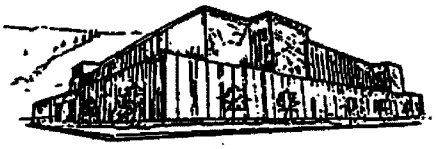
2003

Contrastive phonological analysis of Arabic and English

Khaled Huthaily
The University of Montana



CONTRASTIVE PHONOLOGICAL ANALYSIS
OF
ARABIC AND ENGLISH

by

Khaled HUTHAILY

B.A. Hodeidah University (Hodeidah, Yemen) 1999

presented in partial fulfillment of the requirements

for the degree of

Master of Arts

The University of Montana

July 2003

Approved by:

Chairperson

Dean, Graduate School

8-22-03

Date

Abstract

Khaled Huthaily, M.A., July 2003 Linguistics

Contrastive Phonological Analysis of Arabic and English – 128 pages

Director: Prof. Anthony Mattina

It is commonly believed that when adults start learning a second language, they are very often guided by their first language, especially at the level of phonology. This is usually referred to as a *foreign accent*. In the field of linguistics, this is referred to as *first language* (L1) *transfer*.

In this paper, I study the phonological difficulties that adult native speakers of American English encounter while learning Modern Standard Arabic as a foreign language. The study focuses on describing the segmental phonemes of both Arabic and English and analyzes the Arabic speech of three American students of Arabic, in an attempt to track L1 transfer.

The study also investigates the extent to which the Contrastive Analysis Hypothesis (CAH) can help in predicting the pronunciation errors that American students of Arabic are likely to commit in their production of Arabic speech.

Chapter one presents a brief discussion of the Arabic and English languages. In chapter two, I present an outline of the Contrastive Analysis Hypothesis, the framework on which the study is based. Chapter three addresses the phonological systems of Arabic and English, with a focus on the former. In chapter four, I use the CAH as a framework to predict the errors that adult English-speaking students of Arabic would make in their Arabic speech. Chapter five discusses the study and its results, and chapter six presents the conclusion.

The study concludes that there is evidence that the subjects' first language has an effect on their production of speech sounds of the second language. However, the study confirms that this effect could not be predicted by simply comparing and contrasting the sounds of the first and second languages.

Table of Contents

List of Tables

List of Charts

Legend

1. *Standard American English* as used in the northwest of the U.S.A. is the dialect of English used in this paper.

2. *Modern Standard Arabic* as used in the media is the dialect of Arabic used in this paper.

3. Words are transcribed using the American transcription system.

4. Stressed syllables are indicated with a short vertical line (i.e. " ˈ ") above and before them.

5. In polysyllabic words, syllables are separated by a dot (i.e. " . ").

6. When consonant phonemes appear in pairs in charts, the one on the top represents a voiceless consonant while the one below represents a voiced consonant.

Abbreviations

C	Consonant
CA	Contrastive Analysis
CAH	Contrastive Analysis Hypothesis
IL	Interlanguage
L1	First Language
L2	Second Language
MSA	Modern Standard Arabic
NL	Native Language
SLA	Second Language Acquisition
TL	Target Language
UG	Universal Grammar
V	Vowel

Acknowledgments

My deep thanks go to the AMIDEAST organization and the Fulbright Program, sponsored by the United States Department of State, without the legal and financial support of whom I would not have afforded getting my M.A. and doing this study.

I would also like to thank all the women and men who taught me throughout my academic career. Special thanks go to Professor Anthony Mattina, my academic advisor, for his dedicated guidance and beneficial advice, Dr. Tully Thibeau, who has always been very supportive and very helpful to me throughout the process of doing this study, and Dr. Anthony Beltramo, who offered me many beneficial suggestions and corrections.

I am also indebted to Samir Bitar, the Arabic language tutor at the University of Montana, and the three subjects who participated in this study. Abiding by the research regulations in the University of Montana, I am not allowed to mention the names of the subjects in this study. However, I will always remember that without their consent to participate in this study, the study would not have been done altogether. Thank you: Subject A, Subject B and Subject C.

I am also most grateful to Abdullah Al-Ghamdi, for helping me with the recordings, Craig Bacino, for allowing me to use his laptop to record the speech of the subjects, Melissa Bitz, Molly Collins, and Heather Tomlins, for proofreading the final draft of this paper and saving me from many inconsistencies and typographical errors.

I am sincerely grateful to my parents, sisters and brothers in Yemen. Their prayers have never stopped even though I am on the other side of the globe. To them, I dedicate this work.

Chapter I: Introduction

In this chapter, I present an introduction to the Arabic and English languages and state the object of the study. Since Arabic is the target language (TL) and English is the native language (NL) of the subjects, I focus more on the Arabic language.

1.1. The Arabic Language

Arabic is a South-Central Semitic language spoken by approximately 218 million speakers around the world.[1] It is spoken as a first language (L1) in all the countries of the Arabian Peninsula (i.e. Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine/Israel, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen) as well as in the Arab countries of Africa (i.e. Algeria, Djibouti, Egypt, Libya, Mauritania, Morocco, Somalia, Sudan and Tunisia). These countries are collectively referred to as the Arab World simply because their inhabitants speak Arabic as L1. Arabic is also spoken as a second language (L2) in some countries of Asia (e.g. Iran, Pakistan, India and Indonesia) and Africa (e.g. Chad, Nigeria).

The Holy Qur'an, the sacred book of Muslims, was revealed to the Prophet Mohammad in Arabic. The Holy Qur'an is believed to be the word of God, and Muslims all over the world believe that to understand the message of God in the Holy Qur'an, it must be read in Arabic. Moreover, Muslims must use Arabic when they pray, because they believe it is the language that they will use in Heaven. Therefore, a need exists for

[1] An exact count of the number of speakers of Arabic is lacking.

non-Arab Muslims to learn Arabic. Thus, Arabic has much religious significance and is the religious language of Muslims in many parts of the world.

However, the language that is found in the Holy Qur'an is what is usually referred to as Classical Arabic. Classical Arabic was a dialect of Mecca (presently located in Saudi Arabia), the birthplace of the Prophet Mohammad. Arabs consider Classical Arabic to be the purest, most perfect and most beautiful form of the Arabic language. Since the seventh century, schools, the media, mosques, and official conversations between educated Arabs from different countries use an adapted form of the Classical Arabic dialect, known as Modern Standard Arabic (MSA). Khoja states that "MSA is a simplified form of Classical Arabic, and follows its grammar. The main differences between Classical Arabic and MSA are that MSA has a larger (more modern) vocabulary, and does not use some of the more complicated forms of grammar found in Classical Arabic" (p. 1). In 1974, MSA was chosen to be the sixth official language of the United Nations. When non-native speakers of Arabic learn Arabic as a foreign/second language, it is this dialect of Arabic that they are exposed to in language institutions. It is for this reason that I have chosen this particular dialect in this study.

There are many dialects of Arabic that differ not only from one country to another, but from one region to another in the same country. These dialects often differ in both pronunciation and vocabulary, which sometimes causes confusion. An interesting anecdote from the Arabian history reports the results of one such confusion. On a cold night in the seventh century, the leader of the Muslim army, Khaled Ibn Al-Waleed, ordered the prison guard to "/ˈyʊḍ.fiʔ/" the prisoners. The verb "/ˈyʊḍ.fiʔ/" means "to

cover" or "to make someone warm" in Classical Arabic and Modern Standard Arabic. However, the prison guard was a member of the *Kunanah* tribe and spoke a different dialect of Arabic in which the verb "/ˈyuḍ.fiʔ/" meant "to kill". The result of that confusion was the death of all those poor prisoners. Another example of confusion that exists among speakers of different dialects of Arabic happened to one of my Egyptian teachers in Yemen. In one dialect of Yemeni Arabic[2], the word "/mæš̆y/" means "No". The same word means "Yes" or "OK" in Egyptian Arabic. My teacher asked one of his Yemeni friends to meet with him. The Yemeni friend spoke that dialect of Yemeni Arabic and answered "/mæš̆y/" (meaning "No"), while my teacher interpreted the word "/mæš̆y/" as "Yes." Then, he waited in vain for about two hours for his Yemeni friend to show up.

Egyptian Arabic is the most widely diffused dialect of Arabic, for two main reasons: (1) many Arab countries hired Egyptian teachers due to the lack of local teachers, and (2) Egyptian movies and television shows are shown in almost all the Arab countries. In contrast, many native speakers of Arabic have difficulty understanding the dialects spoken in Algeria, Tunisia, and Morocco. When Arabic speakers from different countries encounter difficulties understanding one another, they shift to Modern Standard Arabic. Recently, some of the media started using a few of these regional dialects (an act which many Arab scholars oppose).

[2] There are a number of Yemeni Arabic dialects. The dialect I refer to in this paragraph is used in Sana'a, the capital of Yemen.

Borrowing [words from foreign languages appearing in MSA and local dialects] is another area that worries some Arab scholars, who believe that Arabic is rich enough to provide equivalent words for the borrowed ones. Most of the borrowed words seem to be related to technology, such as *computer*, *keyboard*, *mouse*, *headphone*, *telephone*, *television*, *satellite*, *dish*, *radio*, etc. Of course, these words are not pronounced in the same way they are pronounced in English. The pronunciation has been modified to match the phonology of Arabic. Likewise, the English language possesses a number of borrowed words from Arabic, because the Arab civilization flourished from the eighth century until the fifteenth century. During this time period, the Arab civilization influenced the English language, and a number of Arabic words (either directly or via intermediate languages) found their way into the English language, such as *alcohol*, *algebra*, *sugar*, *adobe*, *amber*, *apricot*, *berseem*, *cipher*, *coffee*, *cotton*, *jar*, etc.

The sound systems of both Arabic and English as well as the writing systems of these two languages differ. Thus, native speakers of English confront many difficulties while learning Arabic, compared to most European languages. Arabic is written from right to left, and Arabic books are held with the spine on the right-hand side. There are twenty eight letters in the Arabic alphabet, which only represent consonants and long vowels, while short vowels are indicated with diacritical marks. These marks are not often used in ordinary writing, since native speakers can easily identify the intended words from the context and experience. This is one of the difficulties that students of Arabic as a foreign/second language encounter.

1.2. The English Language

English is a West Germanic language of the Indo-European language family which has a large Norman French superstratum. It is now widely spoken in the six continents by more than 350 million people (Encyclopedia Britannica, 2002). It is spoken as L1 in the United States, the United Kingdom, Canada, Australia, Ireland and New Zealand. It is also used as an official language in a number of countries in Asia (i.e. India, and the Philippines) as well as some African countries (i.e. South Africa). As one of the most widely used languages in the world, English has many regional dialects: American English, British English, Australian English, Canadian English, etc. American English itself has a number of broad regional variants: Northern, Southern, Midland, and Western. Each of these broad dialects has a number of sub-dialects. The subjects in this study are speakers of the Western dialect of American English.

1.3. The object of the study

The object of this paper is to study the phonological difficulties that adult native speakers of the Western dialect of American English encounter while learning Modern Standard Arabic as a foreign language. Through this study, I attempt to help textbook writers and teachers of Arabic to anticipate the pronunciation errors that American students of Arabic are likely to commit while producing utterances in Arabic. I also attempt to help American students of Arabic to improve their Arabic pronunciation. To

do so, I compare the phonological systems of both languages to identify L1 transfer, and I use the Contrastive Analysis Hypothesis (CAH) as a framework for this study.

Adults learning a second language have already mastered communicative competence in their first language. This communicative competence "includes knowledge the speaker-hearer has of what constitutes appropriate as well as correct language behaviour and also of what constitutes effective language behaviour in relation to particular communicative goals" (Ellis 1994: 13). When adults start producing utterances in a second language, they are likely to apply the rules that they already know, and this could result in *negative transfer* (see next chapter for the definition of *transfer*). This transfer is very clear especially at the level of phonology. The following example is taken from Akmajian (1995) and illustrates the impact that L1 has on L2 when considering sound systems:

> The English greeting *Merry Christmas* sounds very different when produced by a native speaker of Hawaiian. ... Hawaiian has 8 consonants (/p, m, n, l, k, h, w, ʔ/) and 5 vowels (/a, e, i, o, u/) and ... English has 24 consonants and 15 vowels. There are therefore fewer consonants and vowels available in Hawaiian to represent the consonants and vowels of English. The closest sound to English /r/ is Hawaiian /l/. Somewhat surprising is the fact that the closest consonant to English /s/ is Hawaiian /k/. The other big adjustment in this Hawaiian borrowing is a phonotactic one: Hawaiian does not permit consonant clusters or syllable-final obstruents. As a result, the Hawaiian vowel /a/ is inserted after every consonant that is not immediately followed by a vowel in the borrowed word. *Meli Kalikamaka* is thus the Hawaiian version of *Merry Christmas*. (p. 93)

There have been a number of works in the field of second language acquisition (SLA) that study the impact of L1 on L2. However, not all those studies agree that language transfer exists (Odlin 1989). In 1957, Robert Lado suggested that L2 learners depend entirely on their L1 in the process of their SLA and that this dependence results in transfer. However, in 1974, Dulay and Burt argued that transfer had nothing to do with

the errors committed by L2 learners. This issue is still debatable. McCarthy (2001) states that "(p)erhaps the most stubborn issue that refuses to go away in SLA is the influence of the first or some other language on the acquisition of a new language" (p. 74).

My argument in this paper is that language transfer is a phenomenon that exists in second language learning. The example cited from Akmajian (1995) shows how L1 can affect L2. Gass and Selinker (1993) observe that "(t)here is now overwhelming evidence that language transfer is indeed a real and central phenomenon that must be considered in any full account of the second language process" (p. 7).

In this paper, I investigate the extent to which the CAH can help in predicting the pronunciation errors in the speech of adult native speakers of English. Although the CAH has failed to explain the source of all errors that adult learners commit in their production of L2, something is true about this hypothesis when it comes to accounting for phonological errors that are produced by L2 adult speakers.

My choice of Arabic and English stems from the fact that it has recently been realized that there is a need for Americans with a near-native pronunciation of Arabic. Since September 2001, a number of American agencies (e.g. CIA and FBI) have shown interest in hiring American citizens who speak Arabic fluently. Moreover, the field of business and the importance of world trade between the USA and the Middle East necessitate the need for Americans who can use Arabic. Thus, I hope, through this study, to help American students of Arabic produce a near-native Arabic pronunciation.

Chapter II: Contrastive Analysis Hypothesis

In this chapter, I attempt to examine the Contrastive Analysis Hypothesis (CAH), the problems identified with it, and its current status in SLA research. I concentrate on language transfer from a Contrastive Analysis (CA) perspective, providing a brief historical overview of the CAH and how it accounts for errors in a second language. This chapter emphasizes that although the CAH has failed to explain the source of all errors that adult learners commit in their production of L2, something is true about this hypothesis when it comes to accounting for phonological errors that are produced by L2 adult speakers. The chapter concludes with the assertion that the CAH can sometimes provide an explanation for phonological errors committed by L2 learners. However, language transfer is a complex phenomenon and has not been fully explained by any single theory.

As stated in the previous chapter, I intend to carefully and systematically describe, compare and contrast the phonological systems of Arabic and English in an attempt to trace the source of the phonological errors in the Arabic speech of native speakers of English. The ultimate goal of this thesis is to attempt to help teachers of Arabic as a foreign language to anticipate the phonological errors that English-speaking students are likely to commit in order to help them, the students, to improve their pronunciation.

I believe that language teachers as well as L2 learners need to have knowledge of at least basic phonological concepts, such as place and manner of articulation. Knowledge of the sound systems of the learners' L1 and L2 will help both teachers and

students *feel* the difference in the ways in which the sounds of both languages are produced. Although much of the research in the field of language acquisition concludes that the CAH cannot fully explain errors committed by L2 learners, this hypothesis should not be discarded (Selinker 1992). There is something inherent in this hypothesis that works; moreover, though it has been about half a century since the CAH was proposed, there are still studies done today based on it. Therefore, through my research, I attempt to examine the extent to which the CAH can help in predicting pronunciation errors in the Arabic speech of native speakers of American English.

2.1. Language Transfer

The definition of language transfer is still problematic (Odlin 1989 and Ellis 1994). The definition that I adopt in this thesis is Odlin's (1989: 27) "working definition": "(t)ransfer is the influence resulting from similarities and differences between the target language any other language that has been previously (and perhaps imperfectly) acquired."

Language transfer has long been a controversial issue, and the debate on the influence of L1 on L2 is still an on-going debate among applied linguists. Gass and Selinker (1994: 53) believe that "(t)he acceptance and/or rejection of language transfer as a viable concept has been related to the acceptance or rejection of the specific theory with which it has been associated."

The CAH was suggested in 1957 by Robert Lado, who suggested that L2 learners depend entirely on their L1 in the process of their SLA. This dependence on the learner's L1 results in transfer. However, in 1974, the pendulum swung in the opposite direction

when Dulay and Burt argued that transfer had nothing to do with the errors committed by L2 learners. Currently, it is widely accepted that language transfer is one of many factors that are responsible for the errors committed by L2 learners. McCarthy (2001: 83) states that "(w)hen new languages are encountered, the existing representations of L1 are activated and reshape L2 incoming information. In language transfer, complex factors interact, including language distance ..., cognitive load, attention, sociolinguistic factors, etc."

2.2. Forms of Language Transfer

It is claimed that transfer occurs in one of two forms:

a) *Positive Transfer* (also known as *facilitation*), which occurs where there is a similarity between L1 and L2, leading to something correct. This kind of transfer would assist the acquisition process.

b) *Negative Transfer* (also known as *interference*), which occurs where there is dissimilarity between L1 and L2, leading to something incorrect. This kind of transfer would impede the acquisition process.

Gass studied *pronoun retention* in the speech of two groups learning English as a second language. The first group included native speakers of Arabic and Persian, i.e. languages that, unlike English, allow pronoun retention. The second group included native speakers of French & Italian, i.e. languages that, like English, do not allow for pronoun retention. The subjects were asked to judge the grammaticality of the ungrammatical sentence shown on the following page.

*The woman I gave the book to her is my sister.

The results showed that most of the learners in the first group (i.e. speakers of Arabic and Persian) judged the above sentence grammatical, while most of the learners in the second one (i.e. speakers of French and Italian) rejected the same sentence as ungrammatical. This study is evidence of the impact of L1 on L2. However, I should hasten here to add that – as supported by much research – not all errors can be traced to the learners' L1 concerning syntax.

2.3. Another Manifestation of Transfer

Language transfer is not easy to detect, and it does not show itself merely as either positive or negative transfer. Ellis (1994: 306) suggests that it is not sufficient to focus on the production of errors, as many manifestations of transfer will be missed. One of the important manifestations of language transfer that is not detectable in production is avoidance. That is to say, learners might avoid using a certain linguistic structure in their L2, because this structure does not occur in their L1. In other words, language transfer might not surface as the production of errors, but as avoiding the use of the different structure altogether. In 1974, for example, Schachter found that Chinese and Japanese learners of L2 English made fewer errors in the use of relative clauses than Persian or Arabic learners, because they produced far fewer relative clauses overall (Ellis 1994: 304). This important phenomenon was not considered by classical CA.

2.4. The beginnings of the CAH

The Contrastive Analysis Hypothesis began with the following insight stated by C.C. Fries (1945: 9) in his book *Teaching and Learning English as a Foreign Language*:

> The most efficient materials are those that are based upon a scientific description of the language to be learned, carefully compared with a parallel description of the native language of the learner.

However, Selinker (1992: 9) has noted that "Fries is not known for having undertaken detailed CAs himself and that is most likely why histories of CA and SLA usually fail to mention him."

In 1957, Robert Lado made CA explicit by stating that L1 plays a very important role in SLA. In his influential book *Linguistics Across Cultures*[3], Lado mentions that

> ... individuals tend to transfer the forms and meanings, and the distribution of forms and meanings of their native language and culture to the foreign language and culture—both productively when attempting to speak the language and to act in the culture, and receptively when attempting to grasp and understand the language and the culture as practiced by natives. *(In Gass & Selinker 1993: 53)*

He adds that

> ... the student who comes into contact with a foreign language will find some features of it quite easy and others extremely difficult. Those elements that are similar to his native language will be simple for him, and those elements that are different will be difficult. *(In Ellis 1994: 306)*

The above quotes outline the CAH in its classical form, a form that did hold true in the face of empirical evidence. However, as argued in a lot of literature (Selinker 1992), the CAH is worth considering when examining language transfer. Of course, a revised version of the CAH is needed. Through this study, I hope to contribute to reaching a revised version of the CAH.

[3] Ellis (1994: 307) states about Lado's *Linguistics Across Cultures*: "Lado's book not only laid out the theoretical bases of the CAH but also described the technical procedures needed to carry out the detailed contrastive analysis that were considered necessary for the preparation of 'scientific' teaching materials."

2.5. Assumptions of the CAH

The CAH states that a feature in the L2 is difficult to learn if it is different from or does not exist in the learner's L1. In this case, the learner, the CAH claims, will use a feature that exists in his/her L1. This is known as *negative transfer.* In cases where a feature in the L2 is similar to a feature in the L1, the CAH claims that mastering that feature is going to be easy. Followers of this hypothesis describe language as habit formation and second language acquisition as developing a new set of habits. Errors in SLA were interpreted as the result of transferring the L1 "habits" to the L2. This is the view that behaviorists, such as Skinner, argued for in the 1950s and led to the development of the Audiolingual method of teaching.

Below are the six assumptions that the CAH was based on, summarized by Gass and Selinker (1994: 60):

1. Contrastive analysis is based on a theory of language that claims that language is habit and that language learning involves the establishment of a new set of habits.

2. The major source of error in the production and/or reception of a second language is the native language.

3. One can account for errors by considering differences between the L1 and the L2.

4. A corollary to #3 the greater the differences, the more errors that will occur.

5. What one has to do in learning a second language is to learn the differences. Similarities can be safely ignored as no new learning is involved. In other words, what is dissimilar between two languages is what must be learned.

6. Difficulty and ease in learning are determined respectively by differences and similarities between the two languages in contrast.

Although I am using the CAH as a framework for this paper, it does not mean that I am totally guided by the six assumptions mentioned above. My understanding of language is that it is a means of communication and not "habit." Moreover, a great body of literature in the field of language acquisition shows that the learners' L1 is not the only source of errors in the process of learning a second language. This issue is discussed briefly in the "Decline of the CAH" section later in this chapter.

2.6. Traditions of the CAH

There were two traditions of contrastive analysis: (1) the North American tradition, in which the goal was to improve classroom teaching/learning, i.e. pedagogical implications, and (2) the European tradition, which aimed at gaining a better understanding of *language* (Gass & Selinker 1994: 59).

2.7. The Purpose of CA

Right from the beginning, the motivation for doing CA was to find the "best" teaching materials. This hypothesis suggested that before preparing teaching materials, one should compare L1 and L2. Fries' aim was to develop teaching materials, which were seen as language specific, for adults that would help them master the sound and structural systems of L2 as automatic and unconscious "habits." This purpose is clear in Fries' preface to his book *Teaching and Learning English as a Second Language*: "'(f)oreign' language teaching is always a matter of teaching a specific 'foreign' language to students who have a specific 'native' language background."

As stated above, the birth of the *contrastive analysis hypothesis* started with Lado's work, which was also done for pedagogical purposes. Lado suggested that the native language and the target language should be compared in order to determine the similarities and differences between them. The comparison was not limited to the phonology, morphology and syntax, but included even the culture of both languages. If L1 is similar to L2, learning will be facilitated. If L1 is different from L2, learning will be a difficult process, encountering *negative transfer*. The pedagogical purpose of the CAH was made clear by Lado as follows:

> The most important new thing in the preparation of teaching materials is the comparison of native and foreign language and culture in order to find the hurdles that really have to be surmounted in the teaching. *(In Selinker 1992: 9-10)*

I intend to carefully and systematically describe, compare and contrast the phonological systems of Arabic and English to attempt to trace the source of the pronunciation errors in the Arabic speech of native speakers of English.

2.8. Procedures of CA

Two languages could be compared in terms of their phonological systems, syntactic systems, vocabulary, writing systems, and cultural behavior. Below is the outline that is usually followed while doing CA. I have recomposed this outline based on my readings of Gass and Selinker's (1993 and 1994).

1. *Description* of the two languages;
2. *Selection* of certain areas or items of the two languages for detailed comparison;
3. *Comparison*, i.e. the identification of areas of difference and similarity;
4. *Prediction*, i.e. determining which areas are likely to cause errors; and
5. *Testing* the predictions.

