Contrastive Analysis and the Difficulties in Learning Arabic Consonants by Native Speakers of English

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1- Introduction

The field of Contrastive Analysis is not new to second language teaching and learning. The co-relations between second language acquisition (SLA) and the studies of contrastive analysis have varied from focusing purely on making teaching a second language more effective to including research on the nature of learning a second language. Studies in SLA which are influenced by the contrastive analysis approach have always investigated the parametric and linguistic competence across languages and predicted errors that learners make in their progression of learning a second language. Through the course of investigating such linguistic characteristics of these systematic errors in any given language, researchers have attempted to concentrate both on how languages are learned and on how languages can be taught.

In the field of second language acquisition, the process of learning and teaching the phonology of a language is considered one of the more difficult challenges. The difficulty becomes clearer after the learner reaches puberty. It becomes increasingly rare for the learner to reach native-like pronunciation proficiency even if he/she may go on to master the syntax and morphology of L2. This inefficiency in learning L2 phonology led some researchers to propose that the Critical Period Hypothesis, which claims that language learning becomes much more difficult after puberty, applies only to phonology.

Therefore, the linguistic area of learning and teaching second language phonology has gradually emerged as an independent area in applied linguistics and has become one of the fastest developing areas in the linguistic field.

Throughout this paper, I will be investigating the Contrastive Analysis Hypothesis (CAH), the problems identified with it, and its current status in the field of second language acquisition research. I will concentrate on language transfer from a Contrastive Analysis (CA) perspective, and provide a brief historical overview of the CAH and how it accounts for errors in a second language. My paper argues that although the CAH has failed to explain the source of all errors that adult learners make in their production of L2, the hypothesis does provide a prediction for errors on the phonological level that are produced by L2 adult speakers.

The paper concludes with the assertion that the CAH can often provide an explanation for phonological errors committed by L2 learners. Throughout the paper, I describe, compare, and contrast the phonological systems of Arabic and English to trace the source of the phonological errors in the Arabic speech of native speakers of English. The purpose of this paper is, firstly, to help teachers of Arabic as a foreign language predict the phonological errors that native speakers of English are likely to make when learning/speaking Arabic in order to help the learners improve their pronunciation; secondly, to show that 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 ignored. Researchers, such as Gass and Selinker stated, "we feel, however, that there is overwhelming evidence that language transfer is indeed a real

and central phenomenon that must be considered in any full account of the second language acquisition process" (7).

There is something inherent in this hypothesis that works; moreover, though it has been more than half a century since the CAH was proposed, there are still studies done today based on it. Therefore, through my paper, I will investigate the extent to which the CAH can help in predicting pronunciation errors in the Arabic speech of native speakers of English.

2- Contrastive Analysis Hypothesis

In the middle of the twentieth century, one of the most popular pursuits for applied linguists was the study of two languages in contrast. Later on, this process of drawing a contrast between two languages was formalized as the Contrastive Analysis Hypothesis. The Contrastive Analysis Hypothesis was deeply rooted in the behavioristic and structuralist approaches and, therefore, it claimed that the principal barrier to L2 is the interference of the L1 system with the L2 system (Brown 248).

Charles Fries argues, in his 1945 book *Teaching and Learning English as a Foreign Language*, that "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" (9). For this reason, Carl James discusses in his book *Contrastive Analysis* that Fries, through providing this insight, was the founder of CA (143).

Robert Lado, in his book *Linguistics Across Cultures*, laid out the theoretical foundation for the contrastive analysis hypothesis, provided the technical procedures

needed to do the detailed contrastive analysis, and was the first researcher to suggest the CAH when he pointed out 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. (2)

In other words, L2 learners depend entirely on their L1 in the process of SLA. This dependence on the learner's L1 results in transfer, and by drawing a scientific structural contrast between the mother language and the target one, CAH will enable linguists and language teachers to predict the difficulties the learner will have in learning the target language.

Carl James adopts Rod Ellis' definition of transfer, "the hypothesis that the learning of task A will affect the subsequence of task B." We can substitute for 'task A' and 'task B,' L1 and L2, respectively (11). Another helpful definition is given by Odlin: "transfer is the influence resulting from similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired" (27).

There are two kinds of transfer: 1) Positive transfer takes place when there is no difference in the structure between L1 and L2. Positive transfer facilitates the process of learning the target language. 2) Negative transfer (also known as interference) takes place when there are differences between the first and the target languages. This interference slows down the learning process.

