A Study of Consonant Clusters in an EFL Context

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Abstract
The objective of the present study was to provide answers to the questions whether Persian learners of English would have the same number of vowel insertions in the initial and final consonant clusters and also to see if the phonological system of the Persian students' mother tongue would have any effect on their learning of the pronunciation of the initial and final consonant clusters. To this end, sixty female intermediate EFL learners were administered a pronunciation test. The analysis of the participants' performances in the test showed that the number of vowel insertions they had in the initial consonant clusters was not the same as that of final consonant clusters, and using a chi square displayed that the problem of vowel insertion was found to be much more severe with initial consonant clusters as the participants highly added vowels to such clusters. Furthermore, it was found that Persian language's syllable structure does really affect the learning of consonant clusters (i.e. transfer from mother tongue).

Keywords: pronunciation, consonant clusters, transfer, EFL learners

Introduction

Pronunciation is one aspect of the language teaching process that is tackled by every L2 learner in his journey to acquire native-like proficiency in the target language. For any learner to become proficient in an L2, he has to improve all aspects of language, one of which is pronunciation. Mastering the pronunciation of a language is highly important in terms of communication since in many cases the replacement of one sound for another will result in changes in meaning, hence affecting the flow of communication. Therefore, one of the aims of the teachers must be training the students to pronounce sounds as native speakers of the target language. Accordingly, analyzing the problems learners may face in learning the accurate or at least an acceptable pronunciation of the target language deserves to be thoroughly and intensively inspected.

Playing the central role in face to face communication, pronunciation should also be highly taken into account by English teachers. In fact, teachers should adopt the approach that best helps students acquire native-like or intelligible pronunciation so that they can become efficient members of the English-speaking community in which they communicate and also so that they are not known to have non-native pronunciation errors as such errors may place the speaker at a professional or social disadvantage (Morley, 1991).

Although there has been little research on the teaching and learning of pronunciation, "there is theoretical and technical work to help us understand the processes involved in developing phonology in a second language and the factors that contribute to it" (Lightbown & Spada, 2006, p. 104). The thing that has helped a lot to explain some aspects of first language influence on second language learners' phonological development has been contrastive analysis. One example of L1 influence on L2 phonological development is Persian learners' inability to correctly pronounce English consonant clusters. Actually, Persian learners of English usually tend to insert vowels into English consonant clusters, especially those that occur in the initial position. To Cook (1991), L2 learners do this to make English conform to the syllable structures of their first languages.

According to Keshavarz (2008a), such a tendency on the part of Persian learners of English is because Persian syllable structure does not allow initial consonant clusters. To him, Persian learners of English say 'I e-speak e-Spanish' instead of 'I speak Spanish' because they are unaware of the ways English consonants can be combined to form the so-called consonant clusters and also because they have got used to Persian syllable structure. Cook (1991) maintains that some of the problems L2 learners have regarding the issue of pronunciation learning is related to the differences between the syllable structure of the two languages, i.e. the combinations of consonants and vowels, rather than the differences between single phonemes. Thus, the failure of the Persian learner to correctly pronounce the word 'speak' without the epenthetic vowel is because he/she is unaware of the ways consonants can be combined in English- the permissible consonant clusters.

Therefore, one way to explain the problems Persian learners have in learning the rules of consonant cluster present in English syllable structure is through CAH (contrastive analysis hypothesis). As the name implies, the most important aim of CAH is to compare and contrast two specific languages to find the similarities and differences between them. Using the findings of CAH, contrastivists try to predict the probable errors learners will encounter during their process of learning a second language with the aim of preventing learners from making those errors in advance (Keshavarz, 2008b). James (1980) claims that CA is done at different levels of language consisting of phonology, morphology and syntax. Therefore, as related to the present study, one of the aims of CAH is to find the similarities and differences between two specific languages in the area of phonology.