In the field of phonology, Selinker (1992) mentions that Lado suggested that "at least three checks" should be provided when comparing each phoneme. The most important three checks are:

(1) Does the L1 have a phonetically similar phoneme?

(2) Are the variants (all allophones) of the phonemes similar in both languages?

(3) Are the phonemes and their variants similarly distributed?

2.9. Positions in the CAH

The CAH can be interpreted as representing (1) a *strong* view and (2) a *weak* view. While the strong view states that predictions are made based on a comparison between L1 and L2, the weak view starts with the learners' errors and attempts to account for them by comparing L1 and L2. The weak view became part of *Error Analysis*, while the strong view quickly failed because some predictions did not appear in the actual learners' speech. The section below addresses this issue.

2.10. Decline of the CAH

The major reason behind the decline of the CAH is that it promised too much. Lado stated that language teachers "who understand this field [i.e. CA] will acquire insights and tools for ... diagnosing student difficulties accurately" (In Selinker 1992: 11). The unfulfillment of this 'promise' made the CAH crash. When researchers began looking at the errors made by second language learners, they found that some of the errors came from neither the L1 nor the L2. There were errors that had not been predicted by the CAH, and there were predicted errors that did not occur.

The CAH was proposed at a time when language was thought of as a set of habits. This hypothesis was based on the behaviorist theory of language and language learning. When the behaviorist theory failed to explain several empirical facts of language development in the 1960s, the CAH also died out.

The CAH claims that the starting point in the process of SLA (at all linguistic levels) is the learner's L1. Learners were believed to rely exclusively on their L1 in the process of SLA. However, this extreme position was attacked in 1974 by Dulay and Burt, who argued for another extreme position that claimed that language transfer did not have any role in creating *Interlanguage* (IL) (Selinker 1992: 172). Both these two extreme views failed in the face of empirical testing and evidence.

It is widely accepted now that language learning is systematic, and that learners are not always guided by their L1 in their acquisition of a second language. The CAH promised too much and did not consider the "other factors," such as "language distance ..., cognitive load, attention, sociolinguistic factors, etc." (McCarthy 2001: 83).

Ellis sees that "the problem with the CAH is that it is too simplistic and too restrictive." The problem with CA, as seen by Gass and Selinker (1993: 2), is that

> Classical CA statements provided predictive statements without careful descriptive and analytical studies of actual second language learners under clearly specified conditions.

The CAH claims that the starting point in the process of SLA (at all linguistic levels) is L1. However, current studies have shown that there is difference between the acquisition of phonology and the acquisition of syntax: the starting points in the acquisition of phonology and syntax are not the same. Corder (1983) has stated that

> (a) there is a difference between phonological and syntactic IL learning; (b) for the acquisition of IL phonology, there is 'successive restructuring' from the NL; and (c) for the acquisition of syntax, the starting point is not the NL but rather a 'universal' starting point which is something like a 'universal core.' (In Selinker 1992: 34)

I agree with Corder that the acquisition of syntax seems to start with "a universal core." Although Chomsky's UG (Universal Grammar) was meant to explain children's acquisition of their L1, a number of SLA researchers have started applying this theory to the field of SLA. It seems that UG can provide an explanation for adult L2 learners' errors in the area of syntax. Research has found that the errors that learners commit do not violate the grammar permissible by the Language Acquisition Device (LAD) in the brain. UG does not deny the role of the learners' L1 in the process of building the grammar of their L2. Errors that result from the learners' L1 are explained in terms of *parameter settings*. However, whether adults have access to UG or not is still a debatable issue.[4]

In the area of phonology, it seems that the learners' L1 plays an important role that affects their production of speech in the L2. Ellis (1994: 316) states that "(t)here is a widespread recognition that transfer is more pronounced at the level of the sound system than at the level of syntax." The example cited from Akmajian (1995) in the previous chapter shows how the L1 can affect the intelligibility of the L2. However, one of the attempts to experimentally test predictions made by CA on the phonological level was done in 1960 by Nemser, who concluded that "in terms of the learning of phonological units, classical CA predictions can sometimes lead to correct results and sometimes to incorrect results, ..." (Selinker 1992: 177).

---

[4] A good book that discusses this issue and the application of UG to the field of SLA is White's *Universal Grammar and Second Language Acquisition* (1989).

Yet, Gass and Selinker argue that Lado did not overlook this difficulty in that he made it clear that

> The list of problems resulting from the comparison of the foreign language with the native language ... must be considered a list of hypothetical problems until final validation is achieved by checking it against the actual speech of students. (In Gass & Selinker: 1993: 2)

Thus, many believed that the CAH failed to explain the reasons for second language learners' errors.

In this thesis, I attempt to investigate the extent to which the predictions of the CAH hold.

2.11. Reconsidering the CAH

This hypothesis was fully accepted at the beginning, then rejected, and then accepted again in a modified form. To understand the reason behind this acceptance, rejection, and then acceptance again, Gass and Selinker (1994: 54) believe that "it is necessary to understand the psychological and linguistic thought at the time Lado was writing."[5]

There has been an unsuccessful attempt to discard the entire theory of CA. Selinker (1992: 3) refers to this attempt as the "baby and bathwater syndrome." He believes that all the attempts to get rid of CA have failed and that there is a need to go back to CA. He states that "it is unfortunate that the extreme claims of CA as SLA prediction led many to abandon CA entirely because of those cases when predictions of errors, especially, did not come true," and he argues that "it is a fact that CA predictions sometimes work" and that "SLA thought has never abandoned some fundamental

[5] More information is provided in Chapter 3 of Gass and Selinker's *Second Language Acquisition: An Introductory Course*.

insights inherent in CA" (pp. 10-12). In line with my own observations, I concur with the view that the CAH is acceptable in some revised form.

However, the question is: to what extent can CA succeed in predicting learners' errors? Selinker (1992: 14) believes that "learners do not always transfer to their IL what is in their NL ..., and common sense states that learners may know things important to SLA (e.g. universal grammatical knowledge, knowledge from a third language, cognitive abilities) that cannot be directly related to their NL competence." In CA, unexplained phenomena were called "residue," and this hypothesis did not always succeed in the face of empirical evidence. This, Selinker (1992: 14) believes, "unfortunately ... led for a while to the diminution of language transfer as a force in SLA."

Gass and Selinker (1994: 63) give the following example from Zobl (1980) to show that there are "inconsistencies in actual error production." Word order in French is SOV (when the object is a pronoun), while in English, it is SVO. The following sentence is grammatically correct in French:

Je les vois. (*I see them.*)
↓ ↓ ↓
I them see.

Native speakers of English learning French incorrectly produced the following sentences:

1.*Le chien a mangé les. (Le chien les a mange. – *The dog has eaten them.*)
↓ ↓ ↓ ↓ ↓
The dog has eaten them

2.*Il veut les encore. (Il les veut encore. – *He wants them again.*)
↓ ↓ ↓ ↓
He wants them again

Native speakers of French correctly produced the English sentence *I see them* – despite CA's prediction that these learners would produce the ungrammatical sentence **I them see.*

This study is used by some as a criticism of the role of CA in SLA concerning the field of syntax. However, Gass and Selinker (1994: 63) comment that even in this study "one can still employ the concept of native language influence, although not in a simple way, as was predicted by a behaviorist theory." They provide the following explanation:

> Zobl (1980) hypothesized that this discrepancy occurs due to other factors of the L2. For French speakers learning English, the fact that English always has verb-object order (with both noun and pronominal objects) does not allow the French speaker to find any similarity between the native language and the TL with regard to pronominal placement. Thus, the native speaker of French is thwarted in his or her efforts to find congruence. In a similar fashion, the native speaker of English does find congruence between the NL and the TL. Word order of the type verb-object does occur in French (although only with noun objects). Furthermore, the object-verb order seems to be a more complex construction than the verb-object one, with French children showing a bias toward the latter. (Gass and Selinker 1994: 63)

Thus, it is obvious that language transfer is a complex phenomenon, and that mere comparison between the L1 and the L2 cannot help us understand the role that the L1 plays in SLA. I agree with Gass and Selinker (1994: 64) in that "there are other factors that affect second language learning development and that the role of the native language is far more complex than the simple 1:1 correspondence implied by the early version of the CAH."

Khattab's work (1998) combines childhood bilingualism, phonology, and sociolinguistics, "three areas that are rarely dealt with in combination." She concludes that "there are other important reasons" for transfer beside phonology, such as sociolinguistic factors. McCarthy (2001: 83) adds the following to this list:

> When new languages are encountered, the existing representations of L1 are activated and reshape L2 incoming information. In language transfer, complex factors interact, including language distance ..., cognitive load, attention, sociolinguistic factors, etc.

Dealing with those "other factors" goes beyond the scope of this chapter. In fact, it is not easy to detect transfer because, as Ellis puts it, it is "sometimes apparent and sometimes not ..." McCarthy (2001: 74) comments that:

> Perhaps the most stubborn issue that refuses to go away in SLA is the influence of the first or some other language on the acquisition of a new language.

He adds that

> While there is no doubt that a simple cross-linguistic comparison of two languages is insufficient to explain and predict performance in a second language, accounting for features of second language performance is by no means easy. (McCarthy 2001: 74)

As the topic of this chapter shows, I mainly concentrate on language transfer from a CA perspective but do not go into detail about the "other factors." Selinker (1992: 23) concludes that "we need to reinforce the view that one dimension of Lado was indeed deeply empirical and that this has by and large been missed in the critical literature." This dimension is explained well in Lado's *Linguistics Across Cultures* as follows:

> The list of problems resulting from the comparison of the foreign language with the native language ... must be considered a list of hypothetical problems until final validation is achieved by checking it against the actual speech of students. (In Selinker 1992: 23)

Thus, the predicted errors that I mention in the following chapter are *hypothetical*, and I intend to check the validity of this list against the actual speech of the subjects.

2.12. Conclusion

Language transfer does occur, and many recent studies support the view that L1 does have an impact on L2 "but," as Selinker (1992: 182) says, "not in the classical CA absolute 'all or nothing' fashion." This issue is of interest to language teachers and educational researchers. Selinker (1992: 171) states that "knowledge of the NL plays an

extensive role in SLA; evidence presented in studies reported there strongly supports this view, which can now be stated as SLA fact." There is "no theory of L2 acquisition that ignores the learner's prior linguistic knowledge that can be considered complete" (Ellis 1994: 300). However, language transfer is a complex phenomenon that cannot be explained by just one theory. It is "indeed a real and central phenomenon that must be considered in any full account of the second language process" (Gass & Selinker 1993: 7).

Recent studies in SLA agree that "contrastive analysis is still an essential tool in transfer research, particularly if it is supplemented by comparisons of learners with different language backgrounds" (Ellis 1994: 342). It is true that CA did not empirically show the impact that L1 has on L2 at the level of syntax, but it seems to succeed in providing an explanation for transfer at the level of phonology. A number of studies suggest that the CAH should not be abandoned, but it should be carefully modified (Ellis 1994).

I attempt in this study to examine the extent to which the CAH can help teachers and American students of Arabic predict the pronunciation errors that might occur in the classroom.

Chapter III: The Phonology of Arabic and English

In this chapter, I present an articulatory description and classification of the segmental units, i.e. vowels and consonants, of Arabic and English. As Arabic is the target language, I focus particularly on the sound system of Arabic, presenting my own descriptive analysis.

Both English and Arabic use a pulmonic egressive airsteam mechanism. This means that all the speech sounds of English and Arabic are produced using the lung-air that we breathe out.

3.1. Definition of Vowels

A vowel sound is a sound during the articulation of which the lung-air escapes freely and continuously (with neither blockage nor narrowing of the air passage). Vowels are the most sonorant and most audible speech sounds, and they usually function as the nucleus of a syllable. As they are by default voiced, the feature *voiced/voiceless* is redundant in the description of vowels.

Some linguists divide vowels into two kinds: *monophthongs* and *diphthongs*.[6] Monophthongs are defined as vowels during the articulation of which the tongue

[6] Professor Balasubramanian talked about *triphthongs*, defining them as vowels during the articulation of which the tongue starts out in the position for a simple vowel, glides towards a semi-vowel, and then glides again towards the position for another simple vowel within the same syllable. The word *our*, pronounced in *R*eceived *P*ronunciation (one of the British dialects) as [ɑwə], is an example of a triphthong. (Personal contact)

maintains its position, whereas diphthongs are defined as vowels during the articulation of which the tongue starts out in the position for a simple vowel and then moves towards the position for another simple vowel within one syllable. However, Ladefoged and Maddieson (1996: 321) state that "(t)here is a problem with this definition, in that it does not distinguish between diphthongs and long vowels, which may well be considered to be vowels that have two identical targets." In this paper, I will follow my academic advisor, Professor Anthony Mattina's, belief that "diphthongs are not vowels" (Personal contact).

In the description of the vowels of Arabic, I use my own analysis. This is not an easy task. To illustrate this fact, I would like to quote the following from Brinton (2000: 34):

> Although there are fewer vowels than consonants, their classification is more difficult for several reasons. First, vowels are articulated not by putting the articulators into discrete configuration, but by shaping the tongue in the mouth. Hence, there is theoretically an infinity of different vowel sounds, forming a continuum with no distinct boundaries. Second, there is significant regional and individual variation in the inventory of vowel sounds; in fact, phonologically, different dialects of English are distinguished primarily by their inventory of vowels, while the inventory of consonants is quite consistent across dialects. Third, authorities differ in their analyses of vowel sounds and in their methods of transcribing vowels; several (not entirely compatible) systems of vowel transcription are currently in use. Fourth, we can produce acceptable vowel sounds without the full complement of articulatory gestures; for example, with our teeth clenched or without the required lip rounding. Fifth, differences in length combine with differences in quality in distinguishing vowels, but it is not always easy to separate these differences. Sixth, it is quite difficult to tell where the vowel is when the vowel is produced; in fact, phonologists do not find an exact correlation between position of tongue postulated by the classificatory systems for vowels and measured auditory qualities, especially for the central and back vowels.

The reasons that Brinton has stated show that the description and analysis of vowels is indeed difficult. This becomes clear if we have a look at how Ladefoged and Maddieson have drawn the vowel chart of the English language in their book *The Sounds*

of the Languages of the World. Below is an acoustic chart they have constructed to show the vowels of English.

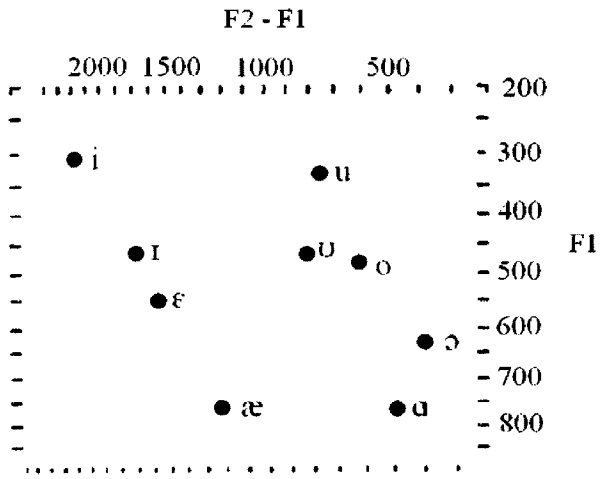


Chart 1: An acoustic representation of the American English vowels as suggested by Ladefoged and Maddieson (1996: 286)

For an unexplained reason, the vowel [ə] is not included in the above chart. However, it is clear that this chart is very different from the vowel chart that the majority of linguists use. Ladefoged and Maddieson (1996: 285) draw attention to the fact that their analysis is different from the "traditional way" of describing vowels in that, as we can see in the chart, "the vowels u and ʊ are slightly forward" and "the vowels ɪ and ʊ, which are traditionally classed as high, are acoustically closer to the mid- vowels ɛ and o rather than to i and u." For a detailed discussion of this chart, I would like to refer the readers of this thesis to chapter nine of Ladefoged and Maddieson's (1996) *The Sounds of the Languages of the World.* What I am trying to emphasize here is that the description of vowels is not an easy process.

In this paper, I am going to use the "traditional way" of describing the vowels of English, and I am going to use my own analysis of the vowels of Arabic. In the section on the vowels of English, I have taken guidance from Chapter 2 of Brinton's (2000) *The Structure of Modern English: A Linguistic Introduction.*

Before I talk about the labels that I am going to use to describe the vowels of Arabic and English in this study, it is important to note that Arabic is a language that makes a distinction between *short* and *long* vowels, whereas English makes a distinction between *lax* and *tense* vowels.[7] I am not sure if the *tense/lax* feature exists in the phonology of Arabic; therefore, I use the feature *short/long* when I describe the vowels of Arabic, and *lax/tense* when I describe the vowels of English. To describe vowels in both Arabic and English, I use a three-term label, showing:

1. The part of the tongue that is raised in the direction of the roof of the mouth: *front*, *central* or *back*. The **front** of the tongue is that part of the tongue that corresponds to the hard palate of the roof of the mouth. The **back** of the tongue corresponds to the velum. And the **center** of the tongue is the part of the tongue that is between the front of the tongue and the back of the tongue.

2. The height of the tongue when it is raised in the direction of the roof of the mouth: *high*, *mid* or *low*. During the articulation of **high** vowels, the back of the tongue is very close to the roof of the mouth, with a wide enough gap for the air to escape freely. **Low** vowels are articulated when the tongue lies low in the mouth, far away from the roof of

[7] Ladefoged and Maddieson (1996: 303) argue that the "members" in English pairs of words such as *heed-hid* and *bait-bet* are "distinguished by variations of the major vowel qualities, Height and Backness (and perhaps Rounding)", and that they "do not find it necessary to consider any additional parameters such as tenseness."

the tongue. **Mid** vowels are vowels during the articulation of which the tongue is between the high and low positions.

3. The shape of the lips: *rounded* or *unrounded.*

3.1.1. The Vowels of Arabic

Almost preserving the classical triangular Proto-Semitic vowel system, the vowel system of MSA consists of six vowels and two diphthongs.

(a) six monophthongs: three long (i.e. /i/, /u/, and /æ/) and three short counterparts (/ɪ/, /ʊ/, and /a/);

(b) two diphthongs: /ay/ and /aw/.

The three long vowels /i/, /u/ and /æ/ are represented by the letters ي /yæʔ/, و /wæw/, and ا /ʔa.lɪf/ respectively. On the other hand, the three short vowels /ɪ/, /ʊ/, and /a/ may be represented in Arabic script by diacritical marks, which are written above (in the case of /a/ and /ʊ/) or below (in the case of /ɪ/) the preceding consonant letter. These vowels, i.e. /ɪ/, /ʊ/, and /a/, may be represented by the marks ـَ [kɑs.rah], ـُ [d̪ˠɑm.mah], and ـَ [fa̪ṯ.ħah]. The presences of the diacritical mark ـْ [sʊ.kun] above a consonant letter indicates that the consonant sound represented by that letter is not followed by a vowel

sound. Another mark that is used in Arabic is the gemination mark ّ [šaḍ.ḍah], which may be used above geminate consonant letters.

However, these marks are not usually written. This might be confusing for L2 learners of Arabic. For instance, without the use of these diacritical marks, it is impossible to tell if the combination of the letters ط and ب, i.e. طب, is meant to represent the word طِب [tˠɪb] (*medicine*), طُب [tˠʊb] (*pile*), or طَب [tˠɑb] (*treated*). In this situation, the only way to eliminate ambiguity is to see the word in a context.

The table below shows the eight Arabic vowel phonemes with an example for each one of them.

No.	Vowel	Definition	Example	
			Phonemic Transcription	Meaning
1	/i/	front high unrounded long	/sˠiṭ/	reputation
2	/ɪ/	front high unrounded short	/sɪṭ/	six
3	/u/	back high rounded long	/sˠum/	fast (v.)
4	/ʊ/	back high rounded short	/sˠʊm/	deaf
5	/æ/	front low unrounded long	/mæl/	money
6	/a/	central low unrounded short	/mal/	He got bored.
7	/ay/	*See the paragraph below.*	/kayf/	how
8	/aw/	*See the paragraph below.*	/lawn/	color

Table 1: The Vowel Phonemes of Arabic

Each of the two-part vowel sounds /ay/ and /aw/ consists of a vowel that is immediately followed by a glide in the same syllable. During the articulation of the

diphthong /ay/, the tongue starts out in the position of the vowel [a] and then glides to the position for the semi-vowel [y]. However, during the articulation of the diphthong /aw/, it sounds to me that the tongue starts out in a position that is a little farther than the position of the vowel [a] and then immediately moves toward the position for the semi-vowel [w]. This change in vowel might be due the influence of the following velar semi-vowel [w]. Therefore, I use the symbol [ɑw] in my allophonic transcription of /aw/.

Chart (*2*) below shows the approximate location of the monophthongs of Arabic, while chart (*3*) on the next page shows the approximate location of the diphthongs.

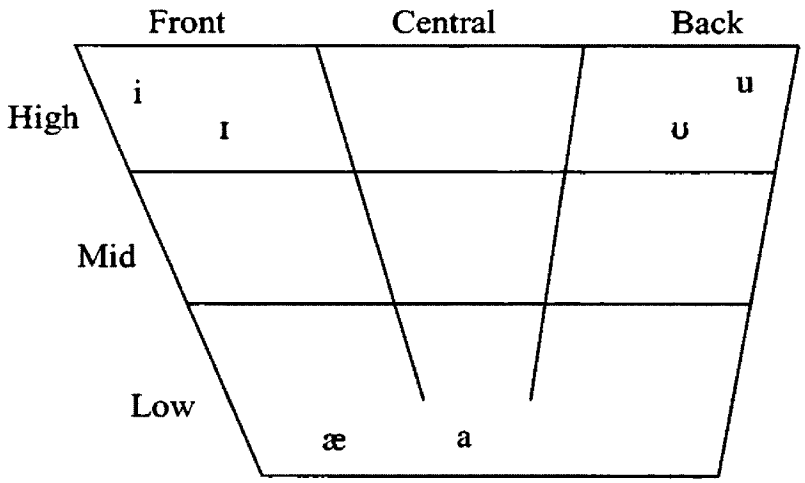


Chart 2: The monophthongs of Arabic

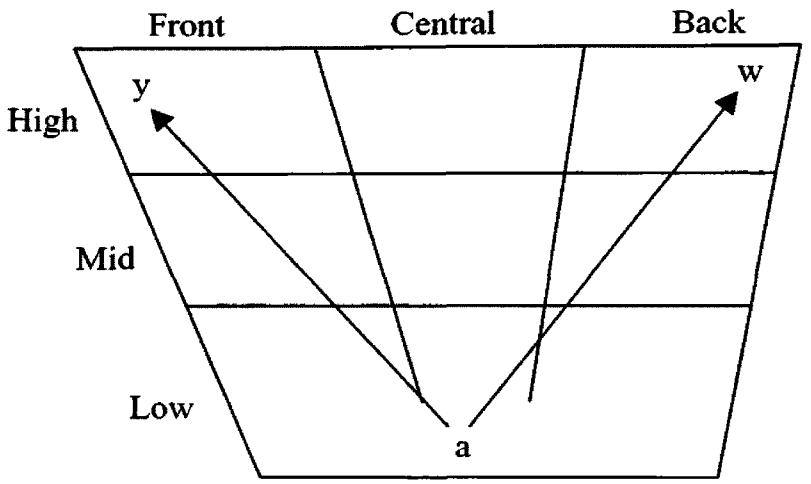


Chart 3: The diphthongs of Arabic

Contrary to what some linguists claim (Smith: 1987), vowel length in Arabic is phonemic, as illustrated by the following minimal pairs:

1. /u/ and /ʊ/:

a) /suq/ [suq] (market) /sʊq/ [sʊq] (drive *imperative*)

b) /kub/ [kub] (cup) /kʊb/ [kʊb] (overturn *imperative*)

c) /ʕuḍ/ [ʕuḍ] (stick) /ʕʊḍ/ [ʕʊḍ] (come back *imperative*)

2. /i/ and /ɪ/:

a) /qa.ˈḍim/ [qɑ.ˈḍim] (old) /qa.ˈḍɪm/ [qɑ.ˈḍɪm] (He came.)

b) /sa.ˈʕiḍ/ [sa.ˈʕiḍ] (happy) /sa.ˈʕɪḍ/ [sa.ˈʕɪḍ] (He became happy.)

c) /ʕa.ˈlim/ [ʕa.ˈlim] (Knower: *one of God's names*) /ʕa.ˈlɪm/ [ʕa.ˈlɪm] (He knew.)

