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English Loanwords in Persian: Vowel Adaptation

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Abstract
The aim of this research is to analyze English loanwords adaptation in Persian language. It especially, focuses on different phonological and phonotactic systems of the two languages and the English vowel adaptation in Persian vocalic system. This process would lead into (a); the change of English lax vowels into Persian tense ones; (b) the Persian constraint of hiatus existing in English; (c) the change of English off-glide diphthongs /a / or /e / into a vowel and a glide sequences in Persian; (d) the change of English diphthongs / /, / / into Persian simple vowels [ ] or [o] respectively; (e) the change of English syllabic consonants [n , m , l] into the Persian non-syllabic ones through vowel insertion. Concerning the above mentioned points, a number of English loanwords have been selected through Persian dictionaries. The used approach in the article is Optimality Theory (OT).
Keywords: Loanword, adaptation, phonological constraint, English, Persian, vowel.

1 Introduction

Words taken into different recipient languages undergo some spelling and pronunciation changes to adapt to the phonological system of recipient language. In adapting a loan, the speaker tries to remain faithful to the source word while still making segmental inventory, phonotactic constraints and prosodic structures. In order to provide a more well-rounded understanding of the complexities of loanword, certain historical and cultural factors must be taken into account. According to Hock and Brian (2009:241-278), "Languages and dialects do not exist in a vacuum". There is always linguistic contact between groups. This contact influences what loanwords are investigated into the lexicon and why certain words are chosen over others. Loanwords adaptations are transformations that apply to words when they are borrowed into a foreign language. Words from a source language that are ill-formed in the borrowing language are thus transformed into well-formed words. The so-called repairs involve general phonological processes, such as segmental and suprasegmental changes as well as epenthesis and deletion.(1997:219) The basic principle in identifying loanwords is the change in sound, because some phonological features of the sounds of the source language are adapted into similar sounds of the target language. Loanwords change in spelling and pronunciation in cases when a new loanword has a very unusual sound, so, the pronunciation is frequently radically changed. Most languages modify words to fit native phonological patterns (including morphemes, structure constraints, morph combination and morphophonemic alternation). (2012:2-6) Through an analysis of the phonological features of English and Persian, this study has gone through the descriptive, contrastive stage of the two languages. While vowel epenthesis appears to be the most widespread repair strategy to conform to Persian phonotactics, the location of the epenthesis varies. The used approach here is based on OT framework.

2 Literature Review

In an early study, representative of the phonetic approximation view, **Silverman** (1992:289) advances two models of adaptation in which the first involves phonetic scansion of the L2 (English) output. He assumes that "the input to loanword phonology is merely a superficial non-linguistic acoustic signal" which is passed into segments on the first level and mapped onto phonemes of the native L1 (Persian) on the basis of acoustic similarity. On the second level, L1 phonological constraints are imposed upon the input and universal grammar principles may apply. A notable claim of this model is that phonological knowledge of the L2 plays no role in adaptation. Based on the above mentioned view, in this study, for every English input, the GEN (generator) produces a candidate set or outputs to suggest which one is the optimal choice based on the Persian phonological patterns.

Jabbari and Arghavan (2010:69) account for the acquisition of consonant clusters of English syllable structures both in onset and coda positions by Persian learners. This study provides an explicit account for not only why Persian learners have difficulties with specific EFL structures, but also how they resolve it. Concerning the adaptation of English loanwords in Persian, **Jabbari** (2012) presents an overview of the different strategies that Persian learners of English employ to deal with initial clusters. **Jabbari** writes: "According to Lado (1957)

it is widely accepted that the phonotactics of one's natural language influences the way a foreign language is pronounced".

In this research, based on the Persian phonological and phonotactic constraints, English loanwords or inputs have undergone some changes, which will be examined in detail.

