic ESL learners' pronunciation of the English voiceless postalveolar affricate /tʃ/ is affected by both linguistic and extra-linguistic factors. Thus, the /tʃ/ sound is harder to pronounce in word-final position for Najdi Arabic ESL learners than in word-initial position. Moreover, the participants used the voiceless postalveolar fricative /ʃ/ instead of the voiceless postalveolar affricate /tʃ/. Finally, the participants who reported that they have spent longer time in the US produced fewer errors than the ones who spent less time in the US. This chapter presented the results of the current study. These results are discussed and compared to the existing literature in chapter 5.

## CHAPTER 5

### DISCUSSION, LIMITATIONS, AND CONCLUSION

The current study investigated the realization of the English voiceless postalveolar affricate /tʃ/ by Najdi Arabic speakers of English. It investigated both linguistic and extra-linguistic factors that might affect Najdi Arabic ESL learners' realization of the /tʃ/ sound. The linguistic variables investigated were sound position within a word (initial and final), the type of sounds learners produced, and the frequency of errors learners produced per word. The extra-linguistic variable was the relation between length of residency (LOR) in the US and the pronunciation accuracy of the investigated sound.

This chapter will compare and combine the findings of the current study with the previously illustrated body of literature. Furthermore, it will test the hypotheses previously mentioned. Limitations, suggestions, implications, and conclusions for the current study will also be provided. The discussion for the current study's findings will be discussed, first with their linguistic and then extra-linguistic relation.

#### **5.1. Linguistic Variables Affecting Najdi Arabic ESL Learners' /tʃ/ Pronunciation**

The Contrastive Analysis Hypothesis (CAH) by Lado (1957) states that elements that are different from a learner's native language are the most difficult to learn. As previously illustrated in chapter 1, the investigated phoneme /tʃ/ is absent from the phonemic inventory of Najdi Arabic. The current study found that Najdi Arabic speakers of English had difficulties in pronouncing the English phoneme /tʃ/, and the total error percentage reached 29%. This finding provided empirical support for the CAH since /tʃ/ was expected by the CAH to cause difficulties based on the Al-Jasser's (1978) comparison of the two languages' phonemic inventories (Lado, 1957).

This finding also provided further support for previous studies that suggested that the English phoneme /tʃ/ would cause pronunciation problems for Saudi speakers of English (Al-Jasser, 1978; Altaha, 1995; Ammar & Alhumaid, 2009; Ahmad, 2011). Moreover, some studies that focused on speakers of languages other than Arabic were supported by this finding, since not all languages have the phoneme /tʃ/ in their language inventories (González Johnson, 2011; Chan, 2010; Tiono & Yostanto, 2008).

Another linguistic variable of interest was the position of /tʃ/ within a word, and whether there was a significant difference between difficulties Najdi Arabic ESL learners encountered in different word positions. The dependent t-test analysis revealed that word-final position was significantly more difficult than word-initial position in the pronunciation of /tʃ/. In word-final position, the error percentage reached 35%, while in word-initial position it reached 22%. The results of the t-test suggested that Najdi Arabic ESL learners struggled more with the /tʃ/ pronunciation in word-final position than in word-initial position.

This finding supported aspects of some studies in the literature while contradicting others. This finding partially contradicted the results of several studies in the literature (Ammar & Alhumaid, 2009; González Johnson, 2011; Tiono & Yostanto, 2008). Tiono and Yostanto's (2008) study on Indonesian ESL learners resulted in high percentage of errors in word-initial and medial positions, but no errors in final position regarding the pronunciation of /tʃ/. Unfortunately, the researchers did not state a reason for the lack of errors in the word-final position. This contradiction might be due to the phonotactics of the different first languages used in the studies. Therefore, the difficulties that Najdi Arabic ESL learners might encounter cannot be generalized to ESL learners with different first languages, even if similar sounds were investigated. A similar observation can be made to the contradiction with González Johnson's (2011) results, since her



study was conducted using Panamanian Spanish ESL learners and therefore L1 differences should again be taken into consideration.