3. /æ/ and /a/:

a) /ˈsæ.ʕɪḍ/ [ˈsæ.ʕɪḍ] (arm) /sa.ˈʕɪḍ/ [sa.ˈʕɪḍ] (He became happy.)

b) /ˈʕæ.lɪm/ [ˈʕæ.lɪm] (scientist) /ʕa.ˈlɪm/ [ʕa.ˈlɪm] (He knew.)

c) /ˈsˠæ.faʜ/ [ˈsˠɑː.faʜ] (He shook hands with ...) /sˠa.ˈfaʜ/ [sˠɑ.ˈfaʜ] (He forgave ...)

Instead of using the *front high unrounded lax vowel* [ɪ], some native speakers of Arabic use the *front mid unrounded lax vowel* [ɛ]. The *front low unrounded lax vowel* /æ/ is realized as (1) a *long back low unrounded lax vowel* [ɑː] when it is preceded by a velar, uvular or velarized consonant and as (2) a *front low unrounded lax vowel* [æ] in the other phonetic environments. Similarly, the *central low unrounded lax vowel* /a/ is realized as (1) a *short back low unrounded lax vowel* [ɑ] after a velar, uvular or velarized consonant and as (2) a *central low unrounded lax vowel* [a] in the other phonetic environments.

3.1.2. The Vowels of English

English has a phonemic inventory of nine vowels and five diphthongs. Below is a list of the vowels of English with an example for each.

No.	Vowel	Definition	Example
1	/i/	front high unrounded tense	beat
2	/ɪ/	front high unrounded lax	bit
3	/ɛ/	front mid unrounded lax	bet
4	/æ/	front low unrounded	bat
5	/u/	back high rounded tense	boot
6	/ʊ/	back high rounded lax	put
7	/ɔ/	back mid rounded lax	all
8	/ɑ/	back low unrounded[8]	car
9	/ʌ/	central mid unrounded	duck
10	/ey/	*See the following paragraph.*	name
11	/ɑy/	*See the following paragraph.*	night
12	/ɔy/	*See the following paragraph.*	boys
13	/ow/	*See the following paragraph.*	bout
14	/ɑw/	*See the following paragraph.*	shout

Table 2: The Vowel Phonemes of English

During the articulation of /ey/, the tongue starts out in the upper-mid front position and moves towards the position for the semivowel /y/. To produce the diphthong /ɑy/, the tongue moves from the position for the vowel /ɑ/ toward the position for /y/. During the articulation of /ɔy/, the tongue starts in the lower-mid back position and glides toward the position for the semivowel /y/. /ow/ is produced when the tongue starts in the

[8] The vowel in words like *car*, *got*, *calm*, which is described here as a back low unrounded vowel /ɑ/, is sometimes described as a central low unrounded vowel /a/ (See Stockwell and Bowen 1965: 87).

upper-mid back position and moves towards the semivowel /w/. Finally, /ɑw/ is produced when the tongue moves from the position for the vowel /ɑ/ toward the position for the semivowel /w/.

Since the equivalent vowel of the semivowel /y/ is /ɪ/, and the equivalent vowel of the semivowel /w/ is /ʊ/, the symbols /ey/, /ɑy/, /ɔy/, /ow/ and /ɑw/ could also be written as /eɪ/, /ɑɪ/, /ɔɪ/, /oʊ/ and /ɑʊ/ respectively.

The two sounds /i/ and /u/ (as in the words *see* and *sue*) are sometimes represented by the symbols /iy/ and /uw/ respectively. However, I treat these two sounds as monophthongs in this paper because there is no audible glide during their production. On the other hand, I use the symbols /ey/ (instead of /e/) and /ow/ (instead of /o/) – considering these two sounds as diphthongs – to represent the final sounds in words like *say* and *so* respectively because there is an audible glide during the production of these sounds. Unlike French and Spanish, Brinton (2000: 36) argues that "(m)ost dialects of English have no 'pure e.'"

The central vowel /ʌ/ is realized as a lower-mid vowel [ʌ] in stressed syllables and as an upper-mid vowel [ə] in unstressed syllables and before /ɹ/. Brinton (2000: 38) describes [ʌ] as a sound that is "lower and somewhat further back than schwa" and that is "sometimes analyzed as a lower-mid back vowel."

Chart (*4*) below shows the approximate location of the English monophthongs, and chart (*5*) shows the distribution of the diphthongs.

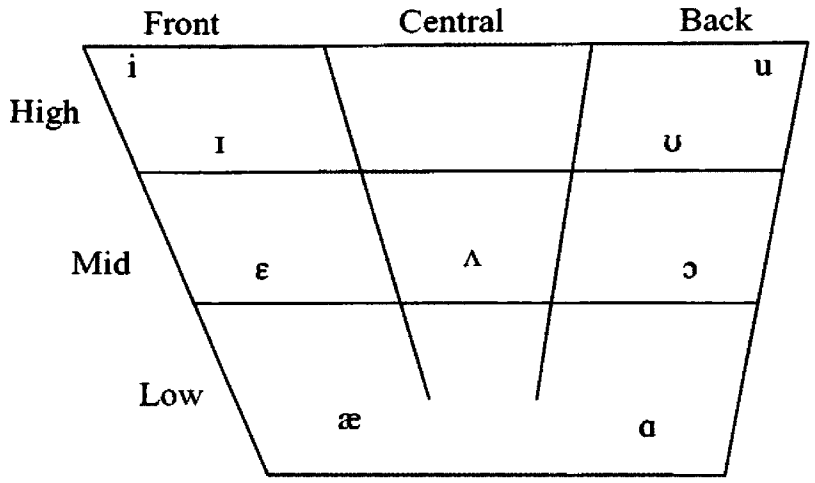


Chart 4: The monophthongs of English

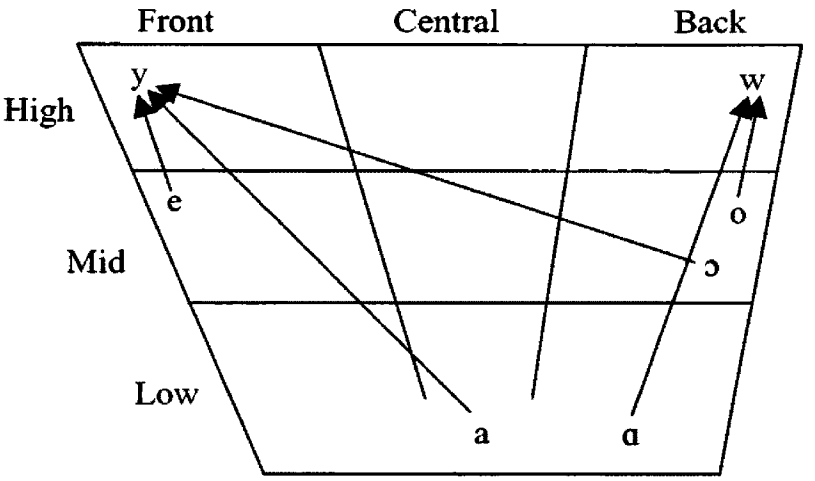


Chart 5: The diphthongs of English

Vowel length is predictable in English as illustrated by the following rule (Brinton, 2000).

/V/ ⟶	[V:] / __#	e.g.	say	/sey/
	[V·] / __ $C_{[+voice]}$	e.g.	made	/meyd/
	[V] / elsewhere	e.g.	rate	/reyt/

The elsewhere rule, Brinton says, could also be stated as:

[V] / __$C_{[-voice]}$, __CC(C)(C)

3.2. Definition of Consonants

A consonant sound is a sound during the articulation of which the lung-air does not escape freely (i.e. there is a narrowing somewhere in the vocal tract). When describing a consonant, three aspects of articulation are given:

1. the status of the vocal cords: vibrating (producing a *voiced* sound) or not (producing a *voiceless* sound);

2. *the place of articulation*, which is based on anatomical structures where the narrowing or closure takes place in the vocal tract. In the production of most sounds, the active articulator (i.e. the one that moves) is either the lower lip or the tongue, and the passive articulator (the one that does not move) is either the upper lip or the roof of the mouth. The labels that are used to describe the place of articulation are shown on the top of table *1*; and

3. *the manner of articulation*, which refers to the way in which the sound is produced, and this is based on the relationship between the articulators. The left-hand side of table *1* shows the labels used to describe the manner of articulation.

3.2.1 The Consonants of Arabic

Arabic has twenty-eight consonant phonemes. Each of these phonemes is represented by a letter of the alphabet, forming a one-to-one relationship between the Arabic letters and consonant phonemes. Velarization is phonemic in Arabic, in which four out of the twenty-eight phonemes are velarized. It is essential to realize that the primary place of articulation of these four phonemes is not the velum. Table (*3*) on the following page shows the consonant phonemes of Arabic.

	Bilabial	Labio-dental	Inter-dental	Denti-Alveolar	Alveolar	Palato-Alveolar	Palatal	Velar	Uvular	Epiglottal	Glottal
Stops	b			t̪ t̪ˠ d̪ d̪ˠ				k	q		ʔ
Fricatives		f	θ ð ðˠ		s sˠ z	š ž		x ɣ		ħ ʕ	h
Nasals	m				n						
Lateral					l						
Trill					r						
Semi-Vowels							y	w			

Table 3: Detailed table of the consonants of Arabic

A streamlined table of the consonants of Arabic is given below.

	Labial	Dental	Denti-alveolar	Alveolar	Palatal	Velar	Glottal
Stops	b		t̪ t̪ˠ d̪ d̪ˠ			k q	ʔ
Fricatives	f	θ ð ðˠ		s sˠ z	š ž	x ɣ	ħ h ʕ
Nasals	m			n			
Oral sonorants				l / r	y	w	

Table 4: Simplified table of the consonants of Arabic

Below is a description of the consonants of Arabic with reference to the letter of the alphabet that is used to represent each phoneme, the allophone(s) of each phoneme and some examples.

I. Stops

1. /b/ voiced bilabial stop

During the articulation of this phoneme, the two lips are brought together making a complete closure. The nasal cavity is closed by raising the velum. Then, the lips are suddenly separated, and the air goes out with a slight explosive noise. The vocal cords vibrate when the air is released. This phoneme is a *voiced bilabial stop*. It occurs initially, medially and finally in words. In the Arabic writing system, this phoneme is represented by the letter ب /bæʔ/. The Arabic phoneme /b/ has two primary allophones, [p] and [b].

a. [p] is a *voiceless bilabial stop* which occurs before voiceless consonants, in words like:

/ʜabs/	[ʜaps]	prison
/kabš/	[kɑpš]	sheep
/ɪɪbʜ/	[ɪɪpʜ]	benefit

b. [b] is a *voiced bilabial stop* which occurs in other phonological environments; for example,

/baʜr/	[baʜr]	sea
/ʕabḍ/	[ʕabḍ]	slave
/qalb/	[qɑlb]	heart

2. /ṭ/ voiceless denti-alveolar stop

During the articulation of the phoneme /ṭ/, the velum is raised to close the nasal passage. The tip and blade of the tongue make a complete closure with the back side of

the upper teeth and the alveolar ridge respectively. Thus, the oral passage of air is also closed. A slight explosive noise is heard when the tip and blade of the tongue are suddenly released. The vocal cords don't vibrate during the production of this phoneme. This phoneme is a *voiceless denti-alveolar stop*. This sound occurs initially, medially and finally in words. It is represented in the writing system by the letter ت /t̪æʔ/. The primary allophone of /t̪/ is [t̪], a *voiceless denti-alveolar stop*.

/t̪amr/	[t̪amr]	dates
/fit̪.ˈnah/	[fit̪.ˈnah]	glamour
/naʜt̪/	[naʜt̪]	carving

3. /t̪ˠ/ voiceless denti-alveolar velarized stop

The phoneme /t̪ˠ/ is articulated exactly like the phoneme /t̪/ except that during the articulation of /t̪ˠ/ the back of the tongue is raised towards the velum. This phoneme is a *voiceless denti-alveolar velarized stop*, and it occurs initially, medially and finally in words. The letter ط /t̪ˠæʔ/ is used in the orthography of Arabic to represent this phoneme. The two sets of minimal pairs below show that [t̪ˠ] and [t̪] are allophones of two different phonemes:

/t̪ˠin/	soil	&	/t̪in/	fig
/ˈt̪ˠæ.bɪʕ/	stamp (n.)	&	/ˈt̪æ.bɪʕ/	follower

The primary allophone /t̪ˠ/ is [t̪ˠ], a *voiceless denti-alveolar velarized stop*.

/t̪ˠin/	[t̪ˠin]	soil
/ma.ˈt̪ˠar/	[mɑ.ˈt̪ˠɑr]	rain
/ba.ˈlæt̪ˠ/	[ba.ˈlɑːt̪ˠ]	blocks

4. /d̪/ voiced denti-alveolar stop

This phoneme is articulated exactly like the phoneme /t̪/ except that in the articulation of /d̪/ the vocal cords vibrate. This phoneme is a *voiced denti-alveolar stop*, and it occurs initially, medially and finally in words. د /d̪æl/ is the letter that is used to represent this sound in the writing system. The primary allophone of /d̪/ is [d̪], a *voiced denti-alveolar stop*, which occurs initially, medially and finally in words.

/d̪in/	[d̪in]	religion
/žɪ.ˈd̪ær/	[žɪ.ˈd̪ær]	wall
/qɪrd̪/	[qɪrd̪]	monkey

5. /d̪ˠ/ voiced denti-alveolar velarized stop

This phoneme is articulated exactly like the phoneme /d̪/ except that in the articulation of /d̪ˠ/ the back of the tongue is raised towards the velum. This phoneme is a *voiced denti-alveolar velarized stop*, and it occurs initially, medially and finally in words. This phoneme is represented in Arabic by the letter ض /d̪ˠæd̪/. Arabs call Arabic "/lʊɣat̪ʊ

ʔaḍˠːæḍ/" which means "the language of /ḍˠæḍ/," because they claim that Arabic is the only language in the world that has the sound /ḍˠ/. As far as my knowledge goes, this seems to be true. However, most native speakers of Arabic nowadays find it difficult to produce this sound. Some speakers (as in Egypt) use the *voiced denti-alveolar palatalized stop* /ḍʲ/ instead of /ḍˠ/; others (as is the case in Yemen) use the *voiced interdental velarized fricative* /ðˠ/. The use of /ðˠ/ instead of /ḍˠ/ is confusing. The two sets of minimal pairs below show that [ḍˠ] and [ḍ] are allophones of two different phonemes:

/ḍˠarb/	beating	&	/ḍarb/	way
/ˈḍˠam.mar/	emaciate	&	/ˈḍam.mar /	destroy

The primary allophone of /ḍˠ/ is [ḍˠ], a *voiced denti-alveolar velarized stop.*

/ḍˠɪlʕ/	[ḍˠɪlʕ]	rib
/ra.ˈḍˠiʕ/	[ra.ˈḍˠiʕ]	infant
/wa.ˈmiḍˠ/	[wɑ.ˈmiḍˠ]	flash

6. /k/ voiceless velar stop

During the articulation of the phoneme /k/, the nasal passage of air is closed by raising the velum. The back of the tongue is also raised towards the velum making a complete closure. The oral passage of air is also closed completely. Then, the back of the tongue is suddenly released, and air escapes from the mouth with a slight explosive noise. The vocal cords do not vibrate during the production of this sound, which is represented

by the letter ك /kæf/ in the Arabic alphabet. This phoneme is a *voiceless velar stop*. It occurs at the beginning, middle and end of words. The primary allophone of /k/ is [k], a *voiceless velar stop*.

/kɪ.ˈt̪æb/	[kɪ.ˈt̪æb]	book
/nɪˈ.kæʜ/	[nɪˈ.kɑːʜ]	marriage
/wɪrk/	[wɪrk]	hip

7. /q/ voiceless uvular stop

The phoneme /q/ is articulated by raising the back of the tongue towards the uvula making a complete closure. The nasal passage of air is closed, and the vocal cords do not vibrate. The air escapes with noise when the back of the tongue is suddenly released. This phoneme is described as a *voiceless uvular stop* and is represented by the letter ق /qæf/ in Arabic. This phoneme occurs word-initially, word-medially and word-finally. For some speakers of Arabic, /q/ does not exist in their consonant inventory. Some speakers (e.g. speakers of Arabic in some parts of Yemen, Iraq, Jordan and the gulf countries) use the sound /g/ (*voiced velar stop*) instead of /q/. In Lebanese, Syrian and urban Egyptian Arabic, the glottal stop /ʔ/ is used instead of /q/. For these speakers, the word for "pen" /qa.ˈlam/ and the word for "pain" /ʔa.ˈlam/ sound exactly the same, i.e. /ʔa.ˈlam/. The primary allophone of /q/ is [q], a *voiceless uvular stop*.

/qa.ˈwɪy/	[qɑ.ˈwɪy]	strong
/saqf/	[sɑqf]	roof

/farq/ [farq] difference

8. /ʔ/ voiceless glottal stop

During the articulation of the glottal stop, the vocal cords are brought together forming a complete closure. Thus, the lung-air is completely imprisoned in the glottis. When the vocal cords are suddenly set apart, the lung-air escapes with a slight explosive noise. The glottal stop is "sometimes realized as a complete stop, and sometimes as laryngealization of the following vowel" (Ladefoged and Maddieson 1996: 74). This sound is called in Arabic *hamza*, and it, Brustad, *et al.* (1995: 42) says, "has no place of its own in the alphabet for historical reasons that involve Quranic spelling. Tradition holds that the dialect of Mecca which the Prophet Muhammad spoke did not have this sound, and therefore it was not written when the Quran was first recorded in script. The symbol for the hamza was developed, along with the short vowels markings, at a later date." This sound is usually represented by the symbol ء written above (when the glottal stop is followed by either /a/ or /ʊ/) or below (when the glottal stop is followed by /ɪ/) the letter ا, which is used to represent the vowel /æ/. This phoneme is a *voiceless glottal stop*, and it occurs initially, medially and finally in words. The primary allophone of /ʔ/ is [ʔ], a *voiceless glottal stop*.

/ʔa.ˈsad̪/ [ʔa.ˈsad̪] lion

/ˈraʔ.fah/ [ˈraʔ.fah] mercy

/xa.ˈt̪ˠaʔ/ [xɑ.ˈt̪ˠɑʔ] mistake

II. Fricatives

9. /f/ voiceless labiodental fricative

During the articulation of the phoneme /f/, the nasal passage of air is closed. The lower lip is brought close to the upper front teeth forming a narrow gap between them. The lung-air escapes through this gap with friction. The vocal cords do not vibrate. This phoneme is a *voiceless labiodental fricative* and represented by the letter ف /fæʔ/ in the Arabic orthography. The primary allophone of /f/ is [f], a *voiceless labiodental fricative.*

/fa.ˈras/	[fa.ˈras]	horse
/mɪf.ˈt̪æʜ/	[mɪf.ˈt̪æʜ]	key
/kahf/	[kɑhf]	cave

10. /θ/ voiceless interdental fricative

The nasal passage of air is closed during the articulation of the phoneme /θ/. The tip of the tongue is brought between the upper and lower front teeth forming a narrow gap between the tip of the tongue and the two rows of teeth. The air coming from the lungs escapes through this gap with audible friction. The vocal cords do not vibrate. This phoneme is a *voiceless interdental fricative* and is represented by the letter ث /θæʔ/ in Arabic. The primary allophone of /θ/ is [θ], a *voiceless interdental fricative.*

/θawr/	[θɑwr]	bull
/naθr/	[naθr]	prose
/baʜθ/	[baʜθ]	research

11. /ð/ voiced interdental fricative

The phoneme /ð/ is articulated exactly like the phoneme /θ/ except that during the articulation of the phoneme /ð/ the vocal cords vibrate. This phoneme is a *voiced interdental fricative*. The letter ذ /ðæl/ represents this phoneme in Arabic. In some dialects of Arabic, for example Egyptian Arabic, /z/ is used in place of /ð/. In these dialects the word for *intelligent* (i.e. /ðaˈkɪy/) and the word for *fragrant* (i.e. /zaˈkɪy/) sound exactly the same, /zaˈkɪy/. The primary allophone of /ð/ is [ð], a *voiced interdental fricative.*

/ðʊˈbæb/	[ðʊˈbæb]	flies (n.)
/ˈkæ.ðɪb/	[ˈkɑː.ðɪb]	liar
/faxð/	[fɑxð]	thigh

12. /ðˠ/voiced interdental velarized fricative

The phoneme /ðˠ/ is articulated exactly like the phoneme /ð/ except that during the articulation of the phoneme /ðˠ/ the back of the tongue is raised towards the velum. This phoneme is a *voiced interdental velarized fricative* and is represented by the letter ظ /ðˠæʔ/ in Arabic. The two sets of minimal pairs below show that [ð] and [ðˠ] are allophones of two different phonemes:

/ðal/	to degrade	&	/ðˠal/	to continue to do something
/ðarf/	shedding tears	&	/ðˠarf/	envelope

The primary allophone of /ðˠ/ is [ðˠ], a *voiced interdental velarized fricative.*

/ðˠarf/	[ðˠɑrf]	envelope
/ˈnaðˠ.rah/	[ˈnɑðˠ.rah]	look
/ˈʜæ.fɪðˠ/	[ˈʜæ.fɪðˠ]	keeper

13. /s/ voiceless alveolar fricative

During the articulation of the phoneme /s/, the velum is raised and the nasal passage of air is completely closed. The blade of the tongue is brought very close to the alveolar ridge in such a way that there is a very narrow gap between them for the lung-air to escape with friction. The vocal cords do not vibrate. This phoneme is a *voiceless alveolar fricative* and is represented by the letter س /sin/ in Arabic. It occurs at the beginning, middle and end of words. The primary allophone of /s/ is [s], a *voiceless alveolar fricative.*

/sʊ.ˈrur/	[sʊ.ˈrur]	happiness
/ˈmas.raʜ/	[ˈmas.raʜ]	theatre
/šams/	[šams]	sun

14. /sˠ/ voiceless alveolar velarized fricative

The phoneme /sˠ/ is articulated exactly like the phoneme /s/ except that during the articulation of /sˠ/ the back of tongue is raised in the direction of the velum. This phoneme is a *voiceless alveolar velarized fricative* and is represented by the Arabic letter

ض /sˠæḍ/. It occurs word-initially, word-medially and word-finally. The two sets of minimal pairs below show that [s] and [sˠ] are allophones of two different phonemes:

/sær/	to walk	&	/sˠær/	to become
/sayf/	sword	&	/sˠayf/	summer

The primary allophone of /sˠ/ is [sˠ], a *voiceless alveolar velarized fricative.*

/sˠɪfr/	[sˠɪfr]	zero
/ba.ˈsˠal/	[bɑ.ˈsˠɑl]	onions
/faʜsˠ/	[faʜsˠ]	medical exam

15. /z/ voiced alveolar fricative

The phoneme /z/ is articulated exactly like the phoneme /s/ except that during the articulation of /z/ the vocal cords vibrate. It is a *voiced alveolar fricative* and is represented by the letter ز /zæy/ in Arabic. /z/ occurs word-initially, word-medially and word-finally. The primary allophone of /z/ is [z], a *voiced alveolar fricative.*

/ˈzæ.ʔɪr/	[ˈzæ.ʔɪr]	visitor
/ža.ˈzi.rah/	[ža.ˈzi.rah]	island
/ɣæz/	[ɣɑːz]	gas

16. /š/ voiceless palato-alveolar fricative

During the articulation of the phoneme /š/, the nasal passage of air is closed completely. The blade of the tongue is brought close to the alveolar ridge, and the front of the tongue is raised towards the hard palate. The air coming from the lungs escapes with friction through the narrow gap between these areas of the tongue and the roof of the mouth. The vocal cords do not vibrate during the production of this phoneme, which is represented by the letter ش /šin/. This phoneme is a *voiceless palato-alveolar fricative.* The primary allophone of the phoneme /š/ is [š], a *voiceless palato-alveolar fricative.*

/šams/	[šams]	sun
/mʊšṯˠ/	[mʊšṯˠ]	comb (n.)
/kabš/	[kɑpš]	sheep

17. /ž/ voiced palato-alveolar fricative

This sound is represented by the Arabic letter ج /žim/. My teacher of phonology in Yemen, Professor Balasubramanian, describes the sound represented by this letter as a *voiced palato-alveolar affricate* and uses the symbol /dʒ/ to transcribe this sound. However, he says: "I am not sure about the place of articulation of the sound represented by the Arabic letter ج if it is pronounced as an affricate. To my ear, it sounds like a voiced palatal affricate, articulated with the tip and blade of the tongue down in the mouth, unlike the English [dʒ] which is articulated with the tip/blade of the tongue touching the teeth-ridge." I agree with Professor Balasubramanian that during that

articulation of the sound that is represented by the letter ج the tip and blade of the tongue are down in the mouth. However, I am going to use the symbol /ž/ to stand for the sound that is represented by the Arabic letter ج because, to *my* ear, this sound is a *fricative* and not an *affricate*. It is articulated in the same way as the phoneme /š/ except that during the articulation of /ž/ the vocal cords vibrate. Therefore, I would consider this phoneme a *voiced palato-alveolar fricative*. Some native speakers of Arabic (for example, Egyptian and most Yemeni speakers of Arabic) use /g/ (*voiced velar stop*) instead of /ž/. The primary allophone of /ž/ is [ž], a *voiced palato-alveolar fricative*.