3 Definition of Loanwords

Loanwords are words adapted by the speakers of one language from a different language (the source language). A loanword can also be called a borrowing. Often, there is an asymmetry between the two languages, such that more words go from one side to the other. Haugen (1950: 212) defines linguistic borrowing as "the attempt reproduction in one language of patterns previously found in another." This definition implies that, besides single lexical terms, borrowing may even concern phrases or patterns." Byron (1971:226) maintains that the phonological structure of a great number of loanwords may be either on good terms with that of the borrowing language or close to it. However, some remain unassimilated. According to Byron, the speed and degree of adaptation relies solely on sociolinguistic and structural factors. Strictly speaking, transmitting loanwords through "the intermediary of a local spoken variety of the donner language" yields to the act of substitution at the levels of phonology and morphology (1971: 227).

4 Theoretical Framework

Optimality Theory (OT), the most recent theory, applied in phonology, has been originally proposed by the linguists Alan Prince and Paul Smolensky (1993) and later expanded by Prince and J. MacCarthy (1994). The approach used in this research is the OT, which is one of the constraint-based and contrastive phonological systems. Optimality is a relative approach. A candidate (output) is optimal if and only if it incurs the least serious violation of a set of violable constraints. So, it will be considered as a surface structure (optimal output).

In optimality theory, every constraint is universal. CON is the same in every language. There are two basic types of constraints. **Faithfulness constraints** require that the observed surface form (the output) match the underlying or lexical form (the input) in some particular way; that is, these constraints require identity between input and output forms. **Markedness constraints** impose requirements on the structural well-formedness of the output. Each plays a crucial role in the theory. Faithfulness constraints prevent every input from being realized as some unmarked form, and markedness constraints motivate changes from the underlying form.

Examples of faithfulness and markedness constraints (1995) include:

MAX: Segments in the input must correspond to segments in the output. (no deletion)

DEP: Segments in the output must correspond to segments in the input. (no insertion)

IDENT: The place, voice, and manner features of segments of the input must surface in the corresponding segments in the output.

COMPLEX avoid consonant clusters.

Within the OT, the phonology of each language is summarized within an evaluator system which in itself includes some violable universal constraints. The constraints are of the IDENT (identical) and markedness type which are in conflict with each other. The input of the evaluator system comprises some phonological candidates which, compared with other candidates, have the least violation of the constraints and will be regarded as the optimal outputs. In this paper, the adaptation of English loanwords with respect to the Persian phonological constraints, based on the OT, will be investigated.

There are three basic components of the OT:

I. GEN(erator) which takes an input and generates the list of possible outputs or candidates.

II. CON(straint) which provides the criteria, in other form of strictly ordered violable constraints, used to decide between candidates.

III. EVAL(uator) which chooses the optimal candidate based on the constraints, and the candidate is the output.

Based on the interplay between forces that require the loan to conform to native phonotactic constraints, a model of input-output mapping, that formalizes the resolution of conflicting sources driving the input towards specific output targets, seems a suitable model of linguistics. The transformed input might be treated the same as a native input. McCarthy has illustrated the input and output diagram in terms of OT.

INPUT GEN CAN EVAL OUTPUT

In the above framework, input represents candidates with regard to particular rankings of the constraint inventory, such as the following:

Input	*Constraint A*	*Constraint B*	*Constraint C*
a. Candidate 1	*!		
b. Candidate 2		*!	
☞c. Candidate 3			*

OT Tableau Sample

Based on this chart, evaluator receives the candidate set from generator, and evaluates it using some constraint hierarchy, and selects the most optimal member as the output of the grammar (2007:4).

For every possible input, the GEN produces a candidate set. A candidate set contains structures. These structures are possible analyses of the input (e.g. words in word phonology, or sentences in syntax). According to the principle of inclusiveness, GEN produces all those analyses of the input that "are admitted by very general considerations of structural well-formedness" (1993: 2).

The EVAL evaluates candidate sets with respect to particular readings of the constraint inventory CON. Because of the conflict between constraints, all conceivable linguistic structures or candidates violate at least some of the constraints. However, constraint violation doesn't lead to ungrammaticality; since, constraints are violable and strictly ranked. Those structures that minimally violate rankings are considered optimal (1997: 3).