According to Ziahosseiny (2006), teachers and textbook writers use CAH to find out which aspects of language are similar to or different from the students' mother tongue. The general belief is that the degree of the difference between the learners' native language and the target language can bring about greater difficulty. Lightbown and Spada (2006) point out that the evidence supporting the CA hypothesis originates partly from the observation that it takes learners longer to become highly fluent in a particular second or foreign language if that language is considerably different from their first languages. Thus, the learners' first language plays an important role in the development of second or foreign language phonology.

As Lightbown and Spada (2006) continue, there are some other factors, such as the amount and type of exposure to the target language and the degree of use of the first language, that substantially contribute to the development of pronunciation. Piske, Mackey, and Flege (2001), based on some studies, have found that the longer the students are exposed to a language, the more their pronunciation will improve (Lightbown & Spada, 2006). They also found that the greater they continue to make use of their first language, the stronger their accents in the second language will be. Therefore, CAH enables the teacher to know how easy or difficult a particular aspect of language will be for a particular group of students with a particular mother tongue (Ziahosseiny, 2006).

In fact, Ziahosseiny (2006) maintains that if the aspect is easy, the teacher will devote less class time to that aspect, and if it is difficult, more time and more exercises will be devoted to that particular aspect of the language. He also points out that the other users of the findings of CAH are textbook writers whose intention is to decide which aspects of the language should be presented first and which later, based on the degree of difficulty.

Transfer from Mother Tongue and the Learning of Consonant Clusters

Hudson (2000), discussing the main reasons for the superiority of child first language acquisition over adult second language learning, points out that the reasons for this dominance are rooted in 'cognitive, affective, and biological differences' between adults and children. He explains that cognitive differences refer to the ability on the part of adults to consciously process their knowledge of things, including knowledge of language. To him, adults' ability to consciously process language is due to their having analytic and meta-linguistic knowledge about the language, i.e. their ability to talk about language and how it works. Moreover, as he continues, adults have 'prior knowledge of their native language'.

Lightbown and Spada (2006) maintain that this prior knowledge can be an advantage in the sense that learners have an idea of how languages work. However, they continue that it can also be a drawback when it causes learners to make interferential errors. In fact, according to Hudson (2000), adults have some expectations, based on their native language, about the target language. Interferential errors, to him, occur when their expectations about the target language are incorrect because the two languages are different from each other

with respect to a specific rule. That's why transfer, as contrastivists maintain, plays an important role in learning a second language. Actually, to Lado (1957), language transfer has always been fundamental to any theory of second language phonological development. The terms that seem necessary to be explained here are transfer, interference, and overgeneralization.

Followers of behavioristic psychology think that when a person learns two specific things successively, the first learning affects the second one (Ziahosseiny, 2006). To Carl James (1980) this influence is called 'transfer'. In fact, he (p. 11) defines transfer as "the effects of one learning task on a subsequent one". According to Hudson (2000), transfer is the influence that earlier knowledge has on the acquisition of later knowledge. Ziahosseiny (2006) and Hudson (2000) declares that transfer can happen in two ways: positive or negative. To them, if the first learning is similar to the second one, then positive transfer happens. The outcome of positive transfer is that the first learning helps the second one, i.e. makes it easier. However, if the first learning is different from the second one, then negative transfer happens; that is, the first learning causes difficulty for the second one.

According to Brown (2000), negative transfer can be referred to as 'interference'. Hudson (2000) maintains that negative transfer occurs when categories in L1 and L2 are similar to each other in some ways but different in others. He continues that such categories may present persistent problems of transfer referred to as interference. To him, foreign accent, which is so common in adult language learning, is mostly because of transfer of phonological categories. Ziahosseiny (2006) maintains that more time and exercise is needed for the learner to be able to overcome the difficulty made by interference.