/žʊrH/	[žʊrH]	wound
/nažm/	[nažm]	star
/d̪ʊrž/	[d̪ʊrž]	draw (n.)

18. /x/ voiceless velar fricative

During the articulation of the phoneme /x/ the nasal passage of air is closed completely. The back of the tongue is brought very close to the velum in such a way that there is a narrow gap between them for the lung-air to escape with audible friction. The vocal cords do not vibrate. This phoneme is a *voiceless velar fricative* and is represented by the letter خ /xæʔ/ in Arabic. /x/ occurs word-initially, word-medially and word-finally, and it has only one allophone which is the *voiceless velar fricative* [x]. Some native speakers of Arabic pronounce the sound represented by the letter خ as a *uvular* fricative (i.e. as [χ]) instead of a *velar* fricative.

/ˈxɪb.rah/ [ˈxɪb.rah] experience

/ˈʔax.d̪ˠar/ [ˈʔɑx.d̪ˠɑr] green

/mʊ.ˈnæx/ [mʊ.ˈnɑːx] weather

19. /ɣ/ voiced velar fricative

The phoneme /ɣ/ is articulated exactly like the phoneme /x/ except that during the articulation of /ɣ/ the vocal cords vibrate. /ɣ/ is a *voiced velar fricative* and is represented by the letter غ /ɣayn/ in the orthography of Arabic. The primary allophone of this phoneme is the *voiced velar fricative* [ɣ], some native speakers of Arabic pronounce the velar fricative /ɣ/ as a *uvular* fricative (i.e. as [ʁ]). On the next page, I present a few examples that show the occurrence of the phoneme /ɣ/ in Arabic.

/ɣa.ˈrib/ [ɣɑ.ˈrib] stranger

/ˈsˠi.ɣah/ [ˈsˠi.ɣɑh] jewelry

/ˈbæ.lrɣ/ [ˈbæ.lrɣ] adult

20. /ʜ/ voiceless epiglottal fricative

During the articulation of the phoneme /ʜ/ the velum is raised, and the nasal passage of air is completely closed. The lower part of the root of the tongue (i.e. the epiglottis) is brought very close to the back wall of the pharynx forming a very narrow gap for the air that is coming from the lungs to escape with audible friction. The vocal

cords do not vibrate. Thus, this phoneme is a *voiceless epiglottal fricative*. The Arabic letter ح /ʜæʔ/ is used to represent this phoneme, which has the primary allophone [ʜ], a *voiceless epiglottal fricative*.

/ʜʊbb/	[ʜʊbb]	love
/baʜr/	[baʜr]	sea
/ruʜ/	[ruʜ]	soul

21. /ʕ/ voiced epiglottal fricative

The phoneme /ʕ/ is articulated exactly like the phoneme /ʜ/ except that during the articulation of /ʕ/ the vocal cords vibrate. /ʕ/ is a *voiced epiglottal fricative* and is represented by the letter ع /ʕayn/ in Arabic. It occurs word-initially, word-medially and word-finally and has only one allophone, which is the *voiced epiglottal fricative* [ʕ].

/ʕiḍ/	[ʕiḍ]	feast (n.)
/maʕ.ˈruf/	[maʕ.ˈruf]	favor
/žuʕ/	[žuʕ]	hunger

Note on epiglottal fricatives:

Some phonologists describe these fricatives as "pharyngeal fricatives." As a native speaker of Arabic, I agree with Ladefoged and Maddieson (1996: 167) that "most of the sounds to which [the] label [pharyngeal fricatives] is attached (e.g. Arabic and Hebrew) are actually ... epiglottal" fricatives. For most native speakers of Arabic,

including myself, the place of articulation of these two consonants is closer to the epiglottis.

22. /h/ voiceless glottal fricative

During the articulation of the phoneme /h/, the velum is raised closing the nasal passage of air completely. The vocal cords are brought close to each other in such a way that the glottis becomes very narrow. The lung-air escapes through this narrow gap with audible friction. The vocal cords do not vibrate. Thus, this phoneme is a *voiceless glottal fricative*. /h/ in Arabic occurs word-initially, word-medially and word-finally. The letter هـ /hæʔ/ is used to represent this phoneme, which has two allophones in Arabic.

(a) a *voiced glottal fricative* [ɦ], which occurs intervocalically; and

(b) a *voiceless glottal fricative* [h], which occurs in all the other phonological environments.

/ha.ˈwæʔ/	[ha.ˈwɑːʔ]	air
/na.ˈhær/	[na.ˈɦær]	day (opposite of *night*)
/maw.hɪ.bah/	[mɑw.ɦɪ.bah]	talent
/ɣay.hab/	[ɣɑy.ɦab]	darkness
/ʔan.ˈhær/	[ʔan.ˈhær]	rivers
/fa.ˈt̪æh/	[fa.ˈt̪æh]	girl

III. Nasals

23. /m/ voiced bilabial nasal

During the articulation of the phoneme /m/, the velum is lowered and, therefore, the nasal passage of air is open. The lips are brought together closing the oral passage of air. The air coming from the lungs escapes freely and continuously through the nose. The vocal cords vibrate. Thus, this phoneme is a *voiced bilabial nasal.* The Arabic letter م /mim/ is used to represent this phoneme, which has two allophones:

(a) a *voiced labiodental nasal* [ɱ], which occurs when /m/ is followed by /f/; and

(b) a *voiced bilabial nasal* [m], which occurs in all the other phonological environments.

/m/ occurs word-initially, word-medially and word-finally, as illustrated by the following examples:

/ˈmas.žɪḍ/	[ˈmas.žɪḍ]	mosque
/ˈžʊm.ʕah/	[ˈžʊm.ʕah]	Friday
/sɪm.faw.ˈnɪy.yah/	[sɪɱ.fɑw.ˈnɪy.yah]	symphony
/sˠa.ˈnam/	[sˠɑ.ˈnam]	idol

24. /n/ voiced alveolar nasal

During the articulation of the phoneme /n/, the velum is lowered, and the nasal passage of air is open. The tip of the tongue makes a firm contact with the alveolar ridge. The oral passage of air is completely closed, and the air coming from the lungs escapes freely and continuously through the nose. The vocal cords vibrate. Therefore, this phoneme is a *voiced alveolar nasal* and is represented by the letter ن /nun/ in Arabic.

This phoneme occurs word-initially, word-medially and word-finally and has five allophones in Arabic:

(a) a *voiced denti-alveolar nasal* [n̪], which occurs when /n/ is followed by /t̪/ or /d̪/;

/bɪnt̪/	[bɪn̪t̪]	girl
/ʢɪnd̪/	[ʢɪn̪d̪]	next to

(b) a *voiced velar nasal* [ŋ], which occurs when /n/ is followed by /k/, /x/, /ɣ/ and /q/;

/zɪnk/	[zɪŋk]	zinc
/ˈʔɪn.xa.d̪aʢ/	[ˈʔɪŋ.xɑ.d̪aʢ]	to be deceived
/ˈʔɪn.ɣa.sal/	[ˈʔɪŋ.ɣɑ.sal]	to be washed
/ʢʊnq/	[ʢʊŋq]	neck

(c) a *voiced bilabial nasal* [m], which occurs when /n/ is followed by /b/[9];

/ðanb/	[ðamb]	fault

(d) a *voiced labiodental nasal* [ɱ], which occurs when /n/ is followed by /f/;

/ʔanf/	[ʔaɱf]	nose

and

(e) a *voiced alveolar nasal* [n], which occurs in all the other phonological environments.

/ˈnæ.ʢɪm/	[ˈnæ.ʢɪm]	soft
/ʢɪ.ˈnab/	[ʢɪ.ˈnab]	grapes
/bʊs.ˈt̪æn/	[bʊs.ˈt̪æn]	garden

[9] The contrast between /n/ and /m/ is neutralized before /b/; this is a morphophonemic or phonological phenomenon.

IV. Lateral

25. /l/ voiced alveolar lateral

During the articulation of the phoneme /l/, the nasal passage of air is completely closed as a result of raising the velum. The tip of the tongue is raised towards the alveolar ridge, and the sides of the tongue are lowered allowing the lung-air to escape through the mouth freely and continuously. The vocal cords vibrate. Thus, this phoneme is a *voiced alveolar lateral.* The Arabic letter ل /læm/ is used to represent this phoneme, which has two allophones in Arabic:

(a) a *voiced alveolar velarized lateral* [ɫ], which occurs before velarized consonants.[10]

(b) a *voiced alveolar lateral* [l], which occurs elsewhere.

The phoneme /l/ occurs word-initially, word-medially and word-finally, as illustrated by the following examples:

/laʜm/	[laʜm]	meat
/fal.ˈlæʜ/	[fal.ˈlæʜ]	farmer
/fil/	[fil]	elephant
/ˈmʊl.sˠaq/	[ˈmʊɫ.sˠɑq]	poster
/ˈɣal.t̪ˠah/	[ˈɣɑɫ.t̪ˠɑh]	mistake
/ˈɣɪl.ðˠah/	[ˈɣɪɫ.ðˠɑh]	thickness

[10] I have found only one word in which the allophone [ɫ] occurs unconditioned by velarized consonants. The word is *Allah* [ʔɑɫ.ɫɑ:h] (God).

V. Trill/Tap

26. /r/ voiced alveolar trill

During the articulation of the phoneme /r/, the velum is raised and the nasal passage of air is closed. The vocal cords vibrate. The letter ر /ræʔ/ is used to represent this phoneme, which has two allophones in Arabic: a tap and a trill. Because of its frequent occurrence, I consider the *voiced alveolar trill* as the phoneme of this family of phones. The two allophones of this phoneme are:

(a) a *voiced alveolar tap* [ɾ], which has a single short closure made between the tip of the tongue and the alveolar ridge. The phoneme /r/ is realized as a tap when it occurs intervocalically.[11]

In some books on phonology, there is no distinction between flaps and taps. However, Ladefoged and Maddieson distinguish between them as follows:

> ... flaps are most typically made by retracting the tongue tip behind the alveolar ridge and moving it forward so that it strikes that ridge in passing. Taps are most typically made by a direct movement of the tongue tip to a contact location in the dental or alveolar region (p. 232).

In this paper, I will follow this distinction and consider the Arabic phone [ɾ] a tap and the English [ɾ] a flap, because during the articulation of the Arabic [ɾ], native speakers of Arabic move the tip of the tongue upward (towards the alveolar ridge) and downward quickly, while English speakers, as described in Ladefoged and Maddieson (1996), have

> a preparatory raising and retraction of the tongue tip during the preceding vowel ... The tongue is then moved forward to make the contact ... after which it returns to the floor of the mouth (p. 232).

[11] When /r/ is geminated intervocalically, it is realized as a *trill* and not a *tap*.

However, I will follow the convention of using the same symbol, i.e. [ɾ], to represent both: the Arabic tap, and the English flap.

(b) a *voiced alveolar trill* [r], which is produced as a result of vibrating the tip of the tongue against the alveolar ridge several times in quick succession. This allophone is realized in all other phonological environments.

The phoneme /r/ occurs word-initially, word-medially and word-finally, as illustrated by the following examples:

/raml/	[raml]	sand
/ˈfɪr.qah/	[ˈfɪr.qɑh]	group
/fɪ.ˈraq/	[fɪ.ˈrɑq]	groups
/bʊ.ˈʜay.rah/	[bʊ.ˈʜay.ɾah]	lake
/ˈqar.yah/	[ˈqɑr.yah]	village
/baʜr/	[baʜr]	sea

V. Semi-Vowels

27. /y/ palatal semi-vowel

During the articulation of the phoneme /y/ the nasal passage of air is completely shut off. The front of the tongue is raised in the direction of the hard palate. The vocal cords vibrate. This phoneme is articulated in almost the same manner as the vowel /i/. Therefore, it is a *palatal semi-vowel*. The Arabic letter ي /yæʔ/ represents this sound. In fact, the letter ي is used to represent both the vowel /i/ and the semi-vowel /y/. When this

letter occurs between two consonants, it represents the vowel /i/. Otherwise, i.e. when this letter occurs word-initially, word-finally, between a vowel and a consonant or between two vowels, it represents the semi-vowel /y/. The primary allophone of the phoneme /y/ is the *voiced palatal semi-vowel* [y].

/ya.ˈmin/	[ya.ˈmin]	right (opposite of *left*)
/mɪ.ˈyæh/	[mɪ.ˈyæh]	water (n.)
/qa.ˈwɪy/	[qɑ.ˈwɪy]	strong

28. /w/ labio-velar semi-vowel

During the articulation of the phoneme /w/, the velum is raised and the nasal passage of air is completely closed. The back of the tongue is raised in the direction of the velum, and the lips are rounded. The vocal cords vibrate. This phoneme is articulated in almost the same manner as the vowel /u/. Therefore, it is a *labio-velar semi-vowel.* The Arabic letter و /wæw/, which is used to represent the vowel /u/, is also used to represent the semi-vowel /w/. When the letter و occurs between two consonants, it represents the vowel /u/; otherwise, it represents the semi-vowel /w/, which occurs word-initially, word-medially and word-finally. The primary allophone of this phoneme is [w], a *labiovelar semi-vowel.*

/waqṯ/	[wɑqṯ]	time
/lawʜ/	[lawʜ]	board
/ʕa.ˈfʊw/	[ʕa.ˈfʊw]	forgiving

Note on semi-vowels:

Semi-vowels are sounds that are articulated as vowels (i.e. with the lung-air escaping freely and continuously, and with neither blockage nor narrowing in the vocal tract) but that function as consonants (i.e. a semi-vowel cannot be the nucleus of a syllable). Ladefoged & Maddieson (1996) state that the term *glides*, which is usually used to describe semi-vowels "based on the idea that they involve a quick movement from a high vowel position to a lower vowel" is "inappropriate; as with other consonants they [semi-vowels] can occur geminated". For this reason, I call the sounds [y] and [w] *semi-vowels* and not *glides*.

3.2.2. The consonants of English

Table (*5*) below shows the distribution of the twenty-four consonant phonemes of English.

	Bilabial	Labio-dental	Inter-dental	Alveolar	Palato-Alveolar	Palatal	Velar	Glottal
Stops	p b			t d			k g	
Affricates					č ǰ			
Fricatives		f v	θ ð	s z	š ž			h
Nasals	m			n			ŋ	
Lateral Liquid				l				
Retroflexed Liquid				ɹ				
Semi-Vowels						y	w	

Table 5: Detailed table of the consonants of English

A streamlined table of the consonants of English is given below.

	Labial	Dental	Alveolar	Palatal	Velar	Glottal
Stops	p b		t d	č ǰ	k g	
Fricatives	f v	θ ð	s z	š ž		h
Nasals	m		n		ŋ	
Oral sonorants			l / ɹ	y	w	

Table 6: Simplified table of the consonants of English

A brief summary of the consonant phonemes of English with the phonemic rules that show the allophones of each phoneme is given in the following pages.

1. /p/ voiceless bilabial stop (occurrence: word- initially, medially, and finally)

/p/ ⟶ [p^h] / #__ ˈV e.g. pen, support

[p˺] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. opt, capture, cup

[p] / elsewhere

2. /b/ voiced bilabial stop (occurrence: word- initially, medially, and finally)

/b/ ⟶ [b˺] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. robbed, objection, cab

[b] / elsewhere

3. /t/ voiceless alveolar stop (occurrence: word- initially, medially, and finally)

/t/ ⟶ [t^h][12] / #__ ˈV e.g. tin, maintain

[ɾ] / ˈV__ {V, [ɹ̩], [l̩]} e.g. city, matter, bottle

[t̪] / __$C_{[interdental]}$ e.g. at that, eighth

[t˺] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. football, that jar, sit

[ʔ] / __$C_{[nasal, alveolar, syllabic]}$ e.g. button, kitten, Britain

[t] / elsewhere

The phonemic rule above shows that /t/ is realized as a voiced alveolar flap [ɾ] when it is preceded by a stressed vowel and followed by another vowel, a syllabic /ɹ̩/ or a

[12] Prof. Mattina states that it could be argued that the default allophones of the English voiceless stops are the aspirated allophones [t^h], [k^h] and [p^h]. However, I am going to follow the common conviction that the English voiceless stops are aspirated when they occur at the beginning of stressed syllables.

syllabic /l/. It could also be realized in casual speech as a flap when it occurs between two unstressed vowels, as in *property* (Brinton, 2000). In these positions, /t/ sounds like /d/ in rapid American English speech. As a matter of fact, the words *bitter* and *bidder* are homophonous in the speech of the subjects in this study.

4. /d/ voiced alveolar stop (occurrence: word- initially, medially, and finally)

/d/ [d̚] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. bedtime, good jar, red

[d̪] / __ $C_{[interdental]}$ e.g. width, breadth

[d] / elsewhere

5. /k/ voiceless velar stop (occurrence: word- initially, medially, and finally)

/k/ ⟶ [k^h] / #__ 'V e.g. king, account

[k̚] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. act, picture, sick

[k] / elsewhere

6. /g/ voiced velar stop (occurrence: word- initially, medially, and finally)

/g/ ⟶ [g̚] / __ {$C_{[stop]}$, $C_{[affricate]}$, #} e.g. begged, big jar, mug

[g] / elsewhere

7. /č/ voiceless palato-alveolar affricate (occurrence: initially, medially, and finally)

8. /ǰ/ voiced palato-alveolar affricate (occurrence: initially, medially, and finally)

9. /f/ voiceless labiodental fricative (occurrence: initially, medially, and finally)

10. /v/ voiced labiodental fricative (occurrence: initially, medially, and finally)

11. /θ/ voiceless interdental fricative (occurrence: initially, medially, and finally)

12. /ð/ voiced interdental fricative (occurrence: initially, medially, and finally)

13. /s/ voiceless alveolar fricative (occurrence: initially, medially, and finally)

14. /z/ voiced alveolar fricative (occurrence: initially, medially, and finally)

15. /š/ voiceless palato-alveolar fricative (occurrence: initially, medially, and finally)

16. /ž/ voiced palato-alveolar fricative (occurrence: medially and finally)[13]

17. /h/ voiceless glottal fricative (occurrence: initially and medially)

/h/ ⟶ [ɦ] / V__V e.g. behave, behalf

[h] / elsewhere

The allophone [h] is the most commonly occurring allophone of the phoneme /h/ (Balasubramanian). It is usually described as a voiceless glottal fricative. However, Brinton (2000) states that /h/ in English is "a kind of voiceless vowel, which is homorganic with the following vowel" and which "can also be a voiceless glottal approximant" (p. 33). This is because, Brinton argues, during the articulation of /h/ the mouth takes the position of the following vowel and then the air is momentarily constricted "before setting the vocal cords in motion to produce the voiced vowel" (p. 33). He illustrates his stand by giving the following rule:

/h/ ⟶ [i̥] /__i e.g. heed

[ɪ̥] / __ɪ e.g. hid

[13] The phoneme /ž/ occurs at the beginning of certain English words that have been borrowed from French, such as *genre* [žɑnɹə].

[æ̥] / __æ e.g. hat

[ụ] / __u e.g. who

[ʊ̥] / __ʊ e.g. hood

etc.

18. /m/ voiced bilabial nasal (occurrence: word- initially, medially, and finally)

/m/ [m̪] /__$C_{[labiodental]}$ e.g. symphony, some views

[m] / elsewhere

19. /n/ voiced alveolar nasal (occurrence: word- initially, medially, and finally)

/n/ [n̪] / __ $C_{[interdental]}$ e.g. tenth, month, in there

[m̪] / __ $C_{[labiodental]}$ e.g. information, invest

[ŋ] / __ $C_{[velar]}$ e.g. income, increase

[n̩] / $C_{[obstruent]}$__# e.g. button, madden

[n] / elsewhere

20. /ŋ/ voiced velar nasal (occurrence: word- medially and finally)

21. /l/ voiced alveolar lateral liquid (occurrence: word- initially, medially, and finally)

/l/ [l̪] / __$C_{[interdental]}$ e.g. health

[ɬ] / __{C, #} e.g. sell, silk

[l̩] / $C_{[obstruent]}$__#, $C_{[nasal]}$__# e.g. paddle, camel

[l] / elsewhere

22. /ɹ/[14] voiced alveolar retroflexed liquid[15] (occurrence: word- initially, medially, and finally)

/ɹ/	[ɻ̥] / $C_{[-voice, +stop]}$__	e.g.	prove, tree, crew
	[ɹ] / $C_{[+voice, +stop]}$__	e.g.	brown, dream, green
	[ɻ̩] / elsewhere	e.g.	read, write, marry

23. /y/ voiced palatal semi-vowel (occurrence: word- initially and medially)

/y/	[ç] / C^h__	e.g.	pure, tune, cure
	[y] / elsewhere		

24. /w/ voiced labio-velar semi-vowel (occurrence: word- initially and medially)

/w/[16]	[ʍ] / C^h__	e.g.	queen, twist
	[w] / elsewhere		

Before I conclude this chapter, I find it important to talk about the glottal stop in English. Brinton mentions that "(s)ome speakers of North American English and British English produce [ʔt] or [ʔ] instead of [t] before *–en* or *–el/le* in words such as *beaten*,

---

[14] I am using the IPA symbol [ɹ] instead of the symbol that is used in the American transcription system, [r], to mark the difference between the Arabic trill [r] and the English retroflexed [ɹ].

[15] Brinton (2000: 33) has stated that the "description of the English retroflex is rather difficult, and there is no completely satisfactory treatment."

[16] In some dialects of English the phoneme /w/ is also realized as [ʍ], a voiceless labiovelar semi-vowel, "with the air slightly constricted in the glottis" when it is followed by an orthographic *h* (Brinton 2000: 33).

fatten, or *battle*" (p. 29). The subjects in this study pronounce [ʔt] instead of [t] in their pronunciation of the examples mentioned in Brinton's statement. In the English speech of my subjects, it sounds to my ears that words such as *am*, *on*, *ice*, *or*, etc. begin with [ʔ] and not with a vowel. Brustad *et al.* state that speakers of English produce the glottal stop when they "pronounce any word that begins with a vowel, such as *our*, *if*, *it*, *I*, *on*, *up*" (p. 41). Therefore, a word such as *am* will be transcribed as [ʔæm] in this paper.

In this chapter, I have analyzed the segmental phonemes of Arabic and English, focusing on the phonemes of Arabic. In the next chapter, I attempt to use the CA as a framework to predict the phonological errors that American learners of Arabic as a second language might commit in their Arabic speech.

Chapter IV: Contrastive Analysis of Arabic and English

In this chapter, I present a comparative and contrastive analysis of the segmental phonemes of English and Arabic, showing the major phonetic and phonological differences between the segmental phonemes of these two languages. I use the Contrastive Analysis Hypothesis (CAH) as a framework to predict the errors that the subjects are likely to commit in their production of Arabic speech. I begin with the vowel systems and then present the consonantal systems.

4.1. The Vowel Systems

The chart below shows the approximate targets for the vowels of both English and Arabic.