Yet, sometimes it becomes difficult to tell what kind of transfer we have through focusing on the occurrence of errors. Rod Ellis supports this in his book *The Study of Second Language Acquisition* when he talks about the fact that some learners avoid using some kinds of structures in their production of L2 because they do not have those structures in their first language. For this reason, hunting for errors does not always indicate if there is a transfer or not in the production of the learner because it will be unclear whether or not the learner is avoiding a certain structure unless he/she is specifically asked to use that kind of structure (306).

Gass and Selinker summarized the assumptions of CAH as follows:

> 1) Language is a habit formation.
>
> 2) The mother language is the main source of difficulty when someone is learning a second language.
>
> 3) Pointing out the areas of dissimilarity between the mother language and the second language will account for errors in the learning process.
>
> 4) The greater dissimilarities between the two languages there are, the more difficulty there will be in the process of learning.
>
> 5) What the learner needs to be aware of when learning a second language is the differences between his/her mother language and the target language because these differences will cause difficulty.
>
> 6) Similarities and differences between L1 and L2 determine how easy or difficult the learning process will be. (60)

It is worth mentioning that the goal of CA for researchers/linguists in Europe was to gain a better understanding of language, while for those in America, it was to enhance

the teaching of language. Comparing the mother and target language and culture will determine the similarities and dissimilarities between the two languages and give a better idea about what kind of teaching materials should be prepared for those learners. Lado, therefore, states that "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" (9-10).

Comparison of two languages using the CAH framework includes the following steps: 1) Choosing the structure, of both languages, to compare. 2) Describing the structures of the two languages. 3) Drawing a contrast between the two structures to identify the areas of similarities and dissimilarities. 4) Predicting, based on the previous step, what is going to be difficult and what is not going to be difficult to be learned. 5) Testing and evaluating the predictions.

3- Strong Version of CAH

Throughout the literature, the CAH has had two versions. The strong version is defined by the claims made by Lado in his 1957 book *Linguistics Across Cultures*:

> The plan of the book rests on the assumption that we can predict and describe the patterns that will cause difficulty in learning, and those that will not cause difficulty, by comparing systematically the language and the culture of the students (vii)…in the comparison between native and foreign language lies the key to ease or difficulty in foreign language learning…those elements that are similar to [the learner] native language will be simple for him and those elements that are different will be difficult. (1-2)

As described above, the strong version of CAH claims that 1) L1 is the source of difficulty in learning L2, 2) the greater the dissimilarity between L1 and L2, the more difficult the learning process will be, 3) doing a contrast between the two languages will predict what is going to be difficult to learn, and 4) the result of this contrast will help in preparing teaching materials and guide language teachers in determining where to place their focus.

Advocates of the strong version of CAH also constructed a hierarchy of difficulty that was applicable to both grammatical and phonological features of language. According to Brown, Clifford Prator "captured the essence of this grammatical hierarchy in six categories." In ascending order of difficulty, they are as follows:

1) Level 0—Transfer: No difference or contrast is present between the two languages. The learner can simply transfer (positively) a sound, structure, or lexical item from the native language to the target one. Example: English and Spanish cardinal vowels.
2) Level 1—Coalescence: Two items in the native language become coalesced into essentially one item in the target language. This requires that learners overlook a distinction they have grown accustomed to. Example: English third-person possessives require gender distinction (his/her), and in Spanish they do not (su).
3) Level 2—Underdifferentiation: An item in the native language is absent in the target language. The learner must avoid that item. Example: English learner of Spanish must "forget"… the use of *some* with mass nouns.

4) Level 3—Reinterpretation: An item that exists in the native language is given a new shape or distribution. Example: An English speaker learning French must learn a new distribution for nasalized vowels.

5) Level 4—Overdifferentiation: A new item entirely, bearing little if any similarity to the native language item, must be learned. Example: An English speaker learning Spanish must learn…Spanish grammatical gender inherent in nouns.

6) Level 5—Split: One item in the native language becomes two or more in the target language, requiring the learner to make a new distinction. Example: An English speaker learning Spanish must learn the distinction between…Spanish indicative and subjective moods. (Brown 250-51)

With more research, linguists noticed that this strong version was oversimplified and made promises that it did not fulfill; predicting difficulty by means of contrastive procedures was soon shown to have glaring shortcomings. Some studies showed that the assumption that whatever is similar is easy and whatever is different is difficult is invalid. The credibility of CAH was also questioned due to its close association with behaviorism, especially when Chomsky published his attack against behaviorism in 1959 (Brown 27). A serious challenge to the validity of CAH was the fact that some errors were not due to the difference between the native language and the target language of the learners. Another reason behind the loss of enthusiasm for the strong version of CAH was the problem of assigning errors to particular levels of the hierarchy, as pointed out by Brown in *Principles of Language Learning and Teaching*: "it was very difficult, even with the six categories, to determine exactly which category a particular contrast fit into…For

example, when a Japanese speaker learns the English /r/, is it a case of a level 0, 1, or 3 difficulty? A case can be made for all three" (251-52).