As far as the acquisition of second language phonology is concerned, Kranke and Christison (as cited in Richards & Renandya, 2002) declare that interference from learners' first language affects the acquisition of the second language sound system more than other systems (such as grammar). That's why, as Jones and Evans (1995) claim, a large number of teaching pronunciation materials include sections on contrastive analysis. These sections, though helping teachers predict where their students will make a mistake and which forms are more difficult for them to learn, are often misleading because these predictions are usually made for individual sounds and sound segments not for supra-segmental features that are usually overlooked in these books. The important question which is very much in debate is "the extent to which inter-language phonology is affected by L1 transfer" (Richards & Renandya, 2002, p. 181).

According to contrastive analysts, the most important factor that affects language learning in general and pronunciation learning in particular is interference from mother tongue. Actually, as Brown (2000) maintains, the early stages of learning an L2 are especially in danger of inter-lingual transfer from the native language, or interference (Cook, 1991). They continue that in these beginning stages, before getting familiar with the system of the second language, the learner makes use of his native language as the only easily accessible

linguistic system. To Brown (2000), while all errors cannot be the result of transfer from mother tongue, many such errors can be seen in learner speech. He believes that once learners have passed the beginning stages of learning an L2, more and more 'intra-lingual' transfer is manifested, i.e. more universal processes of acquisition common to both L1 and L2 can be seen in the learners' speech. Thus, his suggestion for teachers is that they should be familiar with their learners' native language so that they can more easily detect and analyze their errors.

While transfer from mother tongue, as explained above, has been known by contrastive analysts as the only source of pronunciation errors made by learners, other sources are also explained by different researchers during the past century. Tarone's (1978) claim is that transfer forms only one of the factors affecting the inter-language phonology while other factors such as overgeneralization, approximation, and avoidance are much more important. Fledge (1987) points out that learners, once facing a new sound system, compare it with their L1 sound system. He continues that if they find the two systems similar to each other, they use their existing categories; however, when they run into unknown features, they create new categories. Eckman (1977) uses the term 'markedness' to talk about the features that are naturally more difficult than others irrespective of the learners' first language.

According to Ziahosseiny (2006), contrastivists believing in the strong version of CAH assume that the degree of difficulty depends upon the degree of differences. In other words, the more different the items are, the more difficult they will be for learners to learn. Thus, based on the strong version of CAH, it is interference due to negative transfer that is the only source of all errors. In other words, as Brown (2000) asserts, based on the strong version of CAH, second language learning is principally a process of acquiring whatever items are different from the first language. However, this is not true because, as Ziahosseiny (2006) maintains, interference forms only one third of the errors made by second language learners and such a narrow view of interference overlooks the intra-lingual effects of learning.

Therefore, based on the strong version of CAH, it is the syllable structure of Persian language that causes errors on the part of Persian learners of English to accurately pronounce English consonant clusters (Keshavarz, 2008a). According to Keshavarz (2008b), when encountering a word that contains initial consonant clusters, the Persian learner of English negatively transfers his knowledge of Persian syllable structures to pronounce that specific word. He continues that this is because of the fact that initial consonant clusters are not allowed in Persian; therefore, Persian speakers insert a vowel before or in between the cluster to make it easier to pronounce. Thus, they pronounce the word 'street' as /ɛstɛrit/ and 'tree' as /tɛri/.

Cook (1991), explaining the reason why most L2 learners find it difficult to learn English consonant clusters, states that part of interlanguage phonology is the rules for forming syllables. To him, L2 learners, before leaning the rules

underlying English syllable structure, often try by one means or another to make the L2 syllables fit their L1s. Simply stated, they make L2 syllables conform to the syllable structures of their first languages by inserting extra vowels among English consonant clusters. Examples are Koreans saying /kəla:s/ for 'class' or Arabs saying /bi læstik/ for 'plastic'.

Prator (1967), a proponent of the strong version of CAH, has made a hierarchy that shows the degrees of difficulty of different items of language (Keshavarz, 2008b). Based on this hierarchy, initial consonant clusters can be put in level 4, which is over differentiation. Keshavarz (2008b) and Brown (2000) define over differentiation as: a new item which is completely different from the native language must be learned entirely. According to Keshavarz (2008b), initial consonant clusters must be very difficult for Persian learners of English to learn.