5 Methodology

This paper aims at analyzing the mechanism of English loanwords adaptation with respect to constraints of Persian phonotactic system. In view of the applied method, the researcher has made use of library sources and internet sites. Concerning the approach used, some contrasts have been made between English and Persian phonetic systems, then the phonetic changes from English adapted loanwords into Persian phonetic system, due to its constraints, have been described. The approach used is the contrast between English and Persian phonological system through OT. The obtained results are based on the phonotactic principles and patterns, governing Persian language, which change the phonological patterns of English loanwords.

6 Phonological Inventory

6. 1 English Consonants

Consonant sounds are described in terms of their place and manner of articulation. Concerning the place of articulation, most consonant sounds are produced by using the tongue and other parts of the mouth to constrict, in some way, the shape of the oral cavity through which the air is passing. How they are articulated is the matter of their manner of production such as stops (complete closure to the air stream and sudden release). English has 24 consonants that their chart has been drawn below:

	bilabial	labio-dental	dental	alveolar	palato-alveolar	palatal	velar	Glottal
Stop	P b			t d			k g	
Fricative		f v		s z				h
Affricate								
Nasal	m			n				
Liquid				l r				
Glide	w							

Table 1: English Consonants (Yule, 1985: 38)

6. 2 Persian Consonants

Persian consonants comprise 23 which, unlike vowels, can appear at the beginning of a word. Persian plosive consonants include: /b, p, t, d, c, , , /. Fricative consonants include: /s, z, , , , , , χ/. Affricate consonants include: /t , dʒ/, liquid: /r/, lateral: / /, nasals: /m, n/, and glide: / /.

	Bilabial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Uvular	Glottal
Plosive						c ɟ			
Fricative		f v		s z	ʃ			χ	h
Affricate									
Nasal	m			n					
Trill				r					
Lateral									
Glide						j			

Table 2: Persian Consonants (Kord Zafaranlu Kambuziya, 2006)

7 Vowels and diphthongs

7. 1 English Vowels

In English, in the production of vowel sounds, the articulators don't come very close together, and the passage of air stream is relatively unobstructed. We can describe vowel sounds roughly in terms of the position of the

highest point of the tongue and the position of the lips. The targets for vowel gestures can be described in terms of three factors: a) vertical tongue position: high-mid-low, b) horizontal tongue position: front –back; and, c) lip-position: spread-round. (2001: 120).

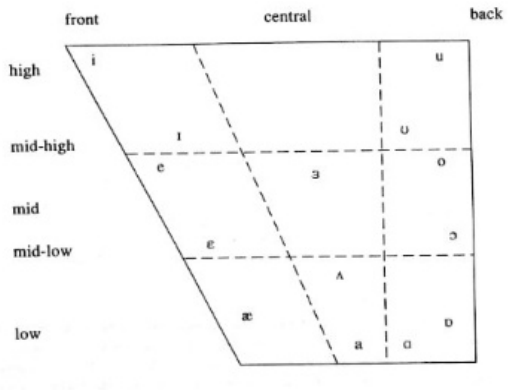

Table 3: English Vowels (2006: 44)

7. 2 English Diphthongs

A diphthong, also known as a gliding vowel, refers to two adjacent vowel sounds occurring within the same syllable. Technically, a diphthong is a vowel with two different targets: that's the tongue moves during the pronunciation of the vowel in most dialects of English. There are also unitary diphthongs, as in English. There are two types of diphthongs: falling and rising. Falling (or descending) diphthongs start with a vowel quality of higher prominence (higher pitch or volume) and end in a semi-vowel with less prominence, like [a] in eye, while rising (ascending) diphthongs begin within a less prominent semi-vowel and with a more prominent full vowel, similar to [j] in "yard". (2001: 111)

/ / poor	/ / day
/ / boy	/ / now
/ / here	/ / dry
/ / go	/ / hair

Table 4: IPA symbols for British English diphthongs (2005:13)

7. 3 Persian Vowels

The Persian language has six vowels. The group of front vowels: /i, e, / and the group of back vowels: / , , /. Diachronically, Persian possesses a distinction of length in its underlying vowel inventory, contrasting the long vowels: /i, , / with the short ones: /e, , / respectively.(1977: 86). There are just two features in Persian vocalic system having phonological function. They include: a) the front and back feature, b) the degree of the height of the tongue. The form or position of the lips isn't considered as a phonological feature, because the form of the lips in articulation of back and front vowels is often rounded and un-rounded respectively.