4- Weak Version of CAH and Cross-Linguistic Influence

Ronald Whardhaugh, in his 1970 article "The Contrastive Analysis Hypothesis," advocates a weak version of CAH, noticing that it (CAH) had intuitive appeal, and that teachers and linguists had successfully used " the best linguistic knowledge available…in order to account for observed difficulties in second language learning" (126). The focus of the weak version is on the explanatory power of the observed errors, not on the predictive one. In other words, the weak version of CAH not only acknowledges the existence and the importance of interference across languages and the fact that interference can explain difficulties, but also pays a good deal of attention to checking the empirical data collected from learners' errors.

The question of "is there a language transfer?" was a controversial one from the 1950s until 1990s, but the typical answer for this question was "yes." What was known as the weak version of the CAH is known today as cross-linguistic influence (CLI). This new version, so to speak, suggests that all theories of second language acquisition should recognize the significance of the role of the learner's prior linguistic knowledge in learning a target language (Ellis 300). The difference between today's focus on influence, rather than prediction, is an important one.

The validity of CAH in predicting learners' performance in phonology is still reliable. Brown warns that "aside from phonology, which remains the most reliable linguistic category for predicting learner performance…other aspects of language present more of a gamble" (252). Ellis also points out that "there is a widespread recognition that

transfer is more pronounced at the level of the sound system than at the level of syntax" (316).

In the following sections of the paper, I describe[1], compare, and contrast Arabic and English consonants to predict, based on CAH, areas of ease and difficulty for English speakers learning Arabic, present preliminary findings about the predictions, and discuss further research needed to test and evaluate these preliminary findings to help teachers and their students[2].

5- Consonants

The definition of a consonant adopted in this paper is "a type of speech sound that is produced by having the air stopped temporarily or cause some friction or interruption as it goes through the vocal apparatus; not a vowel; a phoneme of this kind; a letter of this kind" (Nasr 98). When talking about consonants, the following aspects of articulation are to be considered:

1) Voicing: consonants produced with vocal fold vibration are voiced; consonants produced without vocal fold vibration are voiceless.
2) Place of Articulation: where the constriction is made.
3) Manner of Articulation: what sort of constriction is made.

Arabic consonants

The twenty-eight Arabic letters all represent 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. Below is a description of the

[1] In my description, I mainly follow Ladefoged and Nasr's description and use of phonetic symbols.

[2] Appendix on page 29 shows a chart on Arabic and English consonants.

consonants of Arabic with reference to the allophone(s) of each phoneme and some example(s).

1. /b/ voiced bilabial plosive as in [bæb] 'door'

In the production of this phoneme, the two lips are brought together to make 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. It occurs word-initially, word-medially and word-finally. In Arabic, this phoneme has two primary allophones, [p] and [b].

[b] is a voiced bilabial plosive and occurs in all phonological environments except before voiceless consonants, as in: [bədr] 'full moon', [kəlb] 'dog'. [p] is a voiceless bilabial plosive and occurs before voiceless consonants, as in the word [lʊps] 'confusion'.

2. / t / voiceless dental plosive as in [tin] 'figs'

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 in producing this phoneme; therefore, 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 do not vibrate during the production of this phoneme. This phoneme is a voiceless dental plosive. It occurs word-initially, word-medially and word-finally. The primary allophone of /t/ is [t], a voiceless dental plosive.

3. /tˠ/ emphatic voiceless dental plosive as in [tˠɑlɪb] 'student'

The phoneme /tˠ/ is produced the same way as the phoneme /t/ is produced except that during the articulation of /tˠ/ the back of the tongue is raised towards the velum. This

phoneme is an emphatic dental plosive. It occurs word-initially, word-medially and word-finally. The primary allophone of /tˠ/ is [tˠ], an emphatic voiceless dental plosive.

4. /d/ voiced dental plosive as in [dʊb] 'bear'

To produce this phoneme, the velum must raise 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 vibrate during the production of this phoneme. This phoneme is a voiced dental plosive. It occurs word-initially, word-medially and word-finally. The primary allophone of /d/ is [d], a voiced dental plosive.