However, according to the weak version of CAH, as Ziahosseiny (2006) asserts, when a phonological error (such as the Persian learner being unable to correctly pronounce the English sounds [θ and ð]) occurs, it is not due to the interference of the first learning with the second one; rather, it is owing to the fact that the learner has not yet learned how to say the English sounds, so he draws upon the sounds from his first learning. In other words, he gets help from Persian, not that Persian interferes with his learning. Therefore, based on the weak version of CAH, and as far as the learning of English consonant clusters is concerned, the Persian learner's adding epenthetic vowels to initial consonant clusters is not due to the interference of the first learning (Persian) with the second one (English); rather, the learner gets help from Persian to pronounce English consonant clusters via the use of the Persian syllable structure or as Cook (1991) maintains he carries over a feature of his first language phonology into English.

As opposed to the strong and weak versions of CAH, which state that learners of a foreign language learn on the basis of differences, the moderate version of CAH assumes that errors are made on the basis of similarities, not differences (Ziahosseiny, 2006). In other words, as Ziahosseiny (2006) claims, learners make errors in learning a specific item because they consider that particular item to be similar to the one they already know. To explain, the more the new item to be learned is similar to the one the learner already has in his mind from his first language, the more difficult it will be for him to learn that particular item. As for initial consonant clusters, the Persian learner has not yet come across such a structure (initial consonant clusters) in his L1. Thus, he thinks it is similar to the one he already knows (the syllable structure of Persian language). That is why he makes use of Persian syllable structure instead of the structure of English syllables to pronounce initial consonant clusters.

As a result and based on the literature existing in the area of pronunciation learning, the conclusion Keshavarz (2008b) offers is that errors made by Persian learners of English in pronouncing consonant clusters can be classified as inter-lingual errors (interference), rather than intra-lingual ones (overgeneralization). In other words, the source of error is not found in the students' target language (English), but in their mother tongue (Persian). He explains that this

phonological error (mispronouncing English consonant clusters by Persian learners) is made because of the differences in the syllable structure of the two languages (English and Persian). According to him, no initial consonant cluster is permitted in Persian, i.e. each consonant in the initial position is either preceded or followed by a vowel. As a matter of fact, he claims that students usually tend to transfer the pronunciation features of their mother tongue to the sound system of the L2. Hence, he continues that it is not surprising that Persian-speaking learners of English pronounce words such as 'school' and 'street' as /esku:l/ and /esterit/, and 'try' and 'class' as /terai/ and /kelas/, respectively.

Having discussed the reasons for student errors in the area of pronunciation, the research will now offer the methods presented by different approaches to language teaching in the 20th century for how to remove such errors from the students' speech. It will also review the researches done in this area. The two common methods presented by the various approaches to language teaching over the past century for the teaching of phonology, as mentioned earlier in this paper, have been explicit versus implicit and there has always been a hot debate about which one is more effective.

Objectives of the Study
To achieve the purpose of the study, the following two null hypotheses are formulated as follows:

H_1: Persian learners of English have the same number of vowel insertions in the initial and final consonant clusters.

H_2: The phonological system of the Persian students' mother tongue has no effect on their learning of the pronunciation of the initial and final consonant clusters.

Methodology
Participants
The sample in this study included 60 female intermediate EFL learners studying English at a language school in Gorgan. They aged between 15 and 17 and were selected from a whole population of 152 students who were initially asked to participate in the study from three different language schools in Gorgan, Iran.