Regarding the contradiction with Ammar and Alhumaid's (2009) results, their study was conducted on Najdi Arabic ESL learners' pronunciation errors, including /tʃ/ in three word positions. The study resulted in different error percentages in the three word positions, but the researchers considered word position not to be significant in the pronunciation error percentages.

On the other hand, the above finding supports Ahmed's (2011) study which investigated the realization of several sounds in the pronunciation of Saudi ESL learners, and revealed that /tʃ/ was harder to pronounce in word-final position. Moreover, the same finding supported the results of Binturki (2008) and Rehman, Khan, and Bukhari (2012), where they stated that less accurate pronunciation for second language sounds could be seen in word-final position more than other word positions.

The individuals' error frequency between initial and final position provided further support for the finding that less accurate pronunciation occurred in word-final position. The analysis revealed that only 6% of the participants had from 5 to 8 errors with the /tʃ/ sound in word-initial position while 29% of the participants had from 5 to 8 errors in word-final position. Furthermore, none of the participants had zero errors with the /tʃ/ sound in word-final position versus 28% of participants who had zero errors in word-initial position. The suggestion that could be made here is that /tʃ/ was pronounced significantly less accurately in word-final position than in word-initial position.

The analysis of error frequencies per word revealed that errors were not equally distributed between words. This finding suggested that there was a factor influencing subjects' pronunciation. The environment of each instance of /tʃ/ (preceding or following other sounds)

was investigated, looking for clear patterns that could have led to variance in difficulties, but nothing was found to be significant. Thus, familiarity and level of difficulty of words were investigated as well.

Familiarity with certain words might explain the difference in the occurrence of errors between words. In word-initial position, *chair*, *chicken*, *cheese*, and *church* had the smallest percentages of errors (6% to 17%). This low rate of errors could be attributed to the effect of greater familiarity with the words *chicken* and *cheese* since in Saudi Arabia these two words are widely used in restaurants and family life. Moreover, *chicken* and *cheese* are words of daily usage and ESL beginners' vocabulary, along with the other two words *chair* and *church*. Thus, since the subjects of the study had been living in the target language community for at least a month, they would have been familiar with such words. On the other hand, words such as *chop*, which had the highest error percentage in word-initial position (44%), were neither familiar words nor words of daily usage, so difficulties could be expected.

In word-final position, word familiarity occurred, but not as clearly as in word-initial position due to the previously illustrated difficulties with that position. The word *teach* is a familiar and daily used word, especially by students who were the sample of the current study; thus the error percentage was only 6%. On the other hand, the word *pinch*, which had the highest error percentage in word final position (94%), was neither a familiar word nor a daily usage word, so difficulties could be expected. Other than word familiarity, the existence of consonant clusters in *pinch* and *belch* could be the reason behind the high error rate in these two words and in word-final position in general. This issue was not part of the current study focus, however it can be illustrated more in future studies.

By looking at the available literature, nothing regarding familiarity or common-use words and ease of acquisition could be found by the researcher. Previous literature focusing on the familiarity issue in second language learning would have allowed for a more extensive discussion of the current study's results. From the results of the study and the available literature, it could be inferred that through time and practice a lot of second language problems would disappear. However, this is merely a suggestion, and further research on the issue might provide either support or challenges to this suggestion.

Another issue the current study investigated was the mispronunciation patterns in the Najdi Arabic ESL learners' production of /tʃ/ and whether they differ for word-initial or final position. The analysis revealed that the dominant mispronunciation pattern was a substitution pattern. That pattern could be explained by saying that participants replaced /tʃ/ with /ʃ/. The substitution type occurred 32 out of 144 times (22%) in word-initial position, while the same pattern occurred 51 out of 144 times (35%) in word-final position. There was a single case by one subject where /tʃ/ was replaced with /k/ in word-final position. This single case did not form a pattern, but was worth stating.