5. /dˠ/ emphatic voiced dental plosive as in [dˠʌbʕ] 'hyena'

In the production of this phoneme, 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 vibrate and the back of the tongue is raised towards the velum during the production of this phoneme. This phoneme is an emphatic voiced dental plosive. It occurs word-initially, word-medially and word-finally. The primary allophone of /dˠ/ is [dˠ], an emphatic voiced dental plosive. Arabic is the only language that has this phoneme.

6. /k/ voiceless velar plosive as in [kɪtæb] 'book'

To produce this phoneme, one must close the nasal passage of air 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. It occurs word-initially, word-medially and word-finally. The primary allophone of /k/ is [k], a voiceless velar plosive.

7. /q/ voiceless uvular stop as in [qədəm] 'foot'

In the production of this phoneme, the back of the tongue rises 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 occurs word-initially, word-medially and word-finally. The primary allophone of /q/ is [q], a voiceless uvular stop.

8. /ʔ/ voiceless glottal stop as in [ʔədəb] 'literature'

In the production of this phoneme, the vocal cords are brought together forming a complete closure. Therefore, 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. It occurs word-initially, word-medially and word-finally. The primary allophone of /ʔ/ is [ʔ], a voiceless glottal stop.

9. /f/ voiceless labiodental fricative as in [færɪs] 'knight'

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, and the vocal cords do not vibrate when producing this phoneme. Therefore, this phoneme is a voiceless labiodental fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /f/ is [f], a voiceless labiodental fricative.

10. /θ/ voiceless inter-dental fricative as in [ħədəθə] 'happened'

During the production of this phoneme, the nasal passage of air is closed. 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 inter-dental fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /θ/ is [θ], a voiceless inter-dental fricative.

11. /ð/ voiced inter-dental fricative as in [ðʊbæb] 'flies'

In the production of /ð/, the nasal passage of air is closed. 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 vibrate. This phoneme is a voiced inter-dental fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /ð/ is [ð], a voiced inter-dental fricative.

12. [ðˠ] emphatic voiced inter-dental fricative as in [ðˠɪl] 'shade'

The nasal passage of air is closed and 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, and the vocal cords vibrate and the back of the tongue is raised towards the velum when producing this phoneme. Therefore, this phoneme is an emphatic voiced inter-dental fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /ðˠ/ is [ðˠ], an emphatic voiced inter-dental fricative.

13. /s/ voiceless alveolar fricative as in [sɪn] 'tooth'

During the production of /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 occurs word-initially, word-medially and word-finally. The primary allophone of /s/ is [s], a voiceless alveolar fricative.

14. /sˠ/ emphatic voiceless alveolar fricative [sˠəbæħ] 'morning'

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 and the back of the tongue is raised towards the velum. This phoneme is an emphatic voiceless alveolar fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /sˠ/ is [sˠ], an emphatic voiceless alveolar fricative.

15. /z/ voiced alveolar fricative as in [zəbib] 'raisin'

During the production of this phoneme, 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 vibrate. This phoneme is a voiced alveolar fricative and occurs word-initially, word-medially and word-finally. The primary allophone of /z/ is [z], a voiced alveolar fricative.

16. /ʃ/ voiceless alveo-palatal fricative as in [ʃəræb] 'drink'

In the articulation of this phoneme, 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. This phoneme is a voiceless post-alveolar fricative and occurs word-initially, word-medially and word-finally. The primary allophone of the phoneme /ʃ/ is [ʃ], a voiceless alveo-palatal fricative.

17. /dʒ/ voiced alveo-palatal affricate as in [dʒʊnud] 'soldiers'

The front of the tongue goes against the hard palate while expelled air causes friction rather than plosion. The vocal cords vibrate. This phoneme is a voiced alveo-palatal affricate and occurs word-initially, word-medially and word-finally. It has only one allophone, the voiced alveo-palatal affricate [dʒ].

18. /x/ voiceless velar fricative as in [xʊlud] 'immortality'

In the production of this phoneme, 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 occurs word-initially, word-medially and word-finally. It has only one allophone, the voiceless velar fricative [x].

19. /ɣ/ voiced velar fricative as in [ɣæz] 'gas'

During the production of this phoneme, 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 vibrate. This phoneme is a voiced velar fricative and occurs word-initially, word-medially and word-finally. It has only one allophone, the voiced velar fricative [ɣ].

20. /ħ/ voiceless pharyngeal fricative as in [ħɪsɑn] 'horse'

In the production of this phoneme, the velum is raised, and the nasal passage of air is completely closed. The lower part of the root of the tongue 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. Therefore, this phoneme is a voiceless pharyngeal fricative. It occurs word-initially, word-medially and word-finally. It has only one allophone, the voiceless pharyngeal fricative [ħ].