Instrumentation
A pronunciation test was used in this study. The aim was to see whether the selected sample had vowel insertion while pronouncing the English words with initial or final consonant clusters and if yes, whether the amount of vowel insertion was the same in such clusters. The statistics performed on this test could help the researcher accept or reject the first hypothesis. Moreover, comparing the number of times the students had vowel insertion in the initial consonant clusters against those in the final consonant clusters and performing statistics on these numbers could help the researcher decide whether the students' native language (Persian) had any effect on their pronunciation of the initial or final consonant clusters, thereby accepting or rejecting the second hypothesis. The test included 50 words, half of which contained different initial

consonant clusters and the other half covered different final consonant clusters. The words chosen for the students to pronounce were those they already were familiar with; therefore, the researcher was sure that the words' level of difficulty is in accordance with the participants' knowledge of the English language. The students were asked to read the words aloud while they were voice-recorded. The test was by no means difficult for the students to read as no word was new and unfamiliar to them. In fact, the words in the test were chosen from their own textbook so that the researcher could make sure that the words' level of difficulty is appropriate to the students' level of English knowledge. However, before each test was given to them, they were asked to carefully scan the words to see whether or not they knew the meanings of all words. In the test the researcher listened to how each student read the words, giving a score to that student based on the way he pronounced initial or final consonant clusters. For the scores to be reliable, two other English teachers analyzed the students' pronunciations and scored them, counting their errors in pronouncing different consonant clusters. It is worth mentioning that the three scorers had attended teacher training periods, and thus were highly experienced and skilled in doing so. In this study, they were asked to score the students only based on their pronunciation of consonant clusters, and to pay no attention to other aspects of pronunciation, such as stress. This way the scores given by the three scorers could be reliable. The scales used for rating the results of the tests were interval.

Data Analysis

Since the two hypotheses dealt with frequencies, and also because the variables in them were nominal (i.e. categorical) in nature, the number of times the students inserted vowels in the initial and final consonant clusters in the test were counted and the percentages of such vowel insertions were calculated. The results could show whether or not Persian learners of English insert vowels in the initial or final consonant clusters.

Using a chi square (x^2), the frequencies of the vowel insertions in the initial consonant clusters were then compared with those in the final consonant clusters. The results would show whether or not Persian learners of English would have the same amount of vowel insertion in the initial consonant clusters with those in the final ones. The significance level for the chi square (x^2) was set at .01 (p < .01). Moreover, counting the number of times the participants had vowel insertion in the initial or final consonant clusters could show whether the syllable structure of the Persian language would have any effect on the learning of each cluster (initial or final).

Results
First Hypothesis
H₁: Persian learners of English have the same number of vowel insertions in the initial and final consonant clusters.

Table 1 shows how many vowel insertions the samples had for the initial consonant clusters in the test. It is worth mentioning that there were 50 words in the test 25 of which contained initial consonant clusters and the remaining 25 contained final consonant clusters.

Table 1: Number and Percentage of Vowel Insertions for the Initial Consonant Clusters

Words containing initial consonant clusters	Number of words pronounced with undue vowel insertion	Number of words pronounced without vowel insertion	Percentage of vowel insertion
25	22	3	88%

As Table 1 shows, in 88% of the cases the sample inserted vowels in the initial consonant clusters. Thus, it can be concluded that Persian learners of English highly add vowels in the initial consonant clusters. Table 2 shows how many vowel insertions the sample had for the final consonant clusters in the pre-test.

Table 2: Number and Percentage of Vowel Insertions for the Final Consonant Clusters

Words containing final consonant clusters	Number of words pronounced with undue vowel insertion	Number of words pronounced without vowel insertion	Percentage of vowel insertion
25	4	21	16%

As Table 2 shows, only in 16% of the cases the sample inserted vowels in the final consonant clusters. Thus, it can be concluded that Persian learners of English do not have much vowel insertion in the final consonant clusters.