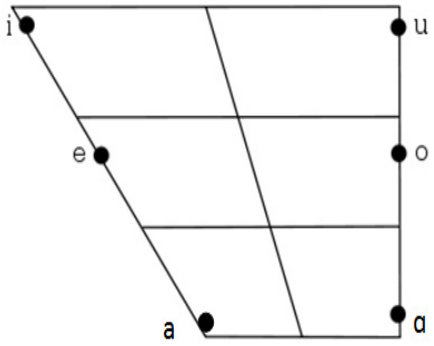

Table 5: Persian Vowels (2006)

8 Data analysis

After collecting some English loanwords, they have been transcribed into their English and Persian phonological Patterns. Then, through contrastive method, the loanword changes from English into Persian have been analyzed based on the Persian phonotactic constraints. For each word, English and Persian pronunciation as well as the vocalic changes has been given. The data corpus is as follows:

	English word	English pronunciation	Persian pronunciation	changes from English to Persian
1	<small>	Ĭ Ĭ	[	ɪ ĬŸ Ĕ ɪ ĬŸ Ĕ
2	<spray>	Ĭ Ĭ		ɪ ĬŸ Ĕ ɪ ĬŸ Ĕ
3	<stadium>	Ĭ Ĭ		
4	<panel>	Ĭ Ĭ		
5	<knock out>	Ĭ Ĭ		
6	<bluff>	Ĭ Ĭ		ɪ ĬŸ Ĕ
7	<secularism>	Ĭ zm̩Ĭ		z
8	<terminal>	Ĭ Ŏ Ĭ		Ŏ ɪ ɪ
9	<bull dozer>	Ĭ Ĭ		ɪ ĬvĔŸ
10	<euro>	/ /	[ ] or [ ]	/o;

Table 6: Samples of English loanwords into Persian

9 Phonological Changes

When the phonotactic of the borrowing language doesn't allow sound combinations or sounds in certain contexts, words are altered, a segment inserted or deleted to satisfy the requirements of the recipient loanwords. English comprises six tense vowels: / , , , , , / and eight lax ones: / , , , a, , Ŏ, , /. The above table shows some of the vowel changes based on Persian phonotactic and phonological rules and constraints, which will be explained and analyzed.

Now let see how the issue we are considering is accounted for the following examples in this theory. First, the constraints shall be interpreted as follows:

CON. 1: ONSET = A syllable begins with one consonant in Persian.
Therefore, vowels at the beginning of syllables are forbidden in Persian phonetics and a glottal stop should be inserted in this place.
CON. 2: *COMPLEX ONSET = No consonant cluster initiation in Persian
CON. 3: *LAX LONG VOWEL / :/ = No lax long vowel in Persian segments
CON. 4: IDENT [F]= Every segment in the output should be the same as the input
CON. 5: DEP-IO= Every segment in the output has a correspondence in the input.
Among these five constraints we assume that there is a ranking as shown in Tableau 1.

ONSET >>*COMPLEXONS >> *LAXLONGVOWEL>> IDENT [F]>> DEP-IO

<small> /sm :l/	ONSET	*COMPLEXONS	*LAXLONGVOWEL	IDENT[F]	DEP-IO
sm :l		*!	*		
s :	*!		*		*
s :			*!		**
☞				*	**

Tableau 1

Tableau 1 shows the input candidate "small" bearing a consonant cluster at the initiation of the word /#sm-/ and also the lax long vowel / :/ which are rejected in Persian phonological system.

