

Persian Learners' Syllabification of English Consonant Clusters

Ali Akbar Jabbari

Head of English department, Yazd University, Iran

E-mail: a_jabbari@hotmail.com

Laila Samavarchi

English department, Yazd University, Iran

E-mail: Laila_samavarchi@yahoo.com

Abstract

In this paper, Persian learners' syllabification of English word-initial and word-final consonant clusters was tested on the basis of the structural differences between their representations and different phonotactic constraints in both English and Persian. For this purpose, twelve children between the ages of 4-6 were experimented on by using 53 pseudo-words designed for this particular study. These pseudo-words were formed by taking into account the English phonotactic constraints. The production of the learners were recorded and transcribed. The results of this study indicate that onset clusters were mainly re-syllabified by epenthesis while the coda clusters mainly by deletion indicating transfer (negative) from Persian to English in the initial state of interlanguage.

Keywords: Consonant clusters, Syllabification, English syllable, Persian syllable

1. Introduction

English is supposed to be an international language which is learnt by speakers of different languages due to a variety of reasons. Every language has its own phonology which may be similar to languages in some respects but at the same time be different. When words which are different in their phonological system are learnt, they may create some difficulties for the learners. Due to having different phonological rules, different languages may lead to re-syllabification of words being learnt. This re-syllabification is systematic and not random i.e. it happens in accordance with the phonological rules of the learners' first language (or languages previously learned) at least in their initial state. In other words, there is a huge possibility of transfer from the learners' first language in the initial state of grammar (Schwartz & Sprouse, 1994). When compared to a language like English which has a complex syllable structure, Persian can be said to have a simpler syllable structure especially when it comes to the syllabification of consonant clusters. Due to different phonotactic constraints in both languages with regards to consonant clusters, Persian learners' of English may re-syllabify the words in English based on phonological constraints of Persian. This process could lead into either deletion of some consonant or epenthesis of a vowel sound between two consonants in a consonant cluster. To understand why the learners re-syllabify, firstly the principles governing the phonological constraints in general will be mentioned and then, the phonotactic properties of both the languages will be discussed.

1.1 Previous Studies on Consonant Clusters

Many linguists have focused on the consonant cluster syllabification in different languages based on different theories. Steele (2000), working within the Principles and Parameters framework of Universal Grammar (Chomsky, 1981), has focused on the modification of the French syllables by beginner Mandarin learners of French. In this experimental study, it was concluded that beginner Mandarin learners deleted segments which could not be properly licensed and deletion of segments was based on the preservation of the constituent heads. It was also concluded that learners' syllabification did not just depend on transfer. Steele (2001) has also worked on the English advanced learners' 'ultimate attainment' of French syllable structure by focusing on the liquid-obstruent, nasal-obstruent and obstruent-liquid clusters at word-final position. This study provided strong evidence in the favor of native-like attainment in L2 acquisition of syllabification with regards to both parameter settings and surface representation.

Chang (2004) has studied the Chinese learners' syllabification of English consonant clusters and has suggested two sources for errors of syllabification: first language influence and developmental factors. Three types of

errors found were related to negative transfer: first, the CCVC clusters were reduced to CVC, C1C2VC were produced as C3VC where C3 was a combination of C1C2, and third, CCC clusters were produced as either CVCC or CCVC. Hence, the errors were the result of deletion, epenthesis or coalescence.

Jabbari and Safari (in press) investigated the different strategies Persian EFL learners employ when it comes to initial consonant clusters. Vowel epenthesis was found to be the most used strategy by these learners but what differed was the location of the epenthetic vowel. It depended on the consonants in the clusters. It was concluded that the epenthetic site was based on maximal perceptual similarity between input and output confirming the crucial role of perceptual similarity.

2. Theoretical Framework

As the focus of the paper is on consonant clusters, the underlying concepts are discussed. It should be noted that these clusters are in conformity with the Sonority Sequencing Generalization and the Syllable Contact Law which follow the Principles and Parameters of Universal Grammar (UG) (Chomsky, 1981).