Since the first hypothesis deals with frequencies and because both the independent and the dependent variables in the hypothesis were nominal (i.e. categorical), the chi square (x^2) was used to compare the frequencies and to determine whether the number of times the samples had vowel insertion in the initial and final consonant clusters were the same. The results of the chi square analysis, based on Table 3, shows that there is a significant relationship between having the same or different number of vowel insertions in the initial and final consonant clusters at the alpha level of .01 (x^2:23.12; df:1; p<.01). In other words, Persian learners of English do not have the same number of vowel insertions for the initial and final consonant clusters. Based on the findings illustrated in Table 3, the first hypothesis is rejected at the alpha level of .01.

Table 3: Chi Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig.(2-sided)	Exact Sig.(1-sided)
Pearson chi square	25.962[b]	1	.000		
Continuity correction [a]	23.157	1	.000		
Likelihood ratio	28.905	1	.000		
Fisher's Exact test				.000	.000
Linear-by-Linear	25.442	1	.000		
	50				

Association					
N of valid cases					

a. computed only for a 2x2 tables

b. 0 cells (.0%) have expected count less than 5. the minimum expected count is 12.50.

Second Hypothesis

H₂: The phonological system of the Persian students' mother tongue has no effect on their learning the pronunciation of the initial or final consonant clusters.

Like the first hypothesis, this hypothesis also dealt with frequencies. In fact, the aim of the second hypothesis was to decide whether or not the syllable structure of the Persian language has any effect on the pronunciation of the English words containing the initial and final consonant clusters. Again, as the dependent variable was nominal in nature dealing with frequencies and with respect to the results acquired from the first hypothesis, only descriptive statistics were needed and the only thing the researcher had to do was to compare the percentages of the times the samples inserted vowel in each kind of consonant cluster.

As Tables 1 and 2 show, because in 88% of the times the selected sample made a mistake in pronouncing the initial consonant clusters, the conclusion is that it is the syllable structure of the Persian language that is causing them to add extra vowels to the English words containing initial consonant clusters. This outcome agrees with the findings of the recent researches saying initial consonant clusters do cause great difficulty for Persian learners of English since such clusters are not allowed in Persian language (Keshavarz, 2008b). However, with respect to the words containing the final consonant clusters, it cannot be claimed that the Persian syllable structure is deterring them from learning the rule because in only 16% of the cases they made a mistake in pronouncing the words with the final consonant clusters while the test showed that they were unaware of the rule.

Thus, the second hypothesis can be rejected because Persian language does really affect the learning of consonant clusters. Actually, with regard to initial consonant clusters, the effect is negative (i.e. the Persian syllable structure is preventing them from learning the rule) while regarding final consonant clusters the effect is positive (i.e. it is not preventing them from learning the rule).

Discussion & Conclusion

The goal of the present study was to find out whether initial or final consonant clusters are more difficult for Persian students to pronounce correctly, i.e. without vowel insertion. The other secondary aim was to investigate whether other factors such as the phonological system of the students' mother tongue have any effect on the learning of the rule. The study was conducted inside an educational environment and under real conditions pervasive in language institutes so that the findings could be applicable in Iranian schools.

Moreover, the reason why some consonant clusters, such as those starting with stops followed by approximants (as in the words 'dress', 'tree', 'green' and 'blue'), were difficult for the participants to pronounce correctly, i.e. without vowel insertion could be the existence of a gap between explicit knowledge and use. In fact, as discussed by DeKeyser (2003), it takes a long time and needs much practice for the explicit declarative knowledge to develop into fully implicit, automatized procedural knowledge. That is why the participants' being aware of the English consonant cluster rules did not guarantee their correct production of such clusters. Thus, the only thing that can gradually bridge the gap between explicit knowledge and use is practice. In other words, more time, more practice and also more exposure are needed for the automatic processing to occur.

Regarding the objectives of the study, the participants' performances on the test were analyzed and the finding showed that Persian learners of English do not have the same number of vowel insertions in the two kinds of consonant clusters. It was also found that the problem was much more severe with initial consonant clusters as some of such clusters were too difficult for the students to pronounce correctly. The differences between the phonological systems of the two languages were found to be the source of a great number of participants' mistakes in correctly pronouncing the words containing initial consonant clusters. As Persian does not allow initial consonant clusters, Persian learners of English would face serious problems in accurately pronouncing such clusters.