In the present study, Gass and Selinker's (1994) LTT was strongly supported by the fact that /ʃ/ was the dominant sound to occur instead of the English /tʃ/ because Arabic has /ʃ/ in its consonant inventory. Therefore, the Arabic ESL learners negatively transferred the /ʃ/ phoneme from Arabic to be a simplified form of English /tʃ/ (Kopczyński & Meliani, 1993). Moreover, the findings supported Eckman's (1977) MDH since /tʃ/ is a universally more-marked sound than /ʃ/, and at the same time /tʃ/ is considered to be a marked sound for Najdi ESL learners, and therefore it caused difficulties for them. This finding added to the already existing body of literature, and provided empirical support to previous studies on Arabic ESL learners (Altaha,

1995; Ammar & Alhumaid, 2009; Ahmed, 2011) as well as ESL learners from different first language backgrounds from Arabic (Tiono & Yostanto, 2008; Chan, 2010; González Johnson, 2011). With the massive support for this finding in the literature, it could be suggested that the mispronunciation of /f/ for /tʃ/ could be generalized to different languages that did not have the phoneme /tʃ/ in their consonant inventories.

## **5.2. Extra-Linguistic Variables Affecting Najdi Arabic ESL Learners' Pronunciation of /tʃ/**

The current study investigated not only the effect of linguistic variables on the Najdi Arabic ESL learners' pronunciation but also investigated the effect of the extra-linguistic variable length of residency (LOR) in the US. Lately, LOR in the target language community has received a great deal of attention in the field of second language acquisition (Asher & García, 1969; Flege, 1988; Flege & Fletcher, 1992; Flege & Liu, 2001; Fu, 2010;).

In the present study, the independent t-test revealed that there was a significant relation between the participants' LOR in the US and the accuracy of their pronunciation. Najdi Arabic ESL learners in the six-month group had more /tʃ/ pronunciation errors, while the one-year group had fewer /tʃ/ pronunciation errors. The effect size  $d$  for the current analysis ( $d = 2.45$ ) was larger than .80, which provided further support for the significance of LOR.

This finding suggested that the more time ESL learners spent in the target language community, the fewer pronunciation errors they would encounter. This finding provided empirical support for the results of previous studies in the literature (Asher & García, 1969; Flege & Fletcher, 1992; Fu, 2010). At the same time, it provided partial support for Flege and Liu's (2011) results, where LOR was significant for the student group, but was not significant for the nonstudent group. The researchers stated that the reason behind such a result could be the kind of input students had from native speakers, compared to the nonstudents (Flege & Liu,

2011). On the other hand, this finding contradicted Flege's (1988) results, where LOR appeared to be not significant between two groups of native Taiwanese ESL learners with different LORs.

Most of the previous studies conducted on Arabic ESL learners were focused on Arabic ESL learners who had never lived in an English speaking country (Ahmed, 2011; Altaha, 1995; Ammar & Alhumaid, 2009). In addition, there was one study previously discussed in the literature conducted on Arabic ESL learners who were living in an English speaking country at the time of the study, but it had not investigated LOR effect on pronunciation accuracy (Binturki, 2008). Therefore, the finding of the current study regarding LOR could not be compared or linked to any previously discussed studies on Arabic ESL learners. As a result, further studies on Arabic ESL learners and the LOR effect on pronunciation should be investigated to contribute to the understanding of LOR in the literature.

The findings of the current study were fully discussed in the previous part. The current study provided empirical support to most of the previously discussed literature. CAH by Lado (1957), MDH by Eckman (1977), and LTT by Gass and Selinker (1994) were supported by the findings of the current study. LOR was also found to be positively significant since when it increased, pronunciation errors decreased. In the next part, limitations and recommendations for further studies will be introduced.