21. /ʕ/ voiced pharyngeal fricative as [ʕʊlum] 'sciences'

The velum is raised and the nasal passage of air is completely closed. The lower part of the root of the tongue 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 vibrate. Therefore, this phoneme is a voiced pharyngeal fricative. It occurs word-initially, word-medially and word-finally. It has only one allophone, the voiced pharyngeal fricative [ʕ].

22. /h/ voiceless glottal fricative as in [hərəm] 'pyramid'

During the articulation of this phoneme, 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. Therefore, this phoneme is a voiceless

glottal fricative. It occurs word-initially, word-medially and word-finally. It has one allophone, the voiceless glottal fricative [h].

23. /m/ voiced bilabial nasal as in [mʊmtæz] 'excellent'

In the articulation of this phoneme, 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. Therefore, this phoneme is a voiced bilabial nasal. It occurs word-initially, word-medially and word-finally. This phoneme has two allophones:

(a) a voiced labiodental nasal [ɱ], which occurs before /f/ as in /ɱəftuħ/ 'opened'

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

24. /n/ voiced alveolar nasal as in [nədwəh] 'seminar'

During the articulation of this phoneme, 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. It occurs word-initially, word-medially and word-finally. This phoneme has four allophones:

(1) a voiced alveo-dental nasal [n], which occurs before /t/ or /d/ as in /hɪndɪ/ 'Indian', /bɪnt/ 'girl'

(2) a voiced velar nasal [ŋ], which occurs before /k/, /x/, /ɣ/ and /q/ as in/bənk/ 'bank'

(3) a voiced bilabial nasal [m], which occurs before /b/ as in /dʒəmb/ 'side'

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

25. /l/ voiced alveolar lateral as in [ləms] 'touching'

In the articulation of this phoneme, 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, which makes this phoneme a voiced alveolar lateral. It occurs word-initially, word-medially and word-finally. This phoneme has two allophones in Arabic:

(a) a voiced alveolar velarized lateral [ɬ], which only occurs in the word /ʔəlɑh/ 'God'

(b) a voiced alveolar lateral [l], which occurs in all other phonological environments.

26. /r/ voiced alveolar trill as in [rəħməh] 'mercy'

Trill /r/ consists of several taps of the tip of the tongue against the alveolar ridge or just behind it so the air can pass only intermittently between the articulation (Ladefoged 54-56). The velum is raised and the trill nasal passage of air is closed. The vocal cords vibrate. It occurs word-initially, word-medially and word-finally. This phoneme has one allophone in Arabic, which is a voiced alveolar trill.

27. /j/ palatal approximant as in [jərkʊd] 'run'

In the articulation of this phoneme, 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. It is a palatal semi-vowel. 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 /j/. The primary allophone of the phoneme /y/ is the voiced palatal semi-vowel [j].

28. /w/ labio-velar semi-vowel as in /wələd/ 'boy'

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. It is a labio-velar semi-vowel. When it 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 labio-velar semi-vowel.

English Consonants

The English consonants are twenty-four in number. Consonants are phonemic, i.e., English consonants are contrastive with each other. In this section, I provide a brief summary of the English consonants with the phonemic rules that show the allophones of each phoneme.

1. /p/ voiceless bilabial plosive as in /pɛn/ 'pen'

This phoneme occurs word-initially, word-medially, and word-finally. It has two allophones: [p] voiceless unaspirated bilabial plosive and [p^h] voiceless aspirated bilabial plosive. The latter occurs only before a vowel in the beginning of stressed syllables and released in word final positions.

2. /b/ voiced bilabial plosive as in /bɛd/ 'bed'

It occurs word-initially, word-medially, and word-finally. It has one allophone: a voiced bilabial plosive [b].

3. /t/ voiceless alveolar plosive as in /tɪp/ 'tip'

It has two allophones: a voiceless unaspirated alveolar plosive [t] and a voiceless aspirated alveolar plosive [t^h]. The latter occurs only before a vowel in the beginning of

stressed syllables and released in word final positions. This phoneme occurs word-initially, word-medially, and word-finally.

4. /d/ voiced alveolar plosive as in /dɪg/ 'dig'

The phoneme /d/ occurs word-initially, word-medially, and word-finally. It has one allophone: a voiced alveolar plosive [d].

5. /k/ voiceless velar plosive as in /ki/ 'key'

This phoneme occurs word-initially, word-medially, and word-finally. It has two allophones: a voiceless unaspirated velar plosive [k] and a voiceless aspirated velar plosive [k^h]. The latter occurs only before a vowel in the beginning of stressed syllables and released in word final positions.