CON. 1: ONSET= A syllable begins with one consonant in Persian.
CON. 2: *COMPLEX ONSET= No consonant cluster initiation in Persian
CON. 3: *DIPHTHONG= No diphthong vowel in Persian
This constraint requires the diphthong vowels of the loanwords to be substituted with simple vowels in Persian language, otherwise this constraint is violated.
CON. 4: IDENT [F]= Every segment in the output should be the same as the input
CON. 5: DEP-IO= Every segment in the output has a correspondence in the input
Among these five constraints, we assume that there is a ranking as shown in Tableau 2.

ONSET >> *COMPLEX ONS >>*DIPHTHONG >> IDENT [F] >> DEP-IO

<spray> /spr /	ONSET	*COMPLEX ONS	*DIPHTHONG	IDENT[F]	DEP-IO
spr		*!	*		
r	*!			*	*
			*!	*	***
☞				*	***

Tableau 2

Considering tableau 2, it should be noted that in Persian syllable system, (C)VCC, a word doesn't start with three consonants, so a vowel is inserted at the beginning of the word with the cluster of /#spr-/ and also the short vowel /e/ is inserted between the second consonant and the third one to avoid the clustering of three consonant sequences constraint in the middle of the word. Then, a glottal stop is placed before the first vowel to satisfy the phonetic formation of the word. On the other hand, the second candidate starting with a vowel has violated Persian onset constraint, which is a fatal violation. The third candidate is ruled out, since, English off-glides / / should be replaced with a sequence of a simple vowel and a glide / / as a consonant in the coda of the last syllable. Just, the fourth candidate is considered as an optimal output.
CON. 1: ONSET= A syllable begins with one consonant in Persian.
Therefore, vowels at the beginning of syllables are forbidden.
CON. 2: *COMPLEX ONSET = No consonant cluster initiation in Persian
CON. 3: *DIPHTHONG= No diphthong vowel / / or / / in Persian
This constraint requires the diphthong vowel of loanwords to be substituted with simple vowels in Persian language, otherwise this constraint is violated.
CON. 4: *HIATUS = No hiatus in Persian
CON. 5: IDENT [F] = Every segment in the output should be the same as the input
CON. 6: DEP-IO = Every segment in the output has a correspondence in the input
Among these six constraints we assume that there is a ranking as shown in Tableau 3.

ONSET >>*COMPLEX ONS >> * DIPHTHONGE >>*HIATUS >> IDENT[F] >> DEP-IO

<stadium> / /	ONSET	*COMPLEX ONS	*DIPHTHONG	*HIATUS	IDENT[F]	DEP-IO
		*!	**			
	*!			*	**	*
				*!	**	**
☞					**	***

Tableau 3

In tableau 3, there are a number of violations from Persian phonological and phonotactic patterns. The first candidate, starting with consonant cluster /#st-/, has two diphthongs / / and / /, so, it is rejected in Persian. The second candidate, starting with a vowel, has been a fatal violation. The third candidate has violated from Persian hiatus constraint. So, the last candidate is regarded as an optimal output. The sequences of a glottal stop and a vowel have been used in the last word without any diphthong vowel. So, it is an optimal Persian output.

CON.1: *SYLLABIFICATION = no syllabification of consonants such as in Persian
CON.2: IDENT [F] = Every segment in the output should be the same as the input
CON.3: DEP-IO = Every segment in the output has a correspondence in the input
Among these three constraints, we assume that there is a ranking as shown in Tableau 4.

***SYLLABIFICATION>> IDENT [F] >> DEP-IO**

<panel> / /	*SYLLABIFICATION	IDENT[F]	DEP-IO
	*!		
a	*!		
☞ e /pan el		**	*

Tableau 4

In tableau 4, the first candidate after the consonant /p/ begins with low front vowel / /, which should be replaced with / / or /a/ in Persian. Also, the first candidate, ending in syllabication, is rejected in Persian. The second candidate has made the same violation as the first candidate in the case of using syllabication. So, a short vowel such as /e/ is inserted before syllabic consonant [ ] as the head of the second syllable. Just the third candidate is accepted with the stress on the second syllable.