However, the problem was not found to be so serious for final consonant clusters where the participants had nearly no vowel insertion. In fact, and based on the results, only in 16% of the times, the sample inserted vowels in final consonant clusters. This percentage is too low to conclude that the participants have vowel insertion in final consonant clusters. This is because Persian syllable structure allows two consecutive consonant clusters in the final position. Thus, it can be said that they are familiar with such clusters in their own mother tongue, causing them to have no problem pronouncing the words containing two final consonant clusters (as in the words 'bend, pant, cold') and even to tolerate those containing longer final clusters (i.e. to have no undue vowel insertion) (as in the words 'texts, words, girls, things, crafts). Even when a word, containing long final consonant clusters, was too difficult to articulate without vowel insertion, they resorted more to 'elision' rather than 'vowel insertion', the act which is also common to native English speakers themselves.

Actually, it is noticeable in English that in casual conversational speech, large consonant clusters, especially those occurring in final position, are frequently reduced as they are usually difficult for even native speakers to pronounce (Keshavarz, 2008a). Thus, it is not surprising to hear them pronounce the word 'depths' as /dɛps/, and similarly the word 'acts' as /æks/. Sometimes, the participants also managed to avoid elision without having undue vowel insertion by reducing the speed of pronunciation, leading them to having artificial articulations. In fact, reducing the speed of articulation is one of the solutions through which foreign speakers of a language manage to keep their accuracy. But this way they lose their fluency (i.e. the effect of accuracy on

fluency). Therefore, explicit knowledge about language rules can affect learners' fluency.

The only final consonant clusters for which the participants couldn't help inserting vowels were those containing dental fricatives such as /θ/ and /ð/ followed by /s/ and /z/, respectively (as in the words 'strengths', 'depths', 'twelfths', 'truths', 'breathes'). The combination of affricates such as /ʤ, ʧ/ followed by /d/ was also difficult for them to pronounce at first, but again the participants managed to solve the problem by reducing the speed of articulation (as in the word 'changed').

Nearly all of the words containing initial consonant clusters in the test were found to be difficult for the participants to pronounce correctly. The fact that in 88% of the words, the participants inserted vowel in initial consonant clusters is suggestive of the depth of their difficulty regarding such clusters. However, the problem was not the same with all such clusters. In other words, the participants did not have the same degree of vowel insertion in all initial consonant clusters. The problem was found to be more severe in clusters with three consonants in the initial position beginning with /s/, such as 'spring, strong, stress'. However, in the words containing two clusters in the initial position, the combinations of fricatives such as /f/ or /θ/ and approximants /r/ or /l/ in the words 'fresh, flash, throw' were the easiest for the participants to learn (i.e. although they had vowel insertion at the beginning, they learned such clusters sooner than the others). However, the combination of /k/ and /l/ in the word 'class' (especially when /l/ was followed by /ɒ/ in the word 'clock') was a little more difficult for the participants to learn. The most difficult combinations were those of /dr/, /tr/, /gr/ and /bl/ (i.e. the combinations of stops and approximants) in the words 'dress', 'tree', 'green' and 'blue'.

The findings of the research are highly consistent with the CA hypothesis, based on which the degree of difference between learners' native language and the target language can bring about greater difficulty. According to this hypothesis, the more different the two languages are, the more difficult it will be for learners to learn the target language. Therefore, initial consonant clusters must be much more difficult for Persian learners to learn than their final counterparts as the degree of difference between English and Persian is greater in such clusters. In fact, based on the CA hypothesis, they will need much more practice and exposure to such clusters to be able to learn the true articulation of English words containing initial consonant clusters.