6. /ɡ/ voiced velar plosive as in /ɡʊd/ 'good'

It occurs word-initially, word-medially, and word-finally. It has one allophone: a voiced velar plosive [ɡ].

7. /tʃ/ voiceless alveo-palatal affricate as in /tʃɛk/ 'check'

This phoneme occurs word-initially, word-medially, and word-finally. It has one allophone: voiceless alveo-palatal affricate [tʃ].

8. /dʒ/ voiced alveo-palatal affricate as in/ dʒʌdʒ/ 'judge'

This phoneme occurs word-initially, word-medially, and word-finally. It has one allophone: voiced alveo-palatal affricate [dʒ].

9. /f/ voiceless labiodental fricative as in /fud/ 'food'

The phoneme /f/ has one allophone (voiceless labiodental fricative [f]) and occurs word-initially, word-medially, and word-finally.

10. /v/ voiced labiodental fricative as in /vɛt/ 'vet'

It has one allophone (voiced labiodental fricative [v]) and occurs word-initially, word-medially, and word-finally.

11. /θ/ voiceless inter-dental fricative as in /θʌmb/ 'thumb'

This phoneme occurs word-initially, word-medially, and word-finally. It has one allophone: voiceless inter-dental fricative [θ].

12. /ð/ voiced inter-dental fricative as in /ðɪs/ 'this'

This phoneme occurs word-initially, word-medially, and word-finally. It has one allophone: voiced inter-dental fricative [ð].

13. /s/ voiceless alveolar fricative as in /sæd/ 'sad'

This phoneme has one allophone (voiceless alveolar fricative [s]) and occurs word-initially, word-medially, and word-finally.

14. /z/ voiced alveolar fricative as in /zu/ 'zoo'

This phoneme occurs word-initially, word-medially, and word-finally. It has one allophone: voiced inter-dental fricative [z].

15. /ʃ/ voiceless alveo-palatal fricative as in /ʃi/ 'she'

This phoneme has one allophone (voiceless alveo-palatal fricative [ʃ]) and occurs word-initially, word-medially, and word-finally.

16. /ʒ/ voiced alveo-palatal fricative as in /mɛʒər/ 'measure'

This phoneme occurs word-initially (in some borrowed words as in /ʒɑnrə/ 'genre') and word-medially only and has one allophone: voiced alveo-palatal fricative [ʒ].

17. /m/ voiced bilabial nasal as in /mæn/ 'man'

This phoneme occurs word-initially, word-medially, and word-finally. It has two allophones: a voiced bilabial nasal [m] and a voiced labiodental nasal [ɱ]. The latter occurs only before /f/.

18. /n/ voiced alveolar nasal as in /nɛst/ 'nest'

It occurs in all positions and has three allophones: voiced alveolar nasal [n], voiced inter-dental nasal [n] that occurs only before inter-dental phonemes as in /tɛnθ/ 'tenth', and voiced labiodental nasal [ɱ] that occurs only before labiodentals as in /ɪnvɛst/ 'invest'.

19. /ŋ/ voiced velar nasal as in /sɪŋ/ 'sing'

It has one allophone only (voiced velar nasal [ŋ]) and occurs only in medial and final positions as /rɪŋ/ 'ring' and /rɪŋɪŋ/ 'ringing'.

20. /l/ alveolar lateral as in /lɛg/ 'leg'

It occurs in all positions and has two allophones: the clear and the dark. Clear [l], in which the front of the tongue is raised in the direction of the hard palate, occurs word initially, before vowels, and between two vowels. In this case the front of the tongue is raised in the direction of the hard palate. Clear [l] is in the following English words: allophone, lead, and lack.

In the production of the dark [ɬ], in which the back of the tongue is raised in the direction of the soft palate and the front of the tongue is somewhat depressed. Dark [ɬ] occurs between a vowel and a following consonant, and word finally as in feel, metal, heal, call, helm, and milk.

21. /r/ alveolar Approximant as in /brɪk/ 'brick'

In this case, the tip of the tongue is held near to the alveolar ridge but does not sufficiently close to the back of the alveolar ridge. The gap between the tongue and the roof of the mouth is still wide enough for the airstream, and the vocal folds vibrate (Ladefoged 54). /r/ is approximant because in the production of this sound, the active articulator moves to narrow the vocal tract, but not so much that fricative noise is created.