CON.1: *DIPHTHONG= No diphthong vowel in Persian
CON.2: IDENT [F] = Every segment in the output should be the same as the input
CON.3: DEP-IO = Every segment in the output has a correspondence in the input
Among these three constraints, we assume that there is a ranking as shown in Tableau 5.

***DIPHTHONG >> IDENT [F] >> DEP-IO**

<knock out> /n /	*DIPHTHONG	IDENT[F]	DEP-IO(V)
n	*!		
☞ c (w)		***	*

Tableau 5

Concerning Tableau 5, in RP (Received Pronunciation) the symbol / / is a somewhat short vowel, instead, / / is used which is a low back, open long vowel in Persian. Moreover, / / an English diphthong, is not used in Persian and is replaced with simple vowel / / which is a mid-back, half-rounded vowel. In this way, candidate one has violated the phonemic system of Persian pronunciation. Only the last candidate with the least violation of the Persian rule is considered as an optimal output.

CON. 1:*COMPLEX ONSET = No consonant cluster initiation in Persian
CON. 2: *Mid-LAX CENTRAL VOWEL = No mid-lax central vowel in Persian
CON. 3: AGREE [ROUND] = Is the markedness constraint that triggers roundness assimilation.
CON.4: IDENT [F] = Every segment in the output should be the same as the input
CON.5: DEP-IO = Every segment in the output has a correspondence in the input
Among these three constraints we assume that there is a ranking as shown in Tableau 6.

***COMPLEX ONSET >>*MID-LOW LAX CENTRAL VOWEL >> AGREE [ROUND] >> IDENT [F]>>DEP-IO**

<bluff> / /	***COMPLEX ONS**	***MID-LOW LAXCENTRAL VOWEL**	**AGREE[ROUND]**	**IDENT[F]**	**DEP-IO**
	*!	*			
e		*!			*
e o			*!	*	*
☞				*	*

Tableau 6

In tableau 6, there are two violations from Persian phonotactic and phonological rule. Whereas, consonant clusters initiation and mid-low lax central vowel aren't used in Persian, the first candidate is ruled out. That is to say, between initial consonant clusters a vowel is inserted. The second candidate, bearing a violation, as it contains mid-low lax central vowel, is also rejected. So, the mid-low central vowel / / is replaced with /o/ which is a mid, back, rounded vowel in Persian affected by the English spelling of the word. The third candidate violates the process of vowel harmony in Persian. The inserted vowel assimilates with the roundness of the following vowel. Only, the fourth candidate is selected as the optimal output.

CON. 1: *SYLLABIFICATION = no syllabification of consonants such as in Persian
CON. 2: *HIGH-LAX VOWEL= no high-lax vowel/ / or / / in Persian
CON. 3: *Mid-LAX CENTRAL VOWEL= no mid-lax central vowel / / in Persian
CON. 4: IDENT [F] = Every segment in the output should be the same as the input
The faithfulness constraint that militates against any change in the output is IDENT.
CON. 5: DEP-IO = Every segment in the output has a correspondence in the input
CON. 6: MAX-IO= Deletion of every segment in the output is forbidden
Among these six constraints, we assume that there is a ranking as shown in Tableau 7.

***SYLLABIFICATION >>*HIGH-LAX VOWEL >>*MID-LAX CENTRAL VOWEL >> IDENT[F] >> DEP-IO >> MAX-IO**

<secularism> / /	*SYLLABIFICATION	*HIGH-LAX VOWEL	*MID-LAX CENTRAL VOWEL	IDENT[F]	DEP-IO	MAX-IO
	*!	**	*			
u		*!	*		*	*
c z			*!	****	*	*
☞ c				*****		*

Tableau 7

Now, considering tableau 7, since Persian phonological system has not a syllabic consonant, as well as high-lax vowels and a schwa, the first candidate violates these constraints which are fatal violations. The second candidate also violates the high-lax vowel / / and mid-lax central vowel / / constraints. The third candidate is ruled out too because of schwa in the middle of the word, being non-existent in Persian, so / / is replaced with / / which is a long low-back, open rounded vowel. Based on Persian phonotactic pattern, a sequence of two consonant clusters can be used at the end of the word. When the obstruent consonants are used in the consonant clusters after the long vowel / , , u/, they change into their voiceless counterparts. So, the last candidate is selected as an optimal Persian output.