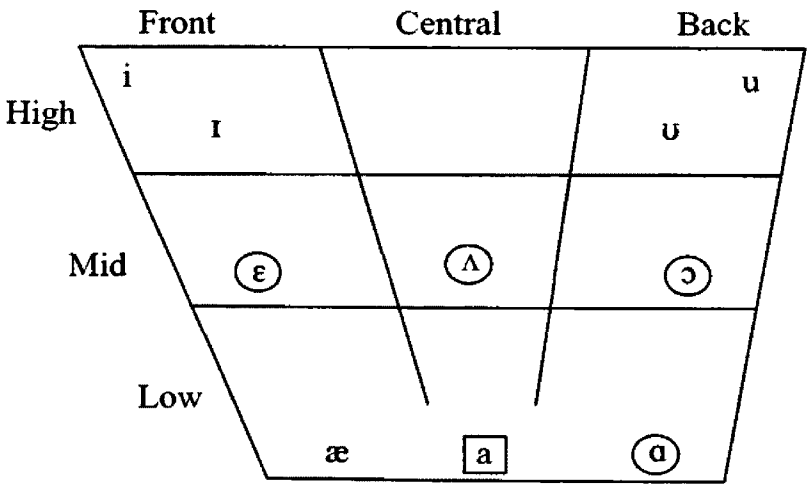


Chart 6: The vowel phonemes of English and Arabic[17]

[17] Phonemes that are circled occur in English only. The phoneme /a/, which is enclosed within a box, occurs in Arabic only. The other phonemes occur in both languages (i.e. have equivalents or near equivalents in English and Arabic).

The chart on the previous page shows that the vowels [i], [ɪ], [u], [ʊ] and [æ] have equivalents or near equivalents in both Arabic and English. It also shows that the vowels [ɛ], [ʌ], and [ɔ] occur in English only, and that the vowel [a] occurs in Arabic only. As mentioned earlier, the Arabic vowels /a/ and /æ/ are realized as [ɑ] and [ɑ:] respectively when /a/ and /æ/ occur after a velar, uvular or velarized consonant.

Because of these differences, the CAH predicts that the subjects will not have difficulty in producing the vowels [i], [ɪ], [u], and [ʊ] in their Arabic speech, because these vowels also occur in the subjects' L1. It also predicts that the subjects will use the front vowel [æ] instead of the back long vowel [ɑ:] in word like /kæn/, which is pronounced as [kɑ:n], and that they will use back vowel [ɑ] instead of central [a].

Below are five areas of errors that the CAH predicts the subjects will commit in their production of the vowels of Arabic.

1) When English vowels are followed by a voiced consonant or occur word-finally, they tend to be longer than they are when they are followed by a voiceless consonant. Thus, the vowel /u/ in the words *soon* and *sue* is slightly longer than it is in the word *suit*. However, it seems that this predictable alternation in vowel-length is missing in the phonological system of Arabic (Balasubramanian).

The CAH predicts that the subjects will transfer this vowel length feature from their L1 to their L2. This transfer would result in pronouncing the vowel /u/ in a word like [kub] longer than it is in a word like [ʜuṭ].

However, I am not going to investigate this feature in this paper due to a lack of acoustic equipment to measure the length of vowels. But if this feature is transferred

from English to Arabic, I do not think that it will affect the intelligibility of the Arabic spoken by native speakers of English, as long as they make a distinction between /u/ and ʊ/ and between /i/ and /ɪ/.

2) Professor Balasubramanian has noted that

> ... there is a difference in the vowel quality between the English /i:/ and the Arabic /i:/ and also between the English /ɪ/ and the Arabic /ɪ/. There is no instrumental evidence to support this claim. I feel that the English /i:/ is slightly more close than the Arabic /i:/ and that the Arabic /ɪ/ is more close than the English /ɪ/. (p. 14)

I agree with Professor Balasubramanian that the English [i] sounds higher than the Arabic [i] and that the Arabic [ɪ] sounds higher than the English [ɪ].

The CAH predicts that the subjects will use their English /i/, which sounds to us as being a bit higher than the Arabic /i/, in their Arabic speech. It also predicts that the subjects will use their English /ɪ/, which sounds to us as being a bit lower than the Arabic /ɪ/, when they speak Arabic.

Again, lack of instrumental evidence makes us uncertain about these "feelings." However, this difference in vowel quality, if it exists (and if it is transferred from English to Arabic), will not render the Arabic of native speakers of English unintelligible.

3) As mentioned in point (2) above, Professor Balasubramanian has noted that the English /u/ sounds slightly higher than the Arabic /u/ and that the Arabic /ʊ/ sounds slightly higher than the English /ʊ/. However, for the same reason mentioned above, I am

not going to investigate the existence of this difference in vowel quality. But if such a difference exists and is transferred, the subjects' Arabic speech will not be unintelligible.

4) As shown in the chart above, the *central low unrounded lax vowel* /a/ exists in Arabic but not in the vowel system of English. The closest English vowel to this Arabic vowel is the back vowel /ɑ/. Therefore, the CAH predicts that the subjects will use the *back low unrounded lax vowel* /ɑ/, which exists in their L1, instead of the target vowel /a/. However, since [ɑ] exists in Arabic as an allophone of the central phoneme /a/, the subjects' use of [ɑ] instead of [a] might not always lead to negative transfer.

5) Based on what I mentioned in point (4) above, the CAH predicts that the subjects will pronounce the Arabic diphthongs [ay] and [aw] as [ɑy] and [ɑw] respectively. The hypothesis also predicts that the subjects' use of [ɑy] and [ɑw] instead of [ay] and [aw] before velar, uvular and velarized consonants will lead to positive transfer.

To summarize, the CAH predicts that the subjects will not have difficulty pronouncing the sounds [i], [ɪ], [u], [ʊ], and [æ], because these sounds have either equivalents or near equivalents in the subjects' L1. However, they need to learn to produce and use the central vowel [a] and, then, make a distinction in their Arabic speech between [a] and [ɑ].

4.2. The Consonantal Systems

	Bilabial	Labio-dental	Inter-dental	Denti-Alveolar	Alveolar	Palato-Alveolar	Palatal	Velar	Uvular	Epiglottal	Glottal
Stops	(p) b			[t̪] [d̪] [t̪ʸ] [d̪ʸ]	(t) (d)			k (g)	[q]		[ʔ]
Affricates						(č) (j)					
Fricatives		f (v)	θ ð [ðʸ]		s [sʸ] z	š ž		[x] [ɣ]		[ħ] [ʕ]	h
Nasals	m				n			(ŋ)			
Lateral Liquid					l						
Retroflexed Liquid					(ɹ)						
Trill					[r]						
Semi-Vowels							y	w			

Table (5): The consonant phonemes of English and Arabic[18]

Based on the table above, the CAH predicts that the sounds [b], [f], [θ], [ð], [s], [z], [š], [ž], [m], [n], [w], and [y] are not likely to create difficulties for the subjects because these sounds have either equivalents or near equivalents in the subjects' L1. However, the table by itself cannot help in predicting the sounds that are likely to create difficulty for the subjects. For instance, the table seems to indicate that the phonemes /k/, /h/ and /l/ might not be problematic for native speakers of English learning Arabic. However, points number 1, 17 and 18 below explain why I have not included these phonemes in the list of sounds that are not likely to create difficulty for the subjects.

[18] Phonemes that are circled occur in English only, whereas phonemes that are enclosed within boxes occur in Arabic only. The other phonemes occur in both English and Arabic (i.e. have equivalents or near equivalents in English and Arabic).

In the following pages, I list the difficulties that the CAH predicts the subjects will encounter while attempting to produce consonants.

1) Since the English voiceless stops, such as /t/ and /k/, are heavily aspirated when they occur at the beginning of a stressed syllable, and since this feature of aspiration does not exist in the phonological system of Arabic, the CAH predicts that the subjects will transfer this feature from their L1 to their L2.

2) Arabic allows a consonant to occur either single or geminate (i.e. doubled) between vowels and at the end of words. This is shown in Arabic script with the use of the symbol ّ /šaḍ.ḍah/, which could be written above the geminate consonant letter. When a consonant is geminated, it is pronounced almost twice as long as when it is single. Consonant gemination distinguishes the two words دَرَس /ḍa.ras/ [ḍaras] (*studied*) and دَرَّس /dar.ras/ [dar:as] (*taught*).[19]

On the other hand, geminate consonants may occur in English only across a morpheme boundary, as in *night-time* and *book-case*. Words which are written with a doubled letter, such as *letter*, *summer*, *manner*, *taller*, etc., have a single consonant intervocalically. This use of two consonant letters to represent one single sound leads many Arab learners of English (especially at the early stages) to double the consonant sound in their English speech.

[19] As explained in chapter 2, /r/ is realized as a tap when it occurs intervocalically in Arabic. However, when /r/ is doubled intervocalically, it is realized as a trill and not a tap.

Since native speakers of English are able produce geminate consonants in their English speech, the CAH predicts that the subjects will not have difficulty producing geminate consonants intervocalically in their Arabic speech. Moreover, the hypothesis also predicts that Arabic word-final consonant clusters that are made up of two identical consonants might create difficulty for the subjects due to the fact that English does not allow consonants to geminate at the end of words.

3) Single consonants can occur in both English and Arabic at the beginning and also at the end of syllables. However, while English allows up to three consonants to form a consonant cluster at the beginning of syllables, Arabic does not allow word-initial consonant clusters. Moreover, up to four consonants can form a consonant cluster at the end of syllables in English, whereas in Arabic, only consonant clusters made up of two consonants are permissible.

As is well known, not just any two, three or four consonants can form a cluster; the order of the consonants in a consonant cluster is very important. For example, the consonants [ð] and [z] – in that exact order – could form a word-final consonant cluster, as in the word *clothes*; [z] cannot come before [ð] in either a word-initial or word-final consonant cluster in English.

The CAH predicts that the subjects will have no difficulty in producing single consonants in Arabic, since both English and Arabic allow single consonants to occur at the beginning and end of syllables. However, the CAH also predicts that the subjects will find it difficult to produce consonant clusters made of two consonants that are not permissible in English.

4) The voiceless bilabial stop [p] exists in both English and Arabic. However, in Arabic it is an allophone of the phoneme /b/ that occurs before voiceless consonants. In contrast, English treats [p] and [b] as allophones of two different phonemes – as illustrated by the minimal pair: *pin* /pɪn/ and *bin* /bɪn/. Both the English /p/ and /b/ occur before voiceless consonants, as seen in the examples: *elapsed* /ɪlæ**p**st/ and *obstacle* /ɑ**b**stəkl/. The CAH predicts that the subjects will use the voiced sound [b] before voiceless consonants in the Arabic speech.

5) The voiceless denti-alveolar stop [t̪] occurs in both the languages. In Arabic, the denti-alveolar [t̪] is the primary allophone of the phoneme /t̪/. On the other hand, [t̪] is an allophone of the alveolar phoneme /t/. The occurrence of the denti-alveolar [t̪] is very restricted in English. It occurs only before any of the interdental fricatives [θ] or [ð], as in *eighth* [eyt̪θ][20], and *Sit there* [sɪt̪ ðr̪]. However, Arabic does not permit the denti-alveolar [t̪] to cluster with either [θ] or [ð]. Therefore, the CAH predicts that the subjects will substitute target denti-alveolar [t̪] by their L1 alveolar [t].

6) The voiced denti-alveolar stop [d̪] occurs in both Arabic and English. However, [d̪] is the primary allophone of the Arabic denti-alveolar phoneme /d̪/, while it is but one of the allophones of the English alveolar phoneme /d/. The occurrence of [d̪] is very restricted in English, as it occurs only before the interdental fricatives [θ] and [ð]. However, [d̪]

[20] The consonant cluster [t̪θ] is not permissible in the phonological system of Arabic.

does not form a consonant cluster with either [θ] or [ð] in Arabic. Because of this difference, the CAH predicts that the subjects will substitute the dental [d] for the interdental [d̪] in words like /ˈd̪æ.fɪʕ/, /mɪ.ˈd̪æd̪/ and /ˈsʸʊd̪.fah/.

7) The voiceless velarized denti-alveolar stop [t̪ʸ] does not exist in the phonology of English. In place of the sound [t̪ʸ] the CAH predicts that native speakers of English will use the voiceless alveolar stop [t]. Thus, the word /t̪ʸin/ (*soil*) would be pronounced as [tin], which sounds like the Arabic word [t̪in] (*figs*).

8) The voiced velarized denti-alveolar stop [d̪ʸ] does not exist in the phonology of English. Instead of using the sound [d̪ʸ], the CAH predicts that native speakers of English would use the voiced alveolar stop [d]. Thus, the word /d̪ʸær/ (*became hungry*) would be pronounced as [dæɪ], which sounds like the Arabic word [d̪ær] (*turned*).

9) Since the voiceless uvular stop [q] does not exist in the sound system of English, the CAH predicts that native speakers of English learning Arabic as an L2 will replace this sound by the voiceless velar stop [k]. For instance, the word [qʊl], which means *say* (imperative form), will be pronounced as [kʰʊɬ]/, which sounds like the Arabic word [kʊl] (*all*).

10) The glottal stop /ʔ/ occurs in both Arabic and English. In Arabic, /ʔ/ is a phoneme that occurs at the beginning, middle and end of syllables. However, the occurrence of [ʔ] seems to be restricted in English. The glottal stop [ʔ] is an allophone of the English phoneme /t/, and it occurs when /t/ is followed by a syllabic /n/.

I found that the subjects used a glottal stop in the word-initial position in words like *at*, *it*, *on*, *under*, and *eat*.[21] The sound [ʔ] never occurs in the word-final position in English. Therefore, the CAH predicts that the subjects will pronounce the Arabic word [maṯn] as [maʔn̩]. It also predicts that the subjects will find it difficult to pronounce the glottal stop at the end of words like [šæʔ] and [jæʔ], and that the subjects will find it easy to produce a glottal stop before vowels in the word-initial position.

11) Since the voiced velarized interdental fricative [ðˠ] occurs in Arabic but not in English, the CAH predicts that native speakers of English will use the closest sound in their L1, i.e. the voiced interdental fricative [ð], instead of [ðˠ]. For example, the hypothesis predicts that the word [ðˠarf], which means *envelope*, will be pronounced as [ðɑɪf], which sounds like the Arabic word [ðarf] (*shedding tears*).

12) The voiceless velarized alveolar fricative [sˠ] does not exist in the phonological system of English, but it is part of the phonological system of Arabic. Therefore, the CAH predicts that native speakers of English will use the voiceless alveolar fricative [s]

[21] "We may claim that [ʔ] is a word-initial phoneme" in English (Dr Thibeau: personal contact).

in place of [sˠ]. However, [s] and [sˠ] are allophones of two different phonemes in Arabic. For example, the CAH predicts that the word [sˠɑyf], which means *summer*, will be pronounced as [sɑyf], which sounds exactly like the Arabic word for *sword*.

13) Because of the absence of the voiceless velar fricatives [x] in the consonantal system of English, the CAH predicts that native speakers of English will use the voiceless velar stop /k/ instead. This prediction is supported by Brinton (2000: 31), who has noted that "English speakers usually substitute their closest sound, [k], for ... ([x])." For example, the CAH predicts that the subjects will pronounce the word [xɑ:l], which means (*uncle*), as [kʰæɬ], which sounds similar to the Arabic word [kæl] (*to weigh*).

14) Similarly, because of the absence of the voiced velar fricatives in the consonantal system of English /ɣ/, the CAH predicts that native speakers of English will use the voiced velar stop /g/ instead. For example, the hypothesis predicts that the subjects will pronounce the word [ɣɑ:b] (*to disappear*) as [gɑ:b] (*to travel*).[22]

15) Since the voiceless epiglottal fricative [ʜ] does not occur in the sound system of English, the CAH predicts that the subjects will substitute the closest sound in their L1 sound system, i.e. the voiceless glottal fricative [h], for [ʜ]. For example, the CAH

[22] Please refer to chapter 1 regarding the use of /g/ instead of /ž/ in some dialects of Arabic.

predicts that the word /ʜa.baṯˠ/, which means *to fail*, will be pronounced as [hɑ.bɑt], which sounds like the Arabic word [ha.baṯˠ] (*to descend*).

16) Also, the voiced epiglottal fricative [ʕ] is absent from the sound system of English, and the CAH predicts that native speakers of English will substitute the closest L1 sound, i.e. the glottal stop [ʔ], for [ʕ]. Thus, the CAH predicts that the word [ʕa.zal], which means *to separate*, will be pronounced as [ʔɑ.zɑɬ][23], which sounds like the Arabic word [ʔa.zal] (*eternity*).

17) The voiceless glottal fricative phoneme /h/ occurs in both Arabic and English. However, its occurrence in English is limited to word-initial and word-medial positions; it does not exist word-finally in English. On the other hand, the occurrence of /h/ in Arabic is not as restricted as it is in English; /h/ occurs word-initially, word-medially and word-finally in Arabic.

Moreover, /h/ in English is always followed by a vowel, whereas, in Arabic, /h/ could be followed by a vowel or a consonant. Because of these differences, the CAH predicts that the subjects will encounter difficulty in producing [h] at the end of words like [sɪ.ˈmah], [šæh] and [mɪ.ˈyæh], and also before consonants, as in the words [qɑhr], [nahb], and [bʊh.ˈṯæn].

[23] Since the lateral phoneme /l/ is velarized at the end of English words, the CAH predicts that the subjects will produce a velarized /l/ at the end of words in their Arabic speech. Point number 18 below discusses this issue.

18) As mentioned in the previous chapter, the voiced alveolar lateral liquid /l/ is velarized in English in the word-final position and before consonants. This velarization feature of the lateral /l/ does not exist in Arabic. Based on this difference, the CAH predicts that the subjects will apply this rule to their Arabic speech when they use the phoneme /l/, and this will lead to negative transfer.

19) The voiced alveolar trill /r/ occurs in Arabic, but not in English. This trill is realized as a tap [ɾ] when /r/ occurs intervocalically. On the other hand, the voiced alveolar retroflexed liquid /ɹ/ occurs in English, but not in Arabic. As we saw in the previous chapter, the English stop /t/ is realized as a flap [ɾ] when it occurs intervocalically or between a vowel and a syllabic /ɹ/ or /l/. Thus, the flap/tap [ɾ][24] is a common allophone between the Arabic trill /r/ and the English stop /t/, occurring when these two phonemes occur intervocalically in both the languages. Based on this, and because [ɾ] is not a variant of the Arabic /t̪/, the CAH predicts that the subjects will pronounce a word like [fa.ˈt̪aʜ] (*to open*) as [fɑɾɑh], which very much sounds like the Arabic word [fa.ˈɾaʜ], which means *happiness*. Thus, the use of [ɾ] in place of [t̪] affects the Arabic spoken by native speakers of English.

The CAH also predicts that that subjects will use the retroflexed [ɹ] instead of the trill [r] in their Arabic speech.

---

[24] As mentioned in the previous chapter, there is a difference between the Arabic tap and the English flap. However, only one symbol is used for both in this paper, i.e. the symbol [ɾ]. Though I prefer to make a distinction between a tap and a flap, I sometimes do not talk about them as separate sounds, because it is difficult to hear the difference between them when people talk rapidly. Therefore, I use the term *tap/flap* to represent any of these two sounds when I am not sure of the exact sound the subjects use.

20) Both the voiced alveolar nasal [n] and the voiced velar nasal [ŋ] occur in Arabic, but they are in complementary distribution. The velar [ŋ] occurs only before the velars /k/, /x/, and /ɣ/ and before the uvular /q/.

Because of this difference, native speakers of Arabic find it difficult to produce [ŋ] intervocalically and word-finally. I have noticed that speakers of Yemeni Arabic tend to use the sequence [ŋ] + [g] in every English word in which [ŋ] occurs. This is also used in hypercorrect English as in the word *hanger* [hæŋgɹ̩].

On the other hand, the alveolar [n] and the velar [ŋ] in English are allophones of two different phonemes: /n/ and /ŋ/.[25] However, the sound [ŋ] could be a variant of the English phoneme /n/ (Brinton, 2000). Brinton states that "the velar nasal is a bit more difficult to produce in isolation since in English it never begins a word" and that "it is always found before an orthographic *k* or *g*, though the *g* may not be pronounced in final position" (pp. 29-30).

Because of this similarity, the CAH predicts that native speakers of English learning Arabic will not encounter difficulty in producing [ŋ] before velar or uvular consonants.

In this chapter, I have used the CAH as a framework to predict the phonological errors that native speakers of English are likely to commit in their Arabic speech. In the next chapter, I am going to compare the list or errors that I have presented in this chapter with subjects' actual Arabic speech.

---

[25] /n/ is realized as [ŋ] in English before a velar consonants.

Chapter V: The Study

5.1. Subjects

The subjects in this study were three adult native speakers of English (2 females and 1 male), speaking the Northern dialect of American English. They were all students at the University of Montana, taking the course *Arabic 102*. They had been exposed to Arabic in a formal setting for about five months at the time of the study. None of them had been to an Arabic-speaking country, and none of them had an opportunity to practice Arabic outside the classroom. Moreover, the three subjects did not speak any other foreign language. Therefore, they were novice learners in terms of their level in Arabic.

The subjects' real names are not going to be revealed in this paper, but I am going to refer to them as subject A, subject B, and subject C. Below is specific information about each subject.

Subject A was a nineteen-year-old female. She was interested in the language as well as the Arabian culture. Her motive in learning Arabic was to visit some of the Arab countries.

Subject B was a twenty-one-year-old female. She was a student of Asian studies, and she was also interested in the culture of the Arab World.

Subject C was a twenty-year-old male. His reason for studying Arabic was that he was looking for a new challenge, and he had found that Arabic was a fascinating language.

The ages of the subjects are very close. The language setting was the same, and the subjects were exposed to Arabic by the same instructor. Each of the subjects had spent almost the same amount of time studying Arabic. They all seemed interested in

learning Arabic. However, there are other factors, such as motivation, that affect language learning that are almost impossible to measure.

5.2. Classroom

I spent about a month sitting in the class with the students and making notes of their phonological errors[26] as well as observing the teaching/learning process. In this section, I briefly describe the important points that are related to the study I conducted.

The instructor of the course was a native speaker of Arabic who spoke MSA while teaching and Palestinian Arabic on some occasions. He was the main source of input for the subjects. Like many native speakers of Arabic, the teacher used [ðˠ] in place of [d̪ˠ]; therefore, the subjects did not hear the sound [d̪ˠ] in the input.

English was used more than Arabic in the classroom. Grammar was taught directly and in English. There were times when the students had opportunities to speak Arabic, but the amount of time spent on speaking was much less than grammar. Occasionally, the students received feedback on their pronunciation when they produced Arabic words. In addition, the instructor sometimes showed his students videotapes of native Arabic speakers.

5.3. Procedure

The data were collected from three main sources. First, I spent a month taking notes on the general phonological errors that the students made when I sat with them in

[26] I have also taken note of some syntactic errors. However, I have but a few, as the students did not have the opportunity to speak productively. This might be due to the fact that it was the students' second semester of Arabic. Since the focus of this thesis is on phonology, I am not going to discuss the syntactic errors here.

class. I also met the subjects individually and asked them to read a list of sixty-two words and ten sentences out loud. I recorded the subjects' pronunciation on a computer for further phonological description and analysis. *Appendix A* shows the phonetic transcription of the sixty-two words, and *Appendix B* shows the phonetic transcription of the ten sentences. In addition, I conversed with the subjects informally in Arabic during the same session. I also recorded the conversations on a computer for further analysis. The phonetic transcription of the subjects' speech appears in *Appendix C*.

I chose words carefully in order to cover the areas that the CAH predicted in the previous chapter. Some of the words were familiar to the students and some were not.

5.4. Results and Discussion

As discussed in Chapter 2, vowels are not easy to describe. Brinton (2000: 34) discusses the problems that create this difficulty, and I agree with him. The descriptions of the vowels in this paper are to the best of my understanding.

1) Confirming the prediction made by the CAH, the subjects used the back vowel [ɑ] instead of the central vowel [a] in their Arabic speech. For example, the three subjects pronounced the word [ra.t̪ib] as [ɹɑ.t^{h}ib], using [ɑ] instead of [a]. They used [ɑ] in place of [a] wherever the sound [a] occurred.

However, when reading some sentences and in conversations, the three subjects used both the back vowel [ɑ] and the central vowel [a] in place of the central vowel [a]. This is an interesting phenomenon, since the subjects were more liable to produce the target sound in a sentential, but not in a word-only, environment. One explanation for this

might be that the subjects were trying to sound more like native speakers when using the target language in a more communicative environment, i.e. producing utterances that are longer than just isolated words. This explanation needs more investigation, because the data also show that there was no pattern that can help in predicting when the subjects would use the back vowel [ɑ] and the central vowel [a] in a sentential environment.

2) The three subjects used the tense vowel [i] instead of the Arabic short vowel [ɪ] in their attempt to pronounce the word [yažɪb]. Subjects B and C substituted [i] for [ɪ] in the words [wɑ:žɪb] and [qɑ:ɾɪb], whereas subject A used the back vowel [ɑ] instead of the front vowel [ɪ] in the word [wɑ:žɪb], and she deleted the vowel [ɪ] in the word [qɑ:ɾɪb].