The r-sounds are called rhotics. The rhotic sounds of the language are quite varied, including quick taps of the tongue against the alveolar ridge, trills in which the tongue is set into vibration by air flowing over it, and the very odd shape of the American English [ɹ], in which the body of the tongue is bunched up high and the tongue tip may be raised or curled backwards (Fasold and Connor-Linton 17-20).

Flap (tap) /r/ has a single tap. The /r/ in the word very is often produced as a flap by many English speakers. So when the underside of the tip of the tongue makes a single tap against the alveolar ridge (or the front part of the hard palate), the sound produced is a flap, e.g. it occurs in the middle of a word such as letter in forms of American English.

22. /h/ voiceless glottal fricative as in /hæt/ 'hat'

It occurs only in initial and medial positions and has one allophone (voiceless glottal fricative [h]).

23. /j/ palatal approximant as in /jɛs/ 'yes'

This phoneme occurs in all positions and has one allophone (palatal approximant [j]).

24. /w/ voiced labialized approximant as in /wul/ 'wool'

It has on allophone (voiced labialized approximant [w]) and occurs in all positions.

Before I conclude this section, it is important to mention the glottal stop /ʔ/ in English that some North American English speakers and British English speakers produce in words such as /bɪʔn/ 'beaten' and /bəʔl/ 'battle'.

6- Contrastive Analysis of Arabic and English Consonants and Preliminary Findings:

In this section, I provide a contrastive analysis of the segmental phonemes of English and Arabic, showing the major phonetic and phonological differences between the consonant phonemes of these two languages. I use the CAH framework to predict the errors that the native English-speaking subjects will make in their production of Arabic consonants. I then present preliminary findings based on my own experience in teaching Arabic as a foreign language to both advanced and beginning students at the University of Arizona and the University of Wisconsin-Madison .

Based on the description of the consonants of the two languages, when a native speaker of English learns the Arabic consonants, CAH makes the following predictions.

A) The sounds [b], [f], [ɵ], [ð], [s], [z], [ʃ], [d], [m], [n], [w], [j], [dʒ], [k], [h], [l], [t] and [ʔ] are not going to be difficult because these sounds exist in the learner's native language.

Preliminary Findings: My students did not have problems learning these consonants; therefore, CAH yields the correct prediction about native speakers of English learning these Arabic consonants.

B) English and Arabic have the voiceless bilabial plosive [p], but in Arabic it is an allophone of the phoneme /b/ that occurs before voiceless consonants. In English, [p] and [b] are allophones of two different phonemes. Therefore, the learner will use [b] in front of voiceless consonants when speaking Arabic.

Preliminary Findings: In this case, it was not clear cut to my ear that speakers of English have difficulty in the production of the Arabic phoneme /b/ in their speech.

C) The Arabic sound [tˠ] does not exist in English. Therefore, it is going to be difficult because the learner will use [t] instead and a word like [tˠin] 'mud' will be pronounced as [tin] 'figs'.

Preliminary Findings: This prediction of CAH is very true and students, even advanced ones, tend to have difficulty in pronouncing this consonant.

D) The sound [dˠ] exists only in Arabic. For this reason, the learner will pronounce it [d] and a word like [dˠɑr] 'poisonous' will be pronounced as [dɑr] 'house'.

Preliminary Findings: This is a correct prediction. This consonant is difficult to pronounce even by Arabic native speakers and a lot of English native speakers I have taught or known had great difficulty in pronouncing this consonant.

E) Since the voiceless uvular stop [q] does not exist in English, the learner will replace this sound by the voiceless velar stop [k]. For example, the word [qʌlb] 'heart' will be pronounced as [kəlb] 'dog'.

Preliminary Findings: This prediction is correct.

F) Since English does not have the sound [ðˠ], the learner will pronounce it [ð] and a word like [ðˠʌrf] 'envelope' will be pronounced as [ðərf] 'shedding tears'.

Preliminary Findings: While CAH predicts learners will pronounce this consonant as /ð/, I have noticed that some of my students sometimes pronounced it as /d/ instead. This is an error that CAH did not predict.

G) The sound [sˠ] does not exist in English and, therefore, it is going to be pronounced [s]. For example, the word [sˠɪd] 'hunt' (in the imperative form) will be pronounced as [sɪd] 'master' (in the imperative form).

Preliminary Findings: I have found this prediction to be correct and students do mispronounce the consonant /sˠ/.

H) The Arabic sound [x] will be pronounced as [k] because English does not have this sound. A word like [xəbir] 'expert' will be pronounced as [kəbir] 'gid'.

Preliminary Findings: I have found this prediction to be true.