CON. 1: *SYLLABIFICATION = no syllabification of consonants such as in Persian
CON. 2: *HIGH-LAX VOWEL = no high-lax vowel / / in Persian
CON. 3: *Mid-LAX LONG CENTRAL VOWEL = no mid-lax long central vowel /ŏ:/ in Persian
CON.4: IDENT [F] = Every segment in the output should be the same as the input
The faithfulness constraint that militates against any change in the output is IDENT.
CON.5: DEP-IO = Every vowel in the output has a correspondence in the input
Among these five constraints, we assume that there is a ranking as shown in Tableau 8.

***SYLLABIFICATION >>*HIGH-lAX VOWEL>>*MID-lAX CENTRAL VOWEL>> IDENT [F] >>DEP-IO**

<terminal> /tŏ: /	*SYLLABIFICATION	*HIGH-LAX VOWEL	*MID-LAX CENTRAL VOWEL	IDENT[F]	*DEP-IO
tŏ:	*!	*	*		
t n		*!		*	*
tŏ: in			*!	**	**
t in				***	*
☞t in				***	**

Tableau 8

Tableau 8 shows that, the first candidate is rejected because of the three fatal violations in mid-lax central vowel /ŏ:/, high-lax vowel / /, as well as syllabification of lateral consonant / /. Because the Persian language has no syllabic consonant, between the final sequence / / the vowel / / should be inserted according to the spelling of the word. The second candidate has violated the second constraints as the first candidate. The third candidate has violated the mid-lax central vowel constraint in Persian. There is no /ŏ:/ segment in Persian phonemic system, so, /e/ which is, mid and front should be substituted. English lax vowel changes into Persian tense one. In the fourth candidate, the liquid /r/ is not pronounced in English, but it is in Persian. Therefore, just the last candidate remains as an optimal Persian output.

CON.1: *DIPHTHONG= No diphthong vowel in Persian
CON. 2: *HIGH-LAX VOWEL = no high-lax vowel in Persian
CON. 3: *Mid-LAX CENTRAL VOWEL = no mid-lax long central vowel in Persian
CON.4: IDENT [F] = Every segment in the output should be the same as the input
The faithfulness constraint that militates against any change in the output is IDENT.
CON.5: DEP-IO = Every segment in the output has a correspondence in the input
Among these five constraints, we assume that there is a ranking as shown in Tableau 9.

***DIPHTHONG >>*HIGH-LAX VOWEL>>*MID-LAX CENTRAL VOWEL >> IDENT [F] >>DEP-IO**

<bull dozer> /b /	*DIPHTHONG	*HIGH-LAX VOWEL	*MID-lAX CENTRAL VOWEL	IDENT [F]	DEP-IO
b	*!	*	*		
b o		*!	*	*	
o			*!	**	
e				***	*!
☞ er				***	*

Tableau 9

Tableau 9 shows that the first candidate has been rejected because of the fatal violations in the high lax rounded vowel / /, the diphthong vowel / /, and the mid lax central vowel or schwa / / constraints. Candidate two has violated the high lax rounded vowel, candidate three the mid-lax central vowel, and candidate four the liquid /r/, which is not pronounced in English but it is in Persian. Therefore, the last candidate, with the least violations of Persian phonological system is an optimal output.

CON.1: *DIPHTHONG= No diphthong vowel / / or / / in Persian
CON.2: IDENT [F]= Every segment in the output should be the same as the input
The faithfulness constraint that militates against any change in the output is IDENT.
CON.3: DEP-IO = Every segment in the output has a correspondence in the input
Among these two constraints, we assume that there is a ranking as shown in Tableau 10.