In their attempt to pronounce the words [bɪṯˠ.ṯˠix] and [θɪ.yæb], subjects B and C correctly used the front vowel [ɪ] in the first syllable of each of those words. Subject A used the back vowel [ɑ] instead of the front vowel [ɪ] in her attempt to pronounce those two words. I could not detect a pattern, because the subject correctly used the front vowel [ɪ] in her attempt to pronounce the words [ʔal.mʊṯ.ṯa.ʜɪ.ḏah], [ʔɪ.la], [ṯˠɑ:.lɪ.bah], and [ʔal.ʢa.ɾa.bɪ.yah].

All the subjects correctly produced the [i]'s in the words [ṯˠɑ.wil], [ɹɑ.tʰib], [ḏæ.ni], [ṯab.ɾir], [bɑ.xil], and [ʜa.bib].

None of the errors mentioned in this section, i.e. the use of [i] instead of [ɪ] or the use of [ɑ] instead of [ɪ], were predicted by the CAH. The CAH predicted that the subjects

would not have difficulty in using these vowels, based on the assumption that the vowels [i], [ɪ] and [ɑ] occur in both the languages.

The data show that there seems to be a lot of variation and individual tendencies in the use of vowels. Therefore, this result supports the claim that not all the errors are predicted by the CAH.

3) As predicted by the CAH, the three subjects heavily aspirated the voiceless stops /t/ and /k/ at the beginning of syllables in their Arabic speech. The subjects used the aspirated stops [t^h] and [k^h] in all the words where the target unaspirated stops [t̪] and [k] occurred in the list of words that they read out. Items (1), (2), (3), (4) and (5) illustrate this transfer. (See list on the following page.)

However, while reading out the list of sentences and conversing with me, the subjects did not always aspirate the stops /t/ and /k/ in their Arabic speech. Lack of sophisticated equipment makes me less confident in making a satisfactory conclusion on this issue. However, based on my analysis of the sixty-two words that the subjects read out, I feel certain that, as the CAH predicted, the subjects transferred the aspiration feature from their L1 to Arabic.

As items (6), (7) and (8) show, the subjects used the aspirated stop [t^h] instead of the target velarized unaspirated [t̪^{ˠ}]. The use [t^h] instead of [t̪^{ˠ}] has been predicted by the CAH. This will be discussed in point number 9 below.

Another example of transfer that is related to the aspiration feature is the subjects' use of the aspirated velar [k^h] instead of the unaspirated uvular [q], as it is shown in items

number (9), (10) and (11). The use of [k^h] instead of [q] has also been predicted by the CAH. This will be discussed in point number 11 below.

In his attempt to pronounce the words in items (12), (13) and (14), subject C used the aspirated stop [k^h] instead of the unaspirated fricative [x]. This has also been predicted by the CAH, though subjects A and B correctly used the target [x] in their attempts to pronounce the target words presented in items (12), (13) and (14).

Below are the items that illustrate this negative transfer:

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [t̪æb]	t^hɑ:b	t^hɑ:b	t^hɑ.ʔɑb
2. [rɑ.t̪ib]	ɹɑ.t^hib	ɹɑ.t^hib	ɹɑ.t^hib
3. [t̪ɑb.ɾir]	t^hɑb.ɾi.ɾ̪	t^hɑ.bɑ:.ɾiɹ	t^hɑ.bɑ.ɹiɹ
4. [t̪abɣ]	t^ha.bɑ.ɣɑh	t^hɑ.bɑ:.yɛx	t^hɑb.bɑyn
5. [kɑpš]	k^hɑbš	k^hɑbš	k^hɑbš
6. [bɪt̪^{ʏ}.t̪^{ʏ}ix]	bɑt.t^hix	bɪ.t^hɑyx	bɪ.t^hɑx.šiš
7. [t̪^{ʏ}ɑ.wiɬ]	t^hɑ.wiɬ	t^hə.wiɬ	t^hɑ.wiɬ
8. [t̪^{ʏ}ɑy.yær]	t^hɪ.yɑ:r	t^hɑ.yɑ:r	t^hɑ.lɪ.yɑ:ɹ
9. [qɑ:d̪]	k^hɑ:d	k^hɑ:d	k^hɑ.ʔəd
10. [qɑl]	k^hɑɬ	k^hɑɬ	k^hɑ.ʔʊɬ
11. [qɑ:.ɾɪb]	k^hɑrb	k^hɑ:.rib	k^hɑʔ.ɹib
12. [xɑyr]	--	--	k^hɑ.ʔiɹ

13. [bɑ.xil]	--	--	ba.k^{h}iɬ
14. [xɑwx]	--	--	k^{h}ɑ.uk

4) Instead of using a geminate [t̪] in the word [ʔal.mʊt̪.t̪a.ʜɪ.d̪ah], subjects A and B used a double aspirated [t^{h}], whereas subject C used a single aspirated [t^{h}]. However, none of the subjects doubled the [t̪] in the word [ʔat̪.t̪ɪ.žæ.ɾah]; they all used a single aspirated [t^{h}]. Also, none of the subjects doubled the nasal [m] in the word [ʕam.mi]; they all used a single [m]. When reading aloud the ten sentences, the subjects did not double the velarized [s^{ˠ}] in the word [ʔɑs^{ˠ}.s^{ˠ}ɑyf]. Subject A used a single [s^{ˠ}], while subjects B and C used a single [s] in place of the geminate [s^{ˠ}]. The doubled fricative [s] in the word [ʔas.sayf] was not also doubled in the speech of the subjects, who used a single [s] instead. Also, none of the subjects doubled the voiced palato-alveolar fricative [ž] in the word [ʜæž.žah].

Subject A correctly doubled the voiced stop [d] in the words [s^{ˠ}ɑd̪.d̪at̪] and [s^{ˠ}ɑd̪.d̪aq], but she did not double the voiceless fricative [s], which she used in place of the velarized fricative [s^{ˠ}]. In the conversation that I had with her, she correctly doubled the nasal [n] in the word [lɪʔan:a] and the velarized fricative [s^{ˠ}] in the word [ʔɑs^{ˠ}.s^{ˠ}ɑyf] (though she used a single [s] when she read out the same word [*Appendix B – point 6*]). However, she used a single [t] in place of the geminate velarized [t̪^{ˠ}] in the word [ʔɑt̪^{ˠ}:ɑqs].

Subject B used a doubled [s] instead of a doubled [sˠ] as shown in the word [ʜɪsˠ.sˠɑh]. While chatting with her informally, she correctly produced the geminate fricative [s] in the word [ʔasːæbɪqɑyn] and the velarized geminate [sˠ] in the word [ʔɑsˠːɑyfayn]. However, the same subject failed to produce the velarized geminate in the word [ʔɑsˠːɑyf] despite the fact that the sound [sˠ] occurs in exactly the same phonological environment in the words [ʔɑsˠːɑyfayn] and [ʔɑsˠːɑyf].

Subject C doubled the single sound [b] in the words [ʕɪb.rah] and [t̪abɣ], which he pronounced as [ʔəb.bɪ.ɹah] and [tʰab.bɑyn] respectively.

The words [sˠɑd̪.d̪at̪] and [sˠɑd̪.d̪ɑq] (presented in items (3) and (4) in the list below) differ in the last two sounds. Both the words have a geminate [d̪] in the middle. As is illustrated in the list below, subject A used a geminate alveolar [d] in place of the geminate denti-alveolar [d̪] in both the words. However, subject B did not geminate the middle consonant in any of the words. Instead, she doubled the fricative [s] in the word [sˠɑd̪.d̪ɑq]. On the other hand, subject C used a single [d] in his attempt to pronounce the word [sˠɑd̪.d̪at̪] and a double [d] in his attempt to pronounce the word [sˠɑd̪.d̪ɑq].

Therefore, I assert that the data show there is variation and that gemination is a feature that cannot be predicted in the speech of the subjects. This conclusion is illustrated in the following list.

Target Word	*Subject A*	*Subject B*	*Subject C*

1. [ʜɪsˠ.sˠah]	ʜɪ.sah	hɪs.sah	ʜa.sˠa
2. [bɪ̪tˠ.t̪ˠix]	bat.t^{h}ix	bɪ.t^{h}ayx	bɪ.t^{h}ax.šiš
3. [sˠad̪.d̪at̪]	sad.dat	sa.dat	sa.dat
4. [sˠad̪.d̪aq]	sad.dak	s:a.dak	sad.dak
5. [ʜæž.žah]	ʜa:.žah	ha:.žah	ʜa:.žah

5) Both Arabic and English allow two consonants to cluster at the end of syllables. However, there are restrictions on which consonants can form a cluster, and the order of the consonants that form a consonant cluster is very important. For example, the interdental [ð] and the alveolar [z] can form a permissible syllable-final consonant cluster in English, only if [ð] comes before [z], as in the word *clothes* [kloðz]; [z] cannot occur before [ð] in a syllable-final consonant cluster in English.

Further, a consonant cluster which is permissible in one language might not be permissible in another. For instance, the consonants [p] and [š] can form a syllable-final consonant cluster in Arabic, as in the word [kapš], but they cannot form a syllable-final consonant cluster in English.

As predicted by the CAH, the data show that the three subjects broke the Arabic syllable-final consonant clusters by inserting of a vowel, as we can see in items 1 to 5 below. Despite the fact that items (6) and (7) show two Arabic words that end consonant clusters that are permissible in English, the three subjects produced the consonant cluster correctly in their attempts to pronounce the words. However, the three subjects used the

voiced [b] in place of the voiceless [p], which might be the result of the classroom instructions that the voiceless bilabial [p] does not exist in Arabic.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [sˠabr]	sa.bar	sa.bar	sa.biɹ
2. [ðarf]	ða.ɾaf	ða.ɹaf	θaw.ɹaf
3. [baxt̪]	ba.xat	ba.xat	baq.χat
4. [t̪abɣ]	t^{h}a.ba.ɣah	t^{h}a.ba:.yɛx	t^{h}ab.bayn
5. [baɣt̪]	ba.ɣat	ba.ɣa:t	ba.ʔayt
6. [ʜaps]	ʜabs	habs	ʜabs
7. [kapš]	k^{h}abš	k^{h}abš	k^{h}abš

English does not allow [b] and [ɹ] to cluster at the end of syllables. In the first item above, i.e. the word [sˠabr], subjects A and B correctly produced the trill [r], but they broke the cluster by the insertion of the back vowel [a]. In contrast, subject C substituted the trill [r] by the native retroflex [ɹ] and broke the cluster by the insertion of the front vowel [i].

English does not allow the consonant clusters [-ɾf] and [-ɹf]. In item (2), subject A used the tap [ɾ] in place of the trill [r] and broke the cluster by the insertion of the central

vowel [a]. On the other hand, subjects B and C used the retroflex [ɹ] in place of the trill [r], and they broke the cluster by inserting the back vowel [ɑ].

The fricative [x] does not exist in English, and the cluster [-xt] is not heard in English. In item (3), i.e. the word [bɑxt̪], subjects A and B correctly produced the target sound [x], whereas subject C produced a farther back consonant, i.e. the voiceless uvular fricative [χ], preceded by the uvular stop [q]. All three subjects broke the syllable-final consonant cluster by the insertion of the back vowel [ɑ]. Despite the fact that both [χ] and [q] do not exist in English, subject C produced a consonant cluster that is made up of these two sounds.

The voiced velar fricative [ɣ] does not exist in the phonological system of English. However, in her attempt to pronounce the word shown in item (4), i.e. the word [t̪abɣ], subject A correctly produced the voiced velar fricative [ɣ], but she broke the cluster by the insertion of the back vowel [ɑ], and she produced an extra syllable at the end of the word, i.e. the syllable [-ɑh]. On the other hand, subject B replaced the sound [ɣ] by the syllable [yɛx], while subject C doubled the previous consonant [b], replaced the sound [ɣ] by the nasal [n], and broke the cluster by the insertion of diphthong [ɑy].

In item (5), i.e. the word [bɑɣt̪], all the subjects used the alveolar [t] instead of the denti-alveolar [t̪]. Subjects A and B correctly produced the voiced velar fricative [ɣ], but they broke the cluster by the insertion of the back vowel [ɑ]. However, subject B made this vowel long before the voiceless consonant [t], despite the fact that English vowels

become long before voiced consonants. Subject C replaced the sound [ɣ] by the glottal stop [ʔ] and broke the cluster by the insertion of the diphthong [ɑy].

In item (4), subject C replaced [ɣ] with the nasal [n], and in item (5), he replaced [ɣ] with the glottal stop [ʔ]. In both situations, he broke the clusters by the insertion of the diphthong [ɑy].

The subjects did not break the consonant clusters at the end of the words [ʜaps] and [kɑpš]. As I mentioned in Chapter 2, the bilabial stops [b] and [p] are two allophones of the same phoneme in Arabic. The voiceless [p] occurs before voiceless consonants, while the voiced [b] occurs elsewhere. However, the subjects were told that the sound [p] does not exist in Arabic, and, consequently, they did not use it in their Arabic speech. This pronunciation error could not be attributed to the subjects' L1, but to their classroom instruction. Despite this, the subjects did not have difficulty producing the consonant clusters [-bs] and [-bš] despite the fact that these clusters are not permissible in English.

The result does not completely confirm the CAH's prediction that the subjects will have difficulty in producing consonant clusters that are not permissible in English. The consonant clusters shown in the list above are not permissible consonant clusters in English. However, the subjects broke most but not all of them. Therefore, I conclude that more data and further study are needed on this topic.

6) The sound [p] exists in Arabic as an allophone of the phoneme /b/ when it occurs before voiceless consonants. My conversations with the subjects revealed that they had been told that the sound [p] does not exist in Arabic. Thus, the subjects used the voiced

sound [b] in their Arabic speech, even before voiceless consonants. Thus, the three subjects pronounced the word [kapš] as [k^{h}abš]. The CAH predicted that the subjects will not have problems with the consonant [b] and that they need to unlearn the use of the sound [p] in their Arabic speech. Therefore, the CAH's prediction does not hold true here.

Thus, I conclude that native speakers of English learning Arabic need to learn the new distribution of the bilabial /b/ in their Arabic speech. Below are two examples of the subjects' overuse of [b].

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [ʜaps]	ʜabs	habs	ʜabs
2. [kapš]	k^{h}abš	k^{h}abš	k^{h}abš

7) As predicted by the CAH, the subjects used their L1 alveolar sound [t] in place of the target denti-alveolar sound [t̪]. This substitution caused as foreign accent in the subjects' Arabic speech, but it did not render their speech unintelligible. Some words that illustrate this finding are shown below.

As I mentioned before, the English stop /t/ is realized as a flap [ɾ] when it occurs intervocalically. Thus, the flap [ɾ] is an allophone of the stop /t/ and not the liquid /ɹ/ in English. Therefore, the CAH predicted that the subjects will use the flap [ɾ] in place of the Arabic stop [t̪] when the Arabic /t/ occurs intervocalically. However, by examining the data, one can see that this prediction does not hold true.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [t̪æb]	tʰɑ:b	tʰɑ:b	tʰɑ.ʔɑb
2. [rɑ.t̪ib]	ɹɑ.tʰib	ɹɑ.tʰib	ɹɑ.tʰib
3. [sˠɑd̪.d̪ɑt̪]	sɑd.dɑt	sɑ.dɑt	sɑ.dɑt
4. [t̪ɑb.rir]	tʰɑb.ɾi.ɾ̪	tʰɑ.bɑ:.ɾiɹ	tʰɑ.bɑ.ɹiɹ
7. [bɑxt̪]	bɑ.xɑt	bɑ.xɑt	bɑq.χɑt
8. [t̪abɣ]	tʰa.bɑ.ɣah	tʰɑ.bɑ:.yɛx	tʰɑb.bayn
9. [bɑt̪]	bɑt	bæt	bɑt
10. [bɑɣt̪]	bɑ.ɣɑt	bɑ.ɣɑ:t	bɑ.ʔɑyt

8) Similarly, the subjects used their L1 alveolar sound [d] in place of the target denti-alveolar sound [d̪]. This L1 transfer is very evident, and it has been predicted by the CAH. Below are some words that illustrate this transfer.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [sˠɑd̪.d̪ɑt̪]	sɑd.dɑt	sɑ.dɑt	sɑ.dɑt
2. [d̪æ.ni]	dɑ:.ni	dɑ:.ni	dɑ:.ni
3. [ʜʊ.d̪ud̪]	ʜɑ.dud	hʊ.dud	hʊ.dud
4. [rʊ.d̪ud̪]	rʊ.dud	rʊd.dud	ɹʊ.dud
5. [qɑ:d̪]	kʰɑ:d	kʰɑ:d	kʰɑ.ʔəd

6. [sˠɑd̪.d̪ɑq]	sɑd.dɑk	sːɑ.dɑk	sɑd.dɑk
7. [sæd̪]	sɑːd	sɑːd	sæ.ʔɛd
8. [ðɑwd̪]	ðud	ðəwd	θɑwd

9) As predicted by the CAH, the subjects used their L1 alveolar [t] instead of the velarized denti-alveolar [t̪ˠ]. The subjects, as mentioned in point 3 above, also transferred the aspiration feature from their L1 into Arabic. A list of words that show this L1 transfer is shown below.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [bɪt̪ˠ.t̪ˠix]	bɑt.tʰix	bɪ.tʰayx	bɪ.tʰɑx.šiš
2. [t̪ˠɑ.wil]	tʰɑ.wiɬ	tʰə.wiɬ	tʰɑ.wiɬ
3. [t̪ˠɑy.yær]	tʰɪ.yɑːr	tʰɑ.yɑːr	tʰɑ.lɪ.yɑːɹ

10) Similarly, as predicted by the CAH, the subjects used their L1 alveolar [d] instead of the target denti-alveolar velarized [d̪ˠ] in their Arabic speech. The use of [d̪ˠ] instead of [d] has been predicted by the CAH. The examples below illustrate this L1 transfer.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [d̪ˠɑ.bæb]	də.bæb	dɑː.bɑb	dɑ.bɑb
2. [ʜɑ.d̪ˠɑr]	ʜɑd.dɑr	hɑː.dɑːr	ʜɑ.dɑː.ɾɑ
3. [bɑyd̪ˠ]	bid	bɑyd	bɑ.ʔɪd

11) As predicted by the CAH, the subjects used the velar [k] (which was aspirated at the beginning of syllables) instead of the uvular [q] in their Arabic speech. However, in his attempt to pronounce the word [baxt̪], subject C produced the uvular stop [q] followed by the uvular fricative [χ] in place of the velar fricative [x]. The result was the utterance [baq.χat]. This pronunciation error was not predicted and could not be explained by the CAH. Examples that illustrate the above analysis are given below.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [qɑːd̪]	k^hɑːd	k^hɑːd	k^hɑ.ʔəd
2. [$s^ɣ$ɑd̪.d̪ɑq]	sad.dak	sːa.dak	sad.dak
3. [qɑl]	k^hɑɬ	k^hɑɬ	k^hɑ.ʔʊɬ
4. [qɑː.ɾɪb]	k^harb	k^hɑː.rib	k^hɑʔ.ɹib

12) The glottal stop [ʔ] occurs in both English and Arabic. However, its distribution is not the same in the phonology of Arabic and English. The glottal stop in Arabic is a phoneme that occurs word-initially (as in [ʔa.šæʕ]), word-medially between two vowels (as in [mɪ.ʔah]), word-medially preceded by a vowel and followed by another consonant (as in [maʔ.t̪am]), word-medially preceded by another consonant and followed by a vowel (as in [naš.ʔah]) and word-finally (as in [ʕa.šæʔ]).

On the other hand, the occurrence of the glottal stop in English is very limited. [ʔ] is an allophone of the English phoneme /t/. As we saw in Chapter 3, the English voiceless

stop /t/ is realized as a glottal stop [ʔ] when /t/ occurs after a vowel and before a syllabic nasal, as in the words *Britain* [bɪɪʔn̩], *button* [bʌʔn̩], and *kitten* [kɪʔn̩]. Moreover, the subjects in this study used a glottal stop in the word-initial position in words like *at*, *it*, *on*, *under*, and *eat*. As mentioned on page 76, one could argue that the glottal stop is a word-initial phoneme in English (Dr Thibeau: personal contact).

Based on these differences between the distribution of the glottal stop [ʔ] in Arabic and English, the CAH predicted that the subjects would use a glottal stop before the syllabic /n/ instead of the denti-alveolar stop [t̪] in their Arabic speech. However, the conversations with the subjects, as well as with many other American students of Arabic, lead me to conclude that this prediction does not hold true. To support my observation, my notes show that some students pronounced the word [maṯn] as [mɑtn̩], and not as [mɑʔn̩], as predicted by the CAH.

Another observation, as predicted by the CAH (and as seen in the phonetic transcription of the data), the subjects produced a glottal stop before vowels in the word-initial position in their attempts to utter Arabic words.

Subject C frequently used the glottal stop in his Arabic speech. There does not seem to be any pattern for this use. The use of the glottal stop could not be traced back to English; therefore, it could not be an example of negative transfer. The CAH did not predict this error, and cannot provide an explanation for it. The list below shows this frequent use of the glottal stop in subject C's speech.

13) The CAH predicted that the subjects would use the voiced interdental fricative [ð] instead of the velarized voiced interdental fricative [ðˠ]. However, the data show different results across the subjects. Subject A used the sound [ð] in place of the target [ðˠ] in her Arabic speech in all positions except at the end of the word [maʜ.ðˠuðˠ], in which she used the voiceless fricative [θ]. On the other hand, subjects B and C used the voiced alveolar stop [d] instead of [ðˠ].

This finding supports the influence of L1 transfer, but it also suggests that learners who speak the same native language might not transfer the same sound from their L1 to their L2 in place of a new target sound: subject A transferred the L1 [ð] and [θ], while subjects B and C transferred the L1 [d]. The CAH did not account for this variation.

The words that contained the sound [ðˠ] in them are listed below with the subjects' pronunciation.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [šɑðˠɪ.yah]	šɑ.ðɪ.yah	šɑd.di.yɑh	šɑ.dɪ.yɑh
2. [ðˠɑ.ʕan]	ðɑ.ʕan	dɑ.ʔɑyn	dɑ.ʔɑn
3. [ʜɑ.ðˠɑr]	hɑ.ðɑr	hɑd.dɑr	ʜɑd.dɑɪ
4. [maʜ.ðˠuðˠ]	mɑ.ʜɑ.ðuθ	mɑ.hɑ.dud	mɑ.xʊ.du.du

14) As mentioned earlier, velarized sounds do not occur in English. Therefore, the CAH predicted that the absence of the velarized [sˠ] in English would lead the subjects to substitute [s] for [sˠ]. This prediction holds true in some but not all the all the words presented in the study. For instance, subject A produced the velarized [sˠ] in the word [ʔɑsˠ.sˠɑyf].

In the conversation that I had with subject B, she used the word [ʔɑsˠ.sˠɑyf] twice, but she pronounced it in two different ways: using the velarized [sˠ] one time, and using her L1 [s] in the second time. The subject did not velarize the /s/ in the words [ʔɑsˠḍɪqɑːʔ] and [sˠɑḍiqɑːṭ]. This variation by the same subject could not be explained by the CAH, and it might suggest that the subject was going through stages of development, in which variation is not governed by predictable rules.

Subject C pronounced the velarized [sˠ] after the back low vowel [ɑ], as shown in item number 1 below. In the conversation that I had with him, he correctly produced the sound [sˠ] in the word [ʔɑsˠl], but not in the word [sˠɑyf].

As we saw in the above paragraphs, the three subjects could produce the velarized [sˠ] in very few examples. However, they used a plain [s] in most of the words in which [sˠ] occurred. Below are some examples in which the sound [sˠ] occurs.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [ʜɪsˠ.sˠɑh]	ʜɪ.sah	hɪs.sah	ʜɑ.sˠɑ
2. [lʊ.sˠusˠ]	lʊ.sus	lʊ.sus	lʊ.sus
3. [sˠɑbr]	sɑ.bar	sɑ.bar	sɑ.biɪ
4. [sˠɑ:ʜ]	sɑ:h	sɑ:x	sɑ.ʜɑ
5. [sˠɑd̪.d̪at̪]	sad.dat	sɑ.dat	sɑ.dat
6. [sˠɑd̪.d̪aq]	sad.dak	s:ɑ.dak	sad.dak

15) Through my contact with this subject, as well as with other American students of Arabic, I have noticed that the voiceless velar fricative [x] is easy to pronounce. The data show that all the subjects did not have any difficulty in articulating the sound [x]. In fact, a number of studies have also found that the sound [x] is an easy sound to learn for speakers of English (Tarone 1987: 72).