### **5.3. Limitations and Recommendations**

The results of the current study supported several results of previously conducted studies that were discussed in the literature and contradicted others. It provided support for the arguments that /tʃ/ is problematic for Najdi Arabic ESL learners, causes more difficulties in word-final position, and is replaced with /f/. However, the present study had limitations that prevented generalizing the results to a wider scale.

With regard to the formula of the study, the results could not be generalized to other Arabic dialects of ESL learners since the study was only conducted with speakers of Najdi Arabic. Furthermore, because of the small sample (N=18), using a word-list only, and the fact that all the participants were in the target language community at the time of the study, the results could not be generalized to all Najdi Arabic ESL learners. The focus of the current study was on the pronunciation of the voiceless postalveolar affricate /tʃ/ in only initial and final word positions; therefore, the results could not be generalized to the pronunciation of this sound word-medially or the pronunciation of any other sound. In addition, the current study investigated the effect of word positions and LOR on the pronunciation accuracy but did not focus on other factors influencing second language pronunciation.

Recommendations for future studies could include having a larger sample, with learners living in the target language community as well as others who do not, in order to make it possible to generalize the results. Future studies should include reading both word-lists and passages in order to investigate pronunciation difficulties in both careful and more spontaneous speech. Moreover, if further studies investigated more than one sound in the three word positions, they would contribute more to the literature. Other factors influencing second language learners' pronunciation, such as motivation, age of arrival in the target language community, age when learners started learning the second language, and frequency of second language use, should be considered in future studies investigating second language learners' pronunciation.

The current study suggested that word familiarity could be a factor influencing Najdi Arabic ESL learners' pronunciation, but there was not enough previous work to compare it with. Further studies should use both advanced level and familiar words in the study instrument to check for familiarity and linguistic ability on pronunciation. Another point was the effect of

consonant clusters on /tʃ/ pronunciation, further studies should investigate this issue by including words that have different types of consonant clusters in the research instrument. Moreover, further studies should focus on the type of second language input the participants are exposed to because the type of input was previously stated to influence pronunciation accuracy (Flege & Liu, 2011).

#### **5.4. Pedagogical Implications**

The findings of the current study provided support to previous studies suggesting that English /tʃ/ was a problematic sound for Arabic ESL learners. The result showed that more exposure to and use of English would minimize pronunciation errors. Therefore, second language teachers play an important role in eliminating errors produced by learners. The following pedagogical implications are provided to ESL teachers as useful tips to help learners in achieving a deeper understanding of English.

First, ESL teachers should be aware of the phonological differences between learners' first and second language. Teachers should clarify areas of difficulty and shed light on the phonemes absent from learners' first language. In the case of /tʃ/ with Arabic ESL learners, teachers should show learners that this phoneme is a combination of a stop and a fricative, both of which Arabic contains as separate sounds. Teachers should also make learners aware that replacing /tʃ/ with /f/ is a common error that they should actively try to avoid. This could be explained by showing minimal pairs, such as *share* vs. *chair*, where the difference could be clearly noticed.

Second, teachers should take into consideration how word final-position triggers more difficulties for learners; therefore, they should consider providing learners with strategies where they can focus on word-final position. Feedback on their output and drilling might lead to better

pronunciation, depending on the classroom situation. With the correct teaching methods and the correct feedback from second language teachers, learners will be able to self-correct, and they will become more aware of their pronunciation.

Third, English orthography sometimes helps Arabic ESL learners' pronunciation of /tʃ/. In this case, teachers should clarify to students that the English orthographic <ch> almost always represents the sound /tʃ/ and that the orthographic <sh> represents the sound /ʃ/. This explanation might serve as a general rule they can rely on, although the /tʃ/ sound can be represented in other ways in English orthography.

These pedagogical implications are tips that ESL teachers should consider when teaching a second language along with other teaching methods that can help learners achieve better pronunciation. Teachers should try to increase students' phonological awareness to a level where they can help themselves by using the teaching method that works best for them.