***DIPHTHONG >> IDENT [F]**

<euro> / /	*DIPHTHONG	IDENT [F]
	!!	
	*!	*
	*!	*
☞ /joro		**

Tableau 10

In tableau 10, the first candidate has violated the Persian on-glide diphthong constraint / / as well as the off-glide diphthong / /. So, the monophthong vowels / / and / / are substituted. Only the last candidate is considered as an optimal output based on the Persian phonological patterns.

10 Conclusion

In this study, the English loanword phonology and its adaptation into Persian phonotactic rules and phonological patterns has been investigated. Whereas, Persian, as one of the Indo-European languages, has been influenced by English loanwords, this research has been dedicated to loanword changes made into Persian. A number of phonological changes of English adapted loanwords include: a) epenthesis or vowel insertion; b) deletion; c) substitution; d) diphthong changes into plain vowels; e) the change of lax vowels into tense ones; f)

the change of mid- lax central vowel such as schwa into a tense one; g) no hiatus in Persian; h) the change of English syllabification consonants into non-syllabic ones. Another point is that, the Persian syllable doesn't start with a vowel in its phonetic representation. In all English loanwords which start with a vowel, a glottal stop is included in Persian. Besides, Persian syllable does not start with a consonant cluster. The Persian syllable structure includes: (C)V(C)(C) in its phonological representation and CV(C)(C) in its phonetic representation.

References

Birjandi, P. (2005), *An Introduction to Phonetics*. Iran, Tehran: Zabankadeh Publication. p.13.

Boersma P. et al. Byron, T. (1971), *Historical Linguistics*. Cambridge University Press. 226-7.

Catford, J. C. (2001), *A Practical Introduction to Phonetics*. Oxford University Press. pp.111,120.

Haugen, E. (1950), *The analysis of linguistic borrowing*. University of Alabama Press. 212.

Hock, Hans Henrich, Brian D. Joseph (2009*), Lexical Borrowing, "Language History, Language Change and Language Relationship*: An Introduction to Historical and Comparative Linguistics. 2nd ed. Berlin: Mouton de Gruyter, P. 241–278.

Itô, Junko (2012), *A Handbook of Japanese Linguistics.* Chapter 3: The Phonological Lexicon Oxford: Blackwell.p. 2-6.

Jabbari, A. A. & Arghavan, Leila (2010), Optimality Theoretic Account of Acquisition of Consonant Clusters of English Syllables by Persian EFL Learners. Journal of English Language Teaching and Learning. P. 69.

Jabbari, A. A. (2012), The Adaptation of English Initial Clusters by Persian Learners. The Journal of Teaching Language Skills. Yazd: Yazd university.

Kambuziya, K. Z. A. (2006), Criticism and Correction of Mohammad Reza Majidi & Elmar Terner's Paper. Language and Linguistics (Journal of the Linguistics Society of Iran). Vol. 2, No.1, spring & summer.

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

Ladefoged, Peter (2006), *A Course in Phonetics*. Thomson Wadsworth.p.44.

McCarthy, John, J. & Prince Allen (1994). *The Emergence of the Unmarked: Optimality in Prosodic Morphology*. Proceedings of NELS. P.2.

McCarthy John, J. (2007), *What is Optimality Theory*? University of Massachusetts. Amherst. P.4.

McCarthy, John, J. & Prince Allen (1995), *Faithfulness and Reduplicative Identity*. University of Massachusetts occasional papers in Amherst, MA: GLSA Publications. PP.249-384.

Prince, Allen & Smolensky, Paul (1993), *Optimal Theory: Constraint Grammar.* University of Colorado: Blackwell Publishers, Technical Report, Rutgers University Center for Cognitive Science and Computer Science Department, University of Colorado at Boulder.

Samareh, Yadollah (1977), *The Arrangement of Segmental Phonemes in Farsi.* Tehran University Publication, p.86.

Silverman, Daniel (1992), *Multiple Scansions in Loanword Phonology*. Evidence from Cantonese.p.289.

Shinohara, S. (1997), *Analyse phonologique de l'adaptationjaponaise de mots étrangers.* Université de Paris III:Paris. p. 219.

Yule, George (1985), *The Study of Language*. 2nd ed. New York: Cambridge University Press.p.35.