Despite the subjects' ability to articulate the sound [x], the data also show that there is variation. For instance, subject B correctly used the sound [x] in many words, except the word [xɑwx], which she pronounced as [xɑ:.uš], replacing the second [x] with the palato-alveolar [š]. The subject did not have difficulty in producing the sound [x] at the end of words, as we can see in the word [bɪt̪ˠ.t̪ˠix] (which she pronounced as [bɪ.tʰayx]) and the word [sˠɑ:ʜ] (which she pronounced as [sɑ:x], replacing the epiglottal [ʜ] with velar [x]).

In his attempt to pronounce the word [xɪ.ræf], subject C used the aspirated stop [k^h] instead of [x]. But in his attempt to pronounce the word [bɪxɑyr], he used the glottal [h] instead of [x]. However, he correctly produced the sound [x] in his attempt to pronounce the disyllabic word [bɪt̪^{ʏ}.t̪^{ʏ}ix]. In his production of the word [bɑxt̪], subject C used the uvular voiceless fricative [χ] – preceded by the uvular stop [q] – instead of the velar counterpart [x]. The use of [χ] in place of [x] was not predicted by the CAH. This difficulty might have resulted from the presence of the word-final consonant cluster [-xt̪], which is not permissible in the subject's L1. As we can see in the list below, the other subjects broke this cluster by inserting the back vowel [ɑ].

Therefore, the data show that the subjects produced the sound [x] easily. They also used it correctly in many examples. However, there was variation, and the CAH could not explain the reason for that variation.

The following list of words shows some of the examples that included the sound [x] and the subjects' pronunciation of those words.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [bɪt̪^{ʏ}.t̪^{ʏ}ix]	bɑt.t^{h}ix	bɪ.t^{h}ayx	bɪ.t^{h}ɑx.šiš
2. [bɑ.xil]	bɑ.xiɬ	bɑ.xiɬ	ba.k^{h}iɬ
3. [bɑxt̪]	bɑ.xɑt	bɑ.xɑt	bɑq.χɑt
4. [xɑyr]	xi.yɛr	xɑ.yir	k^{h}ɑ.ʔiɪ; haːɪ
5. [xɑwx]	xuːx	xɑː.uš	k^{h}ɑ.uk

16) The voiced velar fricative [ɣ] does not exist in the phonology of English. The CAH predicted that the subjects would use the voiced velar stop [g] instead of [ɣ]. However, the data show that this prediction does not hold true.

Subject A did not have difficulty in using the voiced velar fricative [ɣ] in her Arabic speech. In the conversation that I had with her, subject A pronounced the word [maš.ɣu.lah] as [mašuɣulɑ:h], correctly producing the sound [ɣ].

On the other hand, after breaking the consonant cluster by the insertion of the back vowel [ɑ], subject B replaced [ɣ] with the syllable [-yɛx] in the word [t̪abɣ]. However, the subject produced [ɣ] in the word [baɣt̪], after breaking the cluster by the insertion of a long [ɑ].

Subject C used the nasal [n] in place of [ɣ] in the word [t̪abɣ] after breaking the cluster by the insertion of the diphthong [ɑy]. However, in his attempt to pronounce the word [baɣt̪], he replaced the sound [ɣ] with the glottal stop [ʔ] after breaking the cluster by the insertion of the diphthong [ɑy]. In the conversation that I had with him he did not pronounce the fricative [ɣ] in the word [ʔal:uɣah] (pronounced by the subject as [ʔalwɑ]).

The data seem to suggest that complete difference between the L1 and L2 allows the learners to notice this difference, and, thus, avoid transfer and produce the target sound correctly. This finding is supported by examining subject A's performance through out the data.

Based on the above data, I conclude that the CAH's prediction that the subjects would use [g] in place of [ɣ] does not hold true, and that the CAH could not explain the

variation in the data. In a study done in the 1960s, Briere noticed that "(f)or some reason, /ɣ/ is significantly more difficult than /x/" (Selinker 1992: 182).

17) Since the voiceless epiglottal fricative [ʜ] does not exist in the phonology of English, the CAH predicted that the subjects would use the closest sound to it, i.e. the voiceless glottal fricative [h]. The data show that this prediction holds true, but not completely.

Although subject A correctly used the sound [ʜ] in many of the words that had the sound [ʜ] in them, she, as predicted by the CAH, used the glottal [h] in place of the epiglottal [ʜ] in her attempts to pronounce the words [ʜɑ.ðˠɑr], [sˠɑːʜ] and [wɑː.ʜɪḍ]. However, in her attempts to pronounce the words [hæða] and [ðahabṭʊ], she used the "difficult" sound [ʜ] instead of the "easy" sound [h]. As we can easily see in the data, subject A has little difficulty with new sounds (such as the voiced epiglottal fricative [ʕ] and the voiced velar fricative [ɣ]). It seems that the subject's ability to notice the gap between the L1 sounds and the L2 sounds has led her to overuse the target sounds. This overgeneralization could not be explained by the CAH.

The data show that there is variation. Despite the fact that the subjects could produce the sound [ʜ], there was no pattern in the data. For instance, subject A pronounced the minimal pair [ʜɑ.ḍˠɑr] and [ʜɑ.ðˠɑr], which differs in the middle sounds in two different ways; she pronounced the former as [ʜɑ.ðɑr] and the latter as [hɑ.ðɑr], using [ʜ] in the first and [h] in the second.

Subject B, as predicted by the CAH, used the glottal fricative [h] in place of the epiglottal fricative [ʜ] in her Arabic speech. However, she used [x] in place [ʜ] in her attempt to pronounce the word [sˠɑːʜ].

Subject C used the glottal [h] in place of the epiglottal [ʜ] in the words [hʊ.d̪ud̪] and [hɪ.sˠɑː.n]. The use of [h] in place of [ʜ] has been predicted by the CAH. However, the subject replaced the epiglottal [ʜ] with the uvular [χ] in the word [ʜa.bak] and with the velar [x] in the words [maʜ.ðˠuðˠ] and [ʔal.mʊt̪.t̪a.hɪ.d̪ah], and he correctly produced and used the sound [ʜ] in the words [hɪsˠ.sˠɑh], [ʜɑ.d̪ˠɑr], [sˠɑːʜ], [ʜɑ.d̪ˠɑr], [ʜa.bib], [ʜɑ.ðˠɑr], [ʜæž.žah], and [ʜaps].

As we saw above, despite the fact that the sound [ʜ] occurs in exactly the same phonological environment in the words [hɪsˠ.sˠɑh] and [hɪ.sˠɑː.n], subject C correctly produced the sound [ʜ] in the first word, but he replaced [ʜ] with [h] in the second. The CAH could not provide an explanation for this variation in the subject's speech.

Thus, I assert that despite the fact that the CAH's prediction was confirmed, the results show that there is variation that could not be explained by the CAH. Below are the examples that provide evidence to this analysis.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [hɪsˠ.sˠɑh]	hɪ.sah	hɪs.sah	hɑ.sˠɑ
2. [hɑ.d̪ˠɑr]	had.dar	haː.daːr	hɑ.daː.rɑ

3. [hʊ.d̪ud̪]	hɑ.dud	hʊ.dud	hʊ.dud
4. [maʜ.ðˠuðˠ]	mɑ.hɑ.ðuθ	mɑ.hɑ.dud	mɑ.xʊ.du.du
5. [hɑ.bib]	hɑ.bib	hɑ.bib	hɑ.bi.bah
6. [hɑ.bɑk]	hɑ.bɑk	hɑ.bak	χɑ.bɑ:k
7. [hɑ.d̪ˠɑr]	hɑ.ðɑr	hɑ.dɑr	hɑ.dɑ.ɹɑ
8. [hɑ.ðˠɑr]	hɑ.ðɑr	hɑd.dɑr	hɑd.dɑɹ
9. [hæž.žah]	hɑ:.žah	hɑ:.žah	hɑ:.žah
10. [haps]	habs	habs	habs
11. [sˠɑ:ʜ]	sɑ:h	sɑ:x	sɑ.hɑ

18) The voiced epiglottal fricative [ʕ] does not exist in English. The closest English sound to [ʕ] is the glottal stop [ʔ]. Therefore, the CAH predicted that the subjects would use the glottal stop [ʔ] in place of the sound [ʕ].

Subject A used a sound that closely approximates the Arabic sound [ʕ] in most of the Arabic words in which [ʕ] occurs. However, she used a glottal stop [ʔ] instead of the epiglottal [ʕ] in the word [sæ.ʕah], as shown in item number (4) below. In the conversation that I had with her, she pronounced the word [na.ʕam] in two different ways: once as [nɑ.ʕɑm], using [ʕ], and a second time as [nɑ.ʔɑm], using the glottal stop.

As predicted by the CAH, subjects B and C used the glottal stop [ʔ] in place of [ʕ] in most of the Arabic words in which [ʕ] occurred. However, the data show that this prediction was not always the case. In the conversation that I had with subject B, she replaced the sequence [-aʕa-] with the front vowel [æ] in her attempt to pronounce the word [ma.ʕa] and with the long back vowel [ɑ:] in her attempt to pronounce the word [na.ʕam]. She also pronounced the word [ʔaʕ.wɑ:m] as [ʔax.wɑm], using the voiceless fricative [x] in place of the voiced epiglottal [ʕ].

Subject C pronounced the word [ʔal.ʔar.bɪ.ʕæʔ] as [ʔal.ʕʊ.ɹɑ:b.yɑh], using the epiglottal [ʕ] in place of the middle glottal stop. The CAH cannot provide an explanation for this error. He also substituted the long vowel [ɑ:] for the sequence [aʕ] in the word [maʕ.na]. In his attempt to produce the word [ʔal.žæ.mɪ.ʕah], subject C deleted the sound [ʕ], and, to compensate for this deletion, he prolonged the previous and following vowels, pronouncing the word as [ʔalžæmiæ].

The Arabic words [ʕa.mɪl.t̪ʊ] and [ʕamal] have the same stem, and they both begin with the voiced epiglottal [ʕ]. Despite these similarities, subject C pronounced the former as [ʔɑmɑɬtʰu], using a glottal stop in place of [ʕ], and he pronounced the latter in two different ways: as [ʔɑmɑɬ] once and as [ʕɑmɑɬ] another time.

Therefore, the CAH's prediction that the subjects would use the glottal stop [ʔ] in place of the epiglottal [ʕ] holds true. However, the CAH could not explain all the

pronunciation errors that the subjects made in their attempts to pronounce the sound [ʕ]. The results also show that, after mastering a "difficult" sound, the subjects might fall back to using their "easy" L1 sound.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [ʕa.lam]	ʕa:.lam	ʔay.lam	ʔa.lam
2. [ðˠa.ʕan]	ða.ʕan	da.ʔayn	da.ʔan
3. [ʕɪb.rah]	ʕab.ɾ ah	ʔay.bɪ.ɾaʔ	ʔab.bɪ.ɹah
4. [sæ.ʕah]	sa.ʔah	sa.ʔa.yaʔ	sæ:h

19) The voiceless glottal fricative /h/ occurs in both Arabic and English. However, this phoneme occurs in Arabic word-initially, word-medially and word-finally, but only word-initially and word-medially in English. Therefore, the CAH predicted that the subjects would find it difficult to produce the sound [h] at the end of Arabic words. However, the data show that subject A correctly produced [h] at the end of the words, as shown in the list below. Subject B also produced the sound [h] at the end of many words in which [h] occurred, but she also used a glottal stop [ʔ] instead of [h], as shown in items number (5) and (6) in the list below. Subject C also produced the sound [h] in many of the words, but he did not pronounce the [h] at the end of the word [ʜɪsˠ.sˠah].

The word [sa.baʔ] (item number 4 below) ends in a glottal stop. However, the subjects used a glottal stop instead of [h], though subject C used the syllable [-ʔɛh]. Like

the word in item (2) below, the last word on the list below, i.e. the word [kʊl.lɪ.yah], ends in the syllable [-yah]. However, none of the subjects produced the final [h] of the word [kʊl.lɪ.yah], though they did when they pronounced the word [šaðˠɪ.yah]. This variation could not be explained by the CAH.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [ʜɪsˠ.sˠɑh]	ʜɪ.sɑh	hɪs.sɑh	ʜɑ.sˠɑ
2. [šaðˠɪ.yah]	ša.ðɪ.yah	šad-di.yah	ša.dɪ.yah
3. [ʜæž.žah]	ʜɑ:.žah	hɑ:.žah	ʜɑ:.žah
4. [sa.baʔ]	sa.bah	sa.bah	sa.bɑ.ʔɛh
5. [sæ.ʢah]	sɑ.ʔah	sɑ.ʔa.yaʔ	sæ:h
6. [ʢɪb.rah]	ʢab.ɾ ah	ʔay.bɪ.ɾaʔ	ʔab.bɪ.ɹah
7. [kʊl.lɪ.yah]	k^{h}ʊɬ.yæ	k^{h}uɬ.yæ	k^{h}ʊɬ.yæ

20) As predicted by the CAH, the subjects velarized the lateral /l/ at the end of syllables. Their use of [ɬ] instead of [l] at the end of Arabic syllables is a clear example of L1 transfer. However, it sounds to my ears that the subjects did not velarize the /l/ at the end of some words when they conversed with me. I believe that more analysis with the use of better equipment is needed. The conclusion that I draw here is based on the sixty-two words that the subjects read out. The Arabic words that included the sound [l] in them are listed below with the subjects' pronunciation.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [t̪ˠa.wil]	tʰɑ.wiɬ	tʰə.wiɬ	tʰɑ.wiɬ
2. [bɑ.xil]	bɑ.xiɬ	bɑ.xiɬ	ba.kʰiɬ
3. [qɑl]	kʰɑɬ	kʰɑɬ	kʰɑ.ʔʊɬ
4. [ʕa.lam]	ʕɑ:.lɑm	ʔɑy.lɑm	ʔɑ.lɑm

21) As mentioned in chapter three, there is a difference in the articulation of the Arabic tap (which is an allophone of the trill /r/) and the English flap (which is an allophone of the stop /t/). Both these two sounds, i.e. the flap and the tap, occur intervocalically in both the languages. In this paper, the symbol [ɾ] is used to represent both the Arabic tap and the English flap. The lack of acoustic equipment made it hard for me to make sure whether the subjects used the Arabic tap or the English flap in their Arabic speech. Therefore, I use the term *tap/flap* to represent any of these two sounds when I am not sure of the exact sound that the subjects use.

Since the trill [r] exists in the phonology of Arabic and is absent in the phonology of English, the CAH predicted that the subjects would use the closest L1 sound, i.e. the retroflex [ɹ], in place of the target trill [r].

The data show that the three subjects transferred their L1 retroflex [ɹ] instead of using the target trill [r] at the beginning of the word [ra.t̪ib].

The data also show that subject C transferred his L1 retroflex allophone [ɹ] in his attempt to pronounce all the words below except when he attempted to pronounce the

word [sær], which he pronounced as [sɑ.ʔɑ.ɾɑ] once, using the flap/tap [ɾ], and as [sɑː.ʔɪɹ] a second time, using the L1 retroflex [ɹ]. This variation was not predicted and could not be explained by the CAH. Another example of variation in the speech of this subject is clear by examining his pronunciation of the last two words on the list below. The minimal pair [ʜɑ.d̪ˠɑr] and [ʜɑ.ðˠɑr] differs in the middle sound, and both the words end in [-ɑr]. The subject used a flap/tap followed by the back vowel [ɑ] in his attempt to pronounce the former (pronounced as [ʜɑ.dɑː.ɾɑ]), and he transferred the retroflex [ɹ] when attempting to pronounce the latter (pronounced as [ʜɑd.dɑɹ]).

Variation is also clear by examining subject B's pronunciation of the words [ðarf] and [d̪a.ɾas]. She produced an intervocalic retroflex [ɹ] in the former (pronounced as [ðɑ.ɹɑf]) and an intervocalic flap/tap [ɾ] in the latter (pronounced as [dɑ.ɾɑs]).

However, the data show that subjects A and B correctly used the trill [r] before the rounded vowel [ʊ] in the word [rʊ.d̪ʊd̪]. In their attempts to pronounce the word [d̪a.ras], they also correctly produced the tap/flap [ɾ].

In the conversation that I had with subject A, she pronounced the word [bɪxɑyr] (which means *good*) as [bɪxɑyɬ] (which sounds like the Arabic word for *with a horse*: i.e. the word [bɪxɑyl]), using a velarized [ɬ] instead of trill [r]. Subject B also used the word [bɪxɑyr] in the conversation that I had with her, but she deleted the sound [r], pronouncing the word as [bɪxɑy] (which sounds exactly like the colloquial Arabic word for *with a brother*). Interestingly, subject C also used the same word in the conversation

that I had with him, but he pronounced it as [bɪhɑ:ɹ] (which sounds like the Arabic word for *seas*, i.e. the word [bɪʜær]).

Thus, I conclude this section by asserting that the CAH's prediction that the subjects would use their L1 retroflex [ɹ] in place of the trill [r] holds true. However, there is variation in the speech of the subjects that could not be accounted for by the CAH. Below are some examples that illustrate the above analysis.

Target Word	*Subject A*	*Subject B*	*Subject C*
1. [ra.t̪ib]	ɹa.t^{h}ib	ɹa.t^{h}ib	ɹa.t^{h}ib
2. [rʊ.d̪ud̪]	rʊ.dud	rʊd.dud	ɹʊ.dud
3. [ðarf]	ða.ɾaf	ða.ɹaf	θaw.ɹaf
4. [qɑ:.ɾɪb]	k^{h}arb	k^{h}ɑ:.rib	k^{h}ɑʔ.ɹib
5. [d̪a.ras]	da.ɾas	da.ɾas	da.ɹas
6. [ʕɪb.rah]	ʕab.ɾah	ʔay.bɪ.ɾaʔ	ʔab.bɪ.ɹah
7. [t̪ab.rir]	t^{h}ab.ɾi.ɾ	t^{h}ɑ.bɑ:.ɾiɹ	t^{h}ɑ.bɑ.ɹiɹ
8. [na.ðar]	na.ðaɹ	nɑ.ðar	nɑ.θaɹ
9. [ʜa.d̪^{ʏ}ar]	ʜa.ðar	ha.dar	ʜa.da.ɹa
10. [t̪^{ʏ}ay.yær]	t^{h}ɪ.yɑ:r	t^{h}ɑ.yɑ:r	t^{h}ɑ.lɪ.yɑ:ɹ
11. [s^{ʏ}abr]	sa.bar	sa.bar	sa.biɹ
12. [xayr]	xi.yɛr	xa.yir	k^{h}ɑ.ʔiɹ

13. [sær]	saː.ɾə; saː.ɾɑ	saːr; saːr	sa.ʔa.ɾa; saː.ʔɪ
14. [ʜa.d̪ˠar]	ʜad.dar	haː.daːr	ʜa.daː.ɾa
15. [ʜa.ðˠar]	ha.ðar	had.dar	ʜad.daɪ

Chapter VI: Conclusion

It seems to be true that, as Odlin (1989: 112) puts it, "(t)here is no little doubt that native language phonetics and phonology are powerful influences on second language pronunciation." The data show that there are some examples in which language transfer was clear. For example, the subjects transferred the voiceless alveolar stop [t] from their L2 to their L2 instead of producing the voiceless denti-alveolar stop [t̪] of the target language. However, not all the predicted errors held true, and there were many variations. The variations could not be explained by the CAH.

The CAH's inability to account for the variation in the data seems to be explained by Tarone's (1989: 70) assertion that "research which *has* been done in this area [interlanguage phonology] quite clearly shows that transfer is only a part – and often a small part – of the influence on interlanguage phonology." In fact, due to the results of this study, I will investigate the area of interlanguage phonology in future academic endeavors.

It is not enough to focus on teaching grammar rules and new vocabulary. Since it is widely accepted that language is a means of communication, I assert that classroom teachers need to focus on teaching pronunciation in the classroom to enable the students to communicate with native speakers comprehensibly.

It is not enough for language teachers to be native speakers. To understand the nature of the problem, teachers (as well as adult learners) need to study the phonological systems of the native language as well as the target language. Knowledge of the phonological systems of both the L1 and the L2 can help the teachers to explain the target sounds in relation to the sounds that exist in the students' native language.

The results show the subjects transferred some features and sounds from their L1 to their L2, such as the aspiration feature and use of the voiceless alveolar stop [t] instead of the voiceless denti-alveolar velarized stop [t̪ˠ]. However, many examples showed that the subjects made some pronunciation errors that the CAH did not predict. Variation was another issue that the CAH could not explain; patterns in the speech of the subjects were lacking. The errors that the subjects made could not be described in a matter of black and white (as the CAH predicted).

As we saw in Chapter 5 (page 98), instead of using the voiced interdental velarized fricative [ðˠ], subject A, who has mastered many of the totally different Arabic segments that subjects B and C have not, used the fricative [ð], whereas subjects B and C used the stop [d]. In other words, though the subjects spoke the same L1, they did not transfer the same sound from their L1 to their L2. The CAH did not account for this variation.

Another issue that the CAH could not account for is the use of the "difficult" sound [ʜ] in place of the "easy" sound [h] in the speech of one of the subjects. The theory could not account for this overgeneralization.

The data also suggest that mastering a particular sound does not mean that the second language learner will be able to produce this sound every time or that their pronunciation is near-native. For instance, as we saw in Chapter 5, the three subjects correctly produced the fricative target sound [x], but they sometimes used their native stop /k/ instead of [x]. In fact, Agard and Di Pietro (1965: 36) mentioned that "(a)cquiring near-native pronunciation of a foreign language does not consist entirely of controlling the articulation of new phonemes. This is because languages differ not only in

the number and kind of sounds they use but also in the ways they use them." This fact adds to the difficulty of accounting for the variation and some of the pronunciation errors in the speech of the subjects. Gass and Selinker (1994: 98) agree that "(t)he acquisition of a second language phonology is a complex process." An illustration of this complexity is revealed by the many variations in the subjects' pronunciations discussed in Chapter 5.

Consequently, I assert that the CAH can provide some help, but it should not be relied on completely. I also concur with Gass & Selinker's (1994: 98) assertion that "the interest is not in denying the importance of transfer ... but in determining the principles that underlie its use. It is for this reason that the Contrastive Analysis Hypothesis in phonology was not abandoned with the same vigor as in syntax. Rather, the attempt was to reconfigure it and incorporate additional principles" such as "linguistic differences between the NL and the TL systems, universal facts of phonology, and sociolinguistic constraints." Broselow (1987: 292-3) has also stated that "(w)hile it is certain that many factors other than transfer from the first language are involved in phonological errors made by language learners, the failure to predict errors from an examination of the linguistic systems of the first and second languages by no means constitutes sufficient grounds for abandoning the contrastive analysis hypothesis altogether."

Thus, the result of this study provides support to Gass & Selinker's (1994: 98) suggestion that to better understand the acquisition of phonology, we need to modify the CAH in such a way that it takes into account "linguistic differences between the NL and the TL systems, universal facts of phonology, and sociolinguistic constraints." The findings of this study confirm the argument that the acquisition of phonology could not be explained by simply comparing and contrasting the learners' L1 and L2; other factors,

such as the learners' age, sociolinguistic factors, developmental factors, etc., should be taken into account in order to better understand the sources of pronunciation errors in the speech of second language learners.

Before doing this study, as stated in chapter 2, I believed that the CAH, despite the criticisms against it, would provide some help to (1) teachers of Arabic as a foreign language to anticipate the phonological errors that their English-speaking students are likely to commit and (2) American students of Arabic to improve their pronunciation by realizing how the sounds of Arabic are produced (compared to the sounds of the English). However, I now believe that more studies that use the CAH as an underlying framework and do not merely compare L1 and L2 are needed to provide explanations for the acquisition of phonology.

This study concludes that the CAH's predictions of pronunciation errors could sometimes help, but they cannot be completely reliable in predicting the second language learners' errors.

Appendix A

Words

The table below shows the phonetic transcription of the sixty-two words that the subjects read out. The target words that the subjects were attempting to pronounce are phonologically and phonetically transcribed in the shaded part, to the left of the subjects' pronunciation.