I) Because of the absence of the sound [ɣ] in English, the learner will pronounce it as [g]. A word like [ɣɑbəh] will be pronounced as [gɑbəh] which is not an Arabic word because Arabic does not have [g].

Preliminary Findings: I have noticed that students have difficulty in pronouncing this consonant, but sometimes pronounce it as /x/ instead of /g/. This is another error that CAH did not predict.

J) English does not have the sound [ħ] and, for this reason, the learner will pronounce it as [h]. In a word like [ħærɪb] 'fight' (in the imperative form) will be pronounced as [hærɪb] 'wanted'.

Preliminary Findings: I have found this prediction to be correct.

K) The voiced pharyngeal fricative [ʕ] does not exist in English. Therefore, it will be pronounced as [ʔ] and a word like [ʕələm] 'flag' will be pronounced as [ʔələm] 'pain'.

Preliminary Findings: I have found this prediction to be true. Students have difficulty in both receiving and pronouncing the consonant /ʕ/.

L) The voiced alveolar trill /r/ occurs in Arabic, but not in English. Based on this, CAH predicts that the learner will pronounce it as a retroflex [ɹ] instead.

Preliminary Findings: I have found this prediction of CAH to be correct and students, especially Americans, do have difficulty in pronouncing this consonant.

7- Conclusion

In the pervious section, I pointed out that language transfer was clear and native speakers of English tend to have difficulty in the areas that CAH predicts to be difficult. Yet, in some cases students made some pronunciation errors that the CAH did not predict. Some errors that my students made could not be described in a matter of black and white (as the CAH predicted). At the beginning of this paper, I stated that the CAH, despite the criticisms against it, would provide some help to both teachers and students of Arabic as a foreign language. At this point, I emphasize that the CAH's predictions of pronunciation errors are helpful, but they cannot be considered totally reliable in predicting second language learners' errors.

In further research, I need to expand the fifth step of the CAH, which is testing and evaluating predictions. Therefore, I plan to test and evaluate the predictions of CAH in regard to English speakers learning Arabic by conducting an empirical study which collects data through classroom observations, interviews with the subjects and the teacher(s), and records the subjects' speech in Arabic to come up with a more reliable evaluation of CAH in this regard. CAH is crucial in the field of second/foreign language and should not be ignored.

Appendix

Chart of Arabic and English Consonants

Arabic Consonants	English Consonants
/b/ voiced bilabial plosive	/b/ voiced bilabial plosive
No Correspondence	/p/ voiceless bilabial plosive
/ t / voiceless dental plosive	/ t / voiceless dental plosive
/tˠ/ emphatic voiceless dental plosive	No Correspondence
/ d / voiced dental plosive	/ d / voiced alveolar plosive
/dˠ/ emphatic voiced dental plosive	No Correspondence
/k/ voiceless velar plosive	/k/ voiceless velar plosive
/q/ voiceless uvular stop	No Correspondence
/ʔ/ voiceless glottal stop	/ʔ/ voiceless glottal stop
No Correspondence	/v/ voiced labiodental fricative
/f/ voiceless labiodental fricative	/f/ voiceless labiodental fricative
/θ/ voiceless inter-dental fricative	/θ/ voiceless inter-dental fricative
/ð/ voiced inter-dental fricative	/ð/ voiced inter-dental fricative
/ðˠ/emphatic voiced inter-dental fricative	No Correspondence
/s/ voiceless alveolar fricative	/s/ voiceless alveolar fricative
/sˠ/ emphatic voiceless alveolar fricative	No Correspondence
/z/ voiced alveolar fricative	/z/ voiced alveolar fricative
/ʃ/ voiceless alveo-palatal fricative	/ʃ/ voiceless alveo-palatal fricative
No Correspondence	/tʃ/ voiceless alveo-palatal affricate
/dʒ/ voiced alveo-palatal affricate	/dʒ/ voiced alveo-palatal affricate
/x/ voiceless velar fricative	No Correspondence
/ɣ/ voiced velar fricative	No Correspondence
/ħ/ voiceless pharyngeal fricative	No Correspondence
/ʕ/ voiced pharyngeal fricative	No Correspondence
/h/ voiceless glottal fricative	/h/ voiceless glottal fricative
/m/ voiced bilabial nasal	/m/ voiced bilabial nasal
/n/ voiced alveolar nasal	/n/ voiced alveolar nasal
/l/ voiced alveolar lateral	/l/ voiced alveolar lateral
/r/ voiced alveolar trill	/r/ alveolar Approximant
/j/ palatal approximant	/j/ palatal approximant
/w/ labio-velar semi-vowel	/w/ labio-velar semi-vowel

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