Furthermore, it was found that Persian language's syllable structure does really affect the learning of consonant clusters. In fact, based on the results of the first hypothesis, it can be concluded that it is transfer from mother tongue, rather than over generalization, that affects the students' learning of consonant cluster rules. To explain, because the phonological system of Persian students' mother tongue is completely different from that of English language with respect to initial consonant clusters, negative transfer happens in such clusters. However, because the two systems of Persian and English are not so different in final consonant clusters, positive transfer occurs for such clusters. In fact, due to the

fact that Persian language's syllable structure is not so restrictive with respect to the final consonant clusters, its speakers, being familiar with such clusters in their mother tongue, do not find it so difficult to pronounce the English words containing such clusters. Therefore, the conclusion is that the pronunciation system and patterns of the learners' mother tongue strongly influence the learning of those of the target language, and learners probably make more mistakes in areas in which the two systems do not match.

The study also showed that language transfer plays a highly fundamental role in the early stages of phonological development. With respect to the teaching of English consonant clusters to Persian learners, the study proved that Persian learners highly use their knowledge of L1 of syllable structure to pronounce the English words containing such clusters. It also showed that due to the rule's being semantically redundant, the students are unable to learn the syllable structure of English regarding consonant clusters by themselves. Thus, they need to be explicitly instructed.

Moreover, the fact that many advanced learners of English can also be observed inserting vowels in consonant clusters can verify the results. To explain, due to the fact that the rules underlying English consonant clusters are not salient, Persian learners of English continue inserting vowels unless they are instructed by the teacher in the classroom or unless their errors are corrected by native speakers in naturalistic settings. Thus, the authorities in charge of planning the educational strategies in Iran should reconsider their perspectives on the issue of pronunciation.

References

Brown, H.D. (2000). *Principles of language learning and teaching* (Fourth edition). White Plains: Longman.

Cook, V. (1991). *Second language learning and language teaching*. New York: Edward Arnold.

DeKeyser, R. (2003). Implicit and explicit learning. In Doughty & Long, *The handbook of second language acquisition*. Oxford: Blackwell Publishing.

Eckman, F. R. (1977). Markedness and the contrastive analysis hypothesis. *Language learning, 27*, 315-330.

Flege, J. (1987). A critical period for learning to pronounce second languages? *Applied linguistics, 8*, 162-177.

Hudson, G. (2000). *Essential introductory linguistics*. Massachusetts, USA: Blackwell Publishers Ltd.

James, C. (1980). *Contrastive analysis*. Bangor, Wales.

Jones, R. H., & Evans, S. (1995). *Teaching pronunciation through voice quality.* Retrieved September 17, 2011 from http://eltj.oxfordjournals.org/content/abstract/html.

Keshavarz, M. H. (2008a). *Contrastive analysis and error analysis*. Tehran: Rahnama Press.

Keshavarz, M. H. (2008b). *A practical course of English phonetics and phonology*. Tehran: SAMT.

Lado, R. (1957). *Linguistics across cultures*. Ann Arbor: University of Michigan Press.

Lightbown, M. & Spada, N. (2006). *How languages are learned*. Oxford: Oxford University Press.

Morley, J. (1991). The pronunciation component in teaching English to speakers of other languages. *TESOL Quarterly, 25*(3), 114-153.

Piske, T., Mackey, I. R. A. & Flege, J. E. (2001). Factors affecting degree of foreign accent in an L2: A review. *Journal of phonetics*, 29, 191-215.

Prator, C. H. (1967). *Hierarchy of difficulty*. University of California, Los Angelos.

Richards, J.C. & Renendya, W.A. (2002). *Methodology in Language Teaching*. Cambridge: Cambridge University Press.

Tarone, E. (1978). The phonology of interlanguage. In J.C. Richards (Ed.), *Understanding second and foreign language learning* (pp.15-33). Rowley, MA: Newbury House.

Ziahosseiny, S. M. (2006). *Questions and answers on contrastive analysis and error analysis*. Tehran: Rahnama Press.