No.	Target Word		Subject A	Subject B	Subject C
	Phonemic Transcription	Phonetic Transcription			
1	/ʜɪsˠ.sˠah/	[ʜɪsˠ.sˠɑh]	ʜɪ.sɑh	hɪs.sɑh	ʜɑ.sˠɑ
2	/lʊ.sˠusˠ/	[lʊ.sˠusˠ]	lʊ.sus	lʊ.sus	lʊ.sʊs
3	/d̪ˠa.bæb/	[d̪ˠɑ.bæb]	də.bæb	dɑ:.bɑb	dɑ.bɑb
4	/ʜa.d̪ˠar/	[ʜɑ.d̪ˠɑr]	ʜad.dar	hɑ:.dɑ:r	ʜɑ.dɑ:.rɑ
5	/bɪt̪ˠ.t̪ˠix/	[bɪt̪ˠ.t̪ˠix]	bat.t^{h}ix	bɪ.t^{h}ayx	bɪ.t^{h}ax.šiš
6	/sˠabr/	[sˠɑbr]	sɑ.bar	sɑ.bar	sɑ.biɹ
7	/t̪ˠa.wil/	[t̪ˠɑ.wil]	t^{h}ɑ.wiɬ	t^{h}ə.wiɬ	t^{h}ɑ.wiɬ
8	/šaðˠɪ.yah/	[šɑðˠɪ.yah]	šɑ.ðɪ.yah	šad.di.yah	sɑ.dɪ.yah
9	/t̪æb/	[t̪æb]	t^{h}ɑ:b	t^{h}ɑ:b	t^{h}ɑ.ʔɑb
10	/sˠæʜ/	[sˠɑ:ʜ]	sɑ:h	sɑ:x	sɑ.ʜɑ
11	/ra.t̪ib/	[ra.t̪ib]	ɹa.t^{h}ib	ɹa.t^{h}ib	ɹa.t^{h}ib
12	/sær/	[sær]	sɑ:.rɑ	sɑ:r	sɑ:.ʔɪɹ
13	/sˠad̪.d̪at̪/	[sˠɑd̪.d̪at̪]	sad.dat	sɑ.dat	sɑ.dat

No.	Target Word		Subject A	Subject B	Subject C
	Phonemic Transcription	Phonetic Transcription			
14	/d̪æ.ni/	[d̪æ.ni]	dɑ:.ni	dɑ:.ni	dɑ:.ni
15	/bayd̪ʸ/	[bɑyd̪ʸ]	bid	bɑyd	bɑ.ʔɪd
16	/šæb/	[šæb]	ša:b	ša:b	ša:.ʔab
17	/ðarf/	[ðarf]	ða.ɾaf	ða.ɹaf	θaw.ɹaf
18	/ʕa.lam/	[ʕa.lam]	ʕa:.lam	ʔay.lam	ʔa.lam
19	/ðʸa.ʕan/	[ðʸa.ʕan]	ða.ʕan	da.ʔayn	da.ʔan
20	/na.ðar/	[na.ðar]	na.ðaɹ	nɑ.ðar	nɑ.θaɹ
21	/ʜʊ.d̪ud̪/	[ʜʊ.d̪ud̪]	ʜa.dud	hʊ.dud	hʊ.dud
22	/wa.θab/	[wɑ.θab]	wɑ.θab	ʔʊ.θæb	wɑ.θab
23	/wæ.žɪb/	[wɑ:.žɪb]	wɑ.žab	wɑ:.žib	wɑ:.žib
24	/za.wæž/	[zɑ.wɑ:ž]	zʊ.wɑ:ž	za.wɑ:ž	zʊ.wæz
25	/ɬahw/	[lahw]	la.hu	lɑ.hu	lɑ.hu
26	/ʜa.d̪ʸar/	[ʜɑ.d̪ʸɑr]	ʜa.ðar	ha.dar	ʜa.da.ɹa
27	/θɪ.yæb/	[θɪ.yæb]	θɑ.yɑ:b	θɪ.yɑ:b	θɪ.yæb
28	/ya.žɪb/	[ya.žɪb]	ya.žib	yɑ.žib	ya.žib
29	/t̪ʸay.yær/	[t̪ʸay.yær]	t^{h}ɪ.yɑ:r	t^{h}ɑ.yɑ:r	t^{h}ɑ.lɪ.yɑ:ɹ
30	/rʊ.d̪ud̪/	[rʊ.d̪ud̪]	rʊ.dud	rʊd.dud	ɹʊ.dud
31	/t̪ab.rir/	[t̪ab.rir]	t^{h}ab.ɾi.r	t^{h}ɑ.bɑ:.ɾiɹ	t^{h}ɑ.bɑ.ɹiɹ

No.	Target Word		Subject A	Subject B	Subject C
	Phonemic Transcription	Phonetic Transcription			
32	/ža.wæz/	[ža.wɑ:z]	ža.wɑ:z	žʊ.wɑ:z	ža.u.ɑ:z
33	/ʔɪθ.bæt̪/	[ʔɪθ.bæt̪]	ʔɪz.bat	ʔaθ.bat	ʔɪ.θɑ:.bat
34	/sa.baʔ/	[sa.baʔ]	sa.bah	sa.bah	sa.ba.ʔɛh
35	/maʜ.ðˠuðˠ/	[maʜ.ðˠuðˠ]	ma.ʜa.ðuθ	ma.ha.dud	ma.xʊ.du.du
36	/sæ.ɬah/	[sæ.ɬah]	sa.ʔah	sa.ʔa.yaʔ	sæ:h
37	/ba.xil/	[ba.xil]	ba.xiɬ	ba.xiɬ	ba.kʰiɬ
38	/ɬɪb.rah/	[ɬɪb.rah]	ɬab.ɾah	ʔay.bɪ.ɾaʔ	ʔab.bɪ.ɹah
39	/ʜa.bib/	[ʜa.bib]	ʜa.bib	ha.bib	ʜa.bi.bah
40	/šæʔ/	[šæʔ]	šæʔ	šæʔ	šæ.ʔɛʔ
41	/žæ.ʔat̪/	[žæ.ʔat̪]	ǰæt	žæyt	ža.ʔæ.ʔɛ.tah
42	/baxt̪/	[baxt̪]	ba.xat	ba.xat	baq.χat
43	/t̪abɣ/	[t̪abɣ]	tʰa.ba.ɣah	tʰa.ba:.yɛx	tʰab.bayn
44	/qæd̪/	[qɑ:d̪]	kʰɑ:d	kʰɑ:d	kʰɑ.ʔəd
45	/ʜa.ðˠar/	[ʜa.ðˠar]	ha.ðar	had.dar	ʜad.daɹ
46	/sˠad̪.d̪aq/	[sˠad̪.d̪aq]	sad.dak	s:a.dak	sad.dak
47	/d̪a.ras/	[d̪a.ɾas]	da.ɾas	da.ɾas	da.ɹas
48	/ʜæž.žah/	[ʜæž.žah]	ʜɑ:.žah	ha:.žah	ʜɑ:.žah
49	/bat̪/	[bat̪]	bat	bæt	bat

No.	Target Word		Subject A	Subject B	Subject C
	Phonemic Transcription	Phonetic Transcription			
50	/sæḍ/	[sæḍ]	sɑ:d	sɑ:d	sæ.ʔɛd
51	/ʜa.bak/	[ʜa.bɑk]	ʜɑ.bɑk	hɑ.bɑk	χɑ.bɑ:k
52	/šæb/	[šæb]	ša:b	ša:b	ša:b
53	/qal/	[qɑl]	k^{h}ɑɬ	k^{h}ɑɬ	k^{h}ɑ.ʔʊɬ
54	/xayr/	[xɑyr]	xi.yɛr	xɑ.yir	k^{h}ɑ.ʔiɹ
55	/baɣṭ/	[bɑɣṭ]	bɑ.ɣɑt	bɑ.ɣɑ:t	bɑ.ʔɑyt
56	/žayb/	[žayb]	žib	žɑyb	žɑ:.ʔib
57	/xawx/	[xɑwx]	xu:x	xɑ:.uš	k^{h}ɑ.uk
58	/ðawḍ/	[ðɑwḍ]	ðud	ðəwd	θɑwd
59	/sær/	[sær]	sɑ:.ɾə	sɑ:r	sɑ.ʔɑ.ɾɑ
60	/qæ.ɾɪb/	[qɑ:.ɾɪb]	k^{h}ɑrb	k^{h}ɑ:.ɾib	k^{h}ɑʔ.ɹib
61	/ʜabs/	[ʜaps]	ʜɑbs	hɑbs	ʜɑbs
62	/kabš/	[kɑpš]	k^{h}ɑbš	k^{h}ɑbš	k^{h}ɑbš

Appendix B

Sentences

Below is the phonetic transcription of the sentences that the three subjects read out. In the shaded part, below the subjects' pronunciation, I provide the allophonic transcription of the target sentences. For some syntactic and morphological reasons, which are beyond the scope of this study, some words could be pronounced in two ways. The two possible ways are shown in the shaded part, one beneath the other.

1.	(A)	ʔa.naʔ	ʔas.kʊn	fi	ʔa.wa.laː.yat	ʔaɬ.mʊt.t^{h}a.hɪ.dah
	(B)	ʔa.na	ʔas.kʊ.nu	fi	ʔaɬ.waɬ.ya.t^{h}i	ʔaɬ.mʊt.t^{h}a.hɪ.da
	(C)	ʔa.na	ʔas.kʊ.nʊ	fi	ʔaɬ.waɬ.yæt	ʔaɬ.mʊ.t^{h}a.xɪ.da
		ʔa.na	ʔas.kʊ.nu	fi	ʔal.wɪ.læ.yæ.t̪ɪ	ʔal.mʊt̪.t̪a.ʜɪ.d̪ah
			ʔas.kʊn		ʔal.wɪ.læ.yæt̪	ʔal.mʊt̪.t̪a.ʜɪ.d̪a.t̪ɪ

2.	(A)	sa.saː.far	ʔɪ.læ	ʔak.ra.hi.ræ	fi	ʔal.s^{ʏ}ayf
	(B)	saː.saː.fɪ.ru	ʔɪ.laː	ʔaɬ.k^{h}aː.hi.ræʔ	fi	ʔaɬ.sayf
	(C)	sa.ʔa.saː.fɛɪ	ʔɪ.læ	ʔaɬ.k^{h}a.hɪ.rah	fi	ʔal.sayf
		sa.ʔʊ.sæ.fɪ.rʊ	ʔɪ.la	ʔal.qaː.hɪ.ra.t̪ɪ	fi	ʔas^{ʏ}.s^{ʏ}ayf
		sa.ʔʊ.sæ.fɪr		ʔal.qaː.hɪ.rah		ʔas^{ʏ}.s^{ʏ}ay.fɪ

3. (A) maː.haː tʰaː.lɪb.bæ fi kʰʊl.yæ ʔal.tʰɪ.žaː.ɹah

(B) maː.haː tʰaː.lɪ.bah fi kʰul.yæ ʔaɬ.tʰa.xa.ɾah

(C) ma.haː tʰaː.la.bah fi kʰʊl.yæ ʔæ.tʰɪ.žaː.ɾah

ma.ha ʈˠaː.lɪ.ba.ʈʊn fi kʊl.lɪ.ya.ʈɪ ʔaʈ.ʈɪ.žæ.ɾah
ʈˠaː.lɪ.bah kʊl.lɪ.yah ʔaʈ.ʈɪ.žæ.ɾa.ʈɪ

4. (A) ʕan.da.naː dayf

(B) ʔayn.da.naː dayf

(C) ʕɪn.da.nah day.fʊn

ʕɪn̪.d̪a.na d̪ˠayf
d̪ˠay.fʊn

5. (A) haː.ðaː xa.saːn ža.miɬ

(B) ʜæ.ðæ has.saːn žaː.mɪɬ

(C) haː.ðaː hɪ.saːn ža.mɪ.lʊn

hæ.ða ʜɪ.sˠaː.nʊn ža.mil
ʜɪ.sˠaː.n ža.mi.lʊn

6. (A) ʔal.kʰa.lam ʔak.waː mɪn ʔal.sayf

(B) ʔaɬ.kʰa.la.mu ʔak.wæ mɪn ʔaɬ.sayf

(C) ʔal.kʰa.lam ʔa.kʰʊ.ɹah mɪn ʔæ.sayf

ʔal.qa.la.mʊ ʔaq.wa mɪn ʔas.sayf
ʔal.qa.lam ʔas.say.fɪ

7.	(A)	ɣæ.dæ	yʊm	ʔa.t^{h}ɒ.lah	
	(B)	ʔay.daʔ	yæ.mu	ʔaw.t^{h}a.laːʔ	
	(C)	ʔɛn.da.ʔa	yam	ʔa.t^{h}u.lah	
		ɣa.d̪an	yaw.mu	ʕʊt̪^{ɣ}.lah	
			yawm	ʕʊt̪^{ɣ}.la.t̪ɪ	
8.	(A)	ʕa.mi	la.di.hi	xi.ɾaːf	ka.θi.ɾah
	(B)	ʔay.mi	la.day.hi	xa.ɾaːf	k^{h}a.θi.ɾa
	(C)	ʔa.mi	la.da.ɹih	k^{h}ɪ.ɾaː.fʊn	k^{h}a.θi.ɾʊn
		ʕam.mi	la.d̪ay.hɪ	xɪ.ɾæ.fʊn	ka.θi.ɾah
			la.d̪ayh	xɪ.ɾæf	ka.θi.ɾa.t̪ʊn
9.	(A)	ʔal.ba.xur	šaːʔ.ʕah	fi	ʔal.bʊl.daːn	ʔal.ʕar.bɪ.yah
	(B)	ʔal.baxu.ru	šaːy.yaːʔ	fi	ʔal.bu.la.dan	ʔal.ʔar.bɪə
	(C)	ʔal.ba.xuɹ	šaː.ʔɪ.yãx	fi	ʔa.bʊl.dæn	ʔal.ʔa.ɹa.bɪ.yah
		ʔal.ba.xu.ɾʊ	šæ.ʔɪ.ʕʊn	fi	ʔal.bʊl.d̪æ.nɪ	ʔal.ʕa.ɾa.bɪ.yah
		ʔal.ba.xur	šæ.ʔɪʕ		ʔal.bʊl.d̪æn	ʔal.ʕa.ɾa.bɪ.ya.t̪ɪ
10.	(A)	ʔal.yʊm	hu.waː	ʔal.ʔʊ.ɾaː.bɪ.yæʔ	waː	ba.ʔɪ.dah	yaʔ.t^{h}i	ʔal.xa.mis
	(B)	ʔal.yawm	hu.wæ	ʔal.ʔar.ba.yæʔ	wa	bay.da.hu	yaː.t^{h}i	ʔa.xa.mis
	(C)	ʔal.yʊm	hʊ.wæh	ʔal.ʕʊ.ɹaː.b.yah	wa	ba.ʔɪ.dah	yaʔ.t^{h}i	ʔa.xa.mi.sa
		ʔal.yaw.mʊ	hʊ.wa	ʔal.ʔar.bɪ.ʕæʔ	wa	baʕ.d̪a.hʊ	yaʔ.t̪i	ʔal.xa.mis
		ʔal.yawm				baʕ.d̪ah		

Appendix C
Conversations

Below is the phonetic transcription of the speech of the subjects that was recorded in the conversations that I had with them. The target words that the subjects were attempting to pronounce are phonetically transcribed in the shaded part, below the subjects' pronunciation. In my transcription of the target words, I am not concerned about the morphological or syntactic accuracy; my only concern, as it is obvious in this paper, is the phonetic transcription of the words that the subjects were attempting to produce, whether the subjects were using the right morpheme and/or syntactic structure or not. The English words that the subjects used in their speech, such names of U.S. cities and states, are not transcribed in the shaded part.

Subject A

maɹhabtɪn	ʔana	bɪxayɬ	šukran	wa	ʔantʰa	kʰayfa	ʔaɬ	taks	ʔataksu	mʊšmɛs
marʜabt̪ayn	ʔana	bɪxayr	šukran	wa	ʔan̪̪ta	kayfa	ʔaṭˠ:aqs	ʔaṭˠ:aqsʊ	mʊšmɪs

wa:	bærɛd	ʜaða	ʔasˠ:ayf	ʕamaɬ	fi	waytfɪš	ʔɪnša?aɬah	naʕam	naʔm	la:
wa	bærɪḍ	hæða	ʔasˠ:ayf	ʕamal	fi	---	ʔɪnša? ʔaɬ:a:h	naʕam	naʕam	læ

ʔasdɪkaʔ	lɪʔan:a	mašʊɣula:h	naʔm	žɪd:an	ðaʜabtʰu	ʔɪlaɬ	wala:yət	nɔ:ɹθ
ʔasˠḍɪqa:ʔ	lɪʔan:a	mašɣulah	naʕam	žɪḍ:an	ðahabt̪ʊ	ʔɪla	wɪlæyaṭ	---

kæləɹaynə	zʊɹtʰu:	ʔʊsɹatʰi	ʔʊxt	wa:hɛd	fakat	naʔm	laʔ	la:h	ʕafwan
---	zʊr̪tʊ	ʔʊsraṯi	ʔʊxṯ	wa:ʜɪḍ	faqaṭˠ	naʕam	læ	læ	ʕafwan

Subject B

ʔana bɪxay šukɪan wa ʔantʰa mæðæ žaw ʔatʰaksu fi: məzula: žamiɬ ʔana

ʔana bɪxayr šukran wa ʔaṇṭa mæða žaw ʔaṭˠ:aqsu fi --- žamil ʔana

mɪn pokɪtelo ʔaydəho ʔaslan ʔaskʊn sʊkʊntʰu fi məzula: θʊlæθæ

mɪn --- --- ʔasˠlan ʔaskʊn sakaṇṭʊ fi --- θalæθah

ʔaxwam haðæ ʔaɬ sayf ʔaymaɬ fi məzula: læ sakʊntʰu fi ʔaydəho

ʔaɬwa:m hæða ʔasˠ:ayf ʔaɬamal fi --- læ sakaṇṭʊ fi ---

ʔasˠ:ayfɪn ʔas:abakʰayn faʔaɬtʰa: fi ʔaɬ ʔʊtlah safartʰu: ʔɪla: moəb yutʰa

ʔasˠ:ayfayn ʔas:æbɪqayn faɬalṭa fi ʔal ɬʊṭˠlah sæfarṭʊ ʔɪla --- ---

mæ ʔʌstɪga wa: sadɪgat mæ darastʰu na:m safa.rtʰu ʔɪla: wašɪŋtɪn

maɬa ʔasˠḍɪqa:ʔ wa sˠaḍiqa:ṭ mæ ḍarasṭʊ naɬam sæfarṭʊ ʔɪla ---

hayθu ʔɛndama kʊntʰu madrasa: ʔaθænwɪə šʊkran

ʜayθʊ ɬɪn̪ḍama kʊṇṭʊ maḍrasah ʔaθ:ænawɪyah šʊkran

Subject C

ʔana bɪhaːɪ šukran wa ʔanta mɪn ʔayna: ʔasˠɬ laː ʔana mɪn lɪvɪŋgsn̪

ʔana bɪxayr šukran wa ʔan̪t̪a mɪn ʔayna ʔasˠl læ ʔana mɪn ---

mɒntænə ʔafwan laː ʔaʜʊbːu ʔahʊbːu ʔasːafaɪ lækʰɪn ʔadɪus fi ʔaɬžæmɪə

--- ʕafwan læ ʔʊʜɪbːʊ ʔʊʜɪbːʊ ʔasːafar laːkɪn ʔad̪rʊs fi ʔalžæmɪʕah

mamana fɪlsayf ʔamaɬtʰu fɪɬsayf ʔaɬmaːdi waː maðaː yafːaɬ ʔaɬsayf

mæ maʕna fi ʔasˠːayf ʕamalt̪ʊ fi ʔasˠːayf ʔalmaːd̪ˠi wa mæða yafʕal ʔasˠːayf

ʔahabːu ʔaɬʔamaɬ ʔalžæmɪə laː ʔahɛb ʔalʕamaɬ daʔman laːh ʔɛndama

ʔʊʜɪbːʊ ʔalʕamal ʔalžæmɪʕah læ ʔʊʜɪb ʔalʕamal d̪æʔɪman læ ʕɪnd̪ama

kʰʊntʰu tʰɪflan kʰʊntʰu ʔasbaʜ ʔafwan šukɑ̃ wahɛd maɪatʰɪn ʔʊxwa

kʊn̪t̪ʊ t̪ˠɪflan kʊn̪t̪ʊ ʔasbaʜ ʕafwan šukran waːʜɪd̪ marːat̪an ʔʊxra

wahɪd maratʰɪn ʔukra ʔaʜɛbːu ʔaɬdɪaːsah ʔaɬʔaɪbɪyaː kaθiɪɑ̃

waːʜɪd̪ marːat̪an ʔʊxra ʔʊʜɪbːʊ ʔad̪ːɪræsah ʔalʕarabɪyah kaθiran

mamaʔna mantʰɪk ʔalwaɬaɪbi mantʰakiyə šukra masaɬaːma

mæ maʕna man̪t̪ˠɪq ʔalːʊɣah ʔalʕarabɪyah man̪t̪ˠɪqɪyah šukran maʕasːalæmah

Bibliography

Akmajian, A., et al. *Linguistics: An Introduction to Language and Communication*. 4th ed. Massachusetts: The MIT Press, 1995.

Agard, Frederick B., and Robert J. Di Pietro. *The Sounds of English and Italian*. Chicago: The University of Chicago Press, 1965.

Balasubramanian, T. *Contrastive Analysis*. (unpublished work)

Brinton, Laurel J. *The Structure of Modern English: A Linguistic Introduction*. Amsterdam: John Benjamins, 2000.

Broselow, Ellen. "Non-Obvious Transfer: On Predicting Epenthesis Errors." In Ioup, Georgette, and Steven H. Weinberger, eds. *Interlanguage Phonology: The Acquisition of a Second Language Sound System*. Cambridge: Newbury House, 1987.

Brustad, Kristen, et. al. *Alif Baa: Introduction to Arabic Letters and Sounds*. Washington, D.C.: Georgetown University Press, 1995.

_____. Al-*Kitaab Fii Ta^{c}allum al-^{c}Arabiyya: A Textbook for Beginning Arabic (Part One)*. Washington, D.C.: Georgetown University Press, 1995.

Ellis, Rod. *The Study of Second Language Acquisition*. Oxford: OUP, 1994.

Encyclopedia Britannica 2002, CD-ROM.

Fries, Charles C. *Teaching and Learning English as a Foreign Language*. Ann Arbor, MI: The University of Michigan Press, 1945.

Gass, Susan M., and Larry Selinker, eds. *Language Transfer in Language Learning*. Philadelphia, PA: John Benjamins North America, 1993.

_____. *Second Language Acquisition: An Introductory Course*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1994.

Khattab, Ghada. *A Sociophonetic Study of English-Arabic Bilingual Children*. [On-line] Available at: http://www.leeds.ac.uk/linguistics/research/WP1999/ghads.pdf (Accessed on 20th October, 2002)

Khoja, Shereen. *APT: Arabic Part-of-speech Tagger*. [Online] Available at: http://www.comp.lancs.ac.uk/computing/users/khoja/NAACL.pdf (Accessed on 15th October, 2002)

Ladefoged, Peter, and Ian Maddieson. *The Sounds of the World's Languages*. Massachusetts: Blackwell Publishers Inc., 1996.

McCarthy, Michael. *Issues in Applied Linguistics*. Cambridge: Cambridge University Press, 2001.

Odlin, Terence. *Language Transfer: Cross-linguistic Influence in Language Learning*. Cambridge: Newbury House, 1989.

Selinker, Larry. *Rediscovering Interlanguage*. New York: Longman, 1992.

Smith, Bernard. *Arabic Speakers*. In Swan, Michael, and Bernard Smith, eds. *Learner English: A teacher's guide to interference and other problems*. New York: Cambridge University Press, 1987.

Stockwell, Robert P., and J. Donald Bowen. *The Sounds of English and Spanish*. Chicago: The University of Chicago Press, 1965.

Tarone, Elaine E. *The Phonology of Interlanguage*. In Ioup, Georgette, and Steven H. Weinberger, eds. *Interlanguage Phonology: The Acquisition of a Second Language Sound System*. Cambridge: Newbury House, 1987.

White, Lydia. *Universal Grammar and Second Language Acquisition*. Amsterdam: John Benjamins, 1989.