## **5.5. Conclusion**

This study investigated the realization of English /tʃ/ in the pronunciation of Najdi Arabic ESL learners. The English /tʃ/ sound was chosen because it was suggested by previous studies to cause difficulties for Arabic ESL learners. The investigated sound's position within a word as well as LOR were tested since both were suggested in the literature to be factors that influenced ESL learners' pronunciation. Eighteen Najdi Arabic ESL learners' with different LORs constituted the sample of the study. The instrument that was used included 16 words containing the investigated sound in different word positions. Data was recorded and analyzed using both Speech Analyzer and SPSS software.

The results showed that Najdi ESL learners encountered difficulties in pronouncing the investigated sound /tʃ/. Wherever /tʃ/ was mispronounced, it was replaced with /ʃ/. Word-final



position posed more pronunciation difficulties than word-initial position. Word familiarity might have had an effect on pronunciation, since there were fewer errors with more familiar words than with less familiar ones. Finally, learners with a longer LOR showed more accurate pronunciation than those with a shorter LOR.

The results of the current study supported the results of previous studies in the literature. Furthermore, they provided support to CAH, MDH, LTT, and to the positive effect of LOR in the target language community on pronunciation accuracy. The fast improvement in the participants pronunciation accuracy suggested that after a longer period of time, Najdi Arabic ESL learners might acquire /tʃ/ and therefore it would not be considered a sound that pose difficulties for Najdi Arabic ESL learners.

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## APPENDICES

## APPENDIX A

## Demographic Information

Dear participant,

I appreciate your time and effort in taking this questionnaire. I would like to inform you that this is **not** a test or any other kind of evaluation form. The given information will help me to improve my research, which examines issues related to phonology and second language acquisition. Therefore, it is necessary to get responses that reflect your knowledge regarding certain questions. Please try to answer all the following questions.

Many thanks,

Abdullah Alqarni

Please check the appropriate answer or fill in with a relevant information.

1. What is your gender?
  - Male.
  - Female.
  
2. What is your age?
  - 19 or under
  - 20 – 25
  - 26 – 30
  - 31 – 35
  - 36 or older
  
3. In what country did you grow up?
  - Saudi Arabia
  - Other, \_\_\_\_\_

4. What Arabic dialect do you speak?
- Najdi dialect
  - Hejazi dialect
  - Eastern dialect
  - Southern dialect
  - Northern dialect
5. What is the highest level of education you have completed?
- High school or equivalent
  - Some college
  - Bachelor's degree
  - Master's degree
  - Doctoral degree
  - Other, \_\_\_\_\_
6. Do you speak language(s) other than Arabic and English? If yes what are they?
- Yes, \_\_\_\_\_
  - No.
7. Have you ever lived in a non-Arabic speaking country before coming to the US? If yes what are they?
- Yes, \_\_\_\_\_
  - No.



8. For how long have you been learning English back home?

- 6 years.
- 10 years.
- Other, \_\_\_\_\_

9. For how long have you been learning English in the USA?

- 6 months
- 1 year
- 2 years or more

10. For how long have you lived in the US?

- 6 months
- 1 year
- 2 years or more

## APPENDIX B

## Words List

Please read each word in the following lists 3 times.

## List A:

1. Chapter
2. Teach
3. Flag
4. Speech
5. Smash
6. Cheap
7. Shower
8. Pinch
9. Ship

## List B:

1. Chicken
2. Chop
3. Belch
4. Sky
5. Cheese
6. Brooch
7. Sheep
8. Arch
9. Harsh

## List C:

1. Church
2. Couch
3. Fish
4. Rich
5. Chair
6. Smile
7. Chunk
8. Share

VITA  
Graduate School  
Southern Illinois University

Abdullah Ahmed Alqarni

alqarni86@hotmail.com

King Khalid University  
Bachelor of English Language Education, 2008

Thesis Title:

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Major Professor: Dr. James A. Berry