(1) PROSODIC LICENSING (Itô, 1986)

All phonological units must be prosodically licensed i.e. they must belong to higher prosodic structure.

(2) SONORITY SEQUENCING

A string CVC1C2V will be syllabified as CV.C1C2V where sonority $C1 < C2$ and as CVC1.C2V where sonority $C1 > C2$ (modulo language-specific constraints).

The Sonority Sequencing Principle creates syllables in which sonority increases as one moves from either syllable margin towards the nucleus. In a consonant cluster where $C1 < C2$ (increasing sonority), the consonants become the onset of the second syllable whereas in a consonant cluster where $C1 > C2$ (decreasing sonority), the two consonants get re-syllabified into different syllables where C1 becomes the coda of the first syllable and C2 will get re-syllabified as the onset of the next syllable.

(3) SONORITY HIERARCHY (e.g. Clements, 1990)

Obstruent > nasal > liquid > glide > vowel

1 > 2 > 3 > 4 > 5 (5 is the most sonorous while 1 is the least sonorous.)

(4) BINARITY THEOREM (e.g. Kaye, 1990; Hayes, 1991)

Feet and syllable constituents are maximally binary.

3. Phonotactic Constraints in English

English has the syllable structure of (CCC)V(CCCC) which shows that English allows consonant clusters having up to three consonants word-initially and up to four consonants word-finally (Roach, 2000). A vowel sound is obligatory in a syllable while a consonant sound isn't.

The phonotactic property of English allows most of the English sounds as one-consonant onset except /ŋ/ and

/ʒ/. As far as two-consonant onsets are concerned, English allows s + voiceless plosives/fricatives, obstruent + liquids, obstruent + glides and nasals + glides. Three-consonant onsets are permitted in English under the condition that the first consonant should be s as in *spl, spr, str, skr, spj, stj, skj, skw*.

Now we consider the codas in English. Only the two glides *w* and *j* and *h* and *r* in non-rhotic accents are not permitted as one-consonant-codas. Two-consonant codas can be liquids (l, r) + consonants, nasals + obstruent which have the same place of articulation, 2 obstruents and s + voiceless obstruents except stridal coronal sounds. Three-consonant codas which are possible are those which have a nasal as the first consonant followed by 2 obstruents (e.g. *months*) or morphologically complex codas which are permitted like in 2-consonant codas. Four-consonant codas permitted are the well-formed 3-consonant codas mentioned above followed by s or t as an affix.

3.1 Representation of English Consonant Cluster in Onset Position

The representations of the English two-consonant onset 'school' /sku:l/ and three-consonant onset 'split' /split/ are shown in the figures (1) and (2) below (Jabbari 2005):

3.2 Representation of English Consonant Cluster in Coda Position

The representations of the English two-consonant clusters- liquid+obstruent in figure (3), obstruent+ liquid in (4) and nasal+obstruent in (5) in word-final position are as follows:

As can be seen above, the representations for liquid-obstruent and nasal-obstruent clusters are the same. It can be seen in the representations (3) and (5) that English allows onset of empty-headed syllables (OEHS). In other words, syllables may be empty-headed, that is, their nuclei may be phonetically unrealized as in (3) above. Regarding the nasal-obstruent clusters, different languages have different parameters which is stated in (5) below.

(5) BRANCHING X-SLOT (NASAL) PARAMETER (Steele, 2001)

A nasal cannot (unmarked) or can (marked) be licensed in the dependent position of a branching X-slot.

Following the above parameter, English is said to have the unmarked setting of the following parameter which can be seen in (5) above. In other words, in English a nasal cannot be in the depending position of a branching X-slot.

As far as the obstruent-liquid cluster is concerned, there is syllabification of the prosodic word into two syllables as in (4) above. This happens since in English, the liquids can be syllabified as onset-nucleus sequence. This final liquid is velarized and syllabified.

4. Phonotactic Constraints in Persian

Persian has the syllable structure of CV(CC) which shows that Persian doesn't allow consonant clusters syllable-initially but does allow syllable-finally only up to two consonants. Unlike English, an initial consonant is obligatory in Persian which can be a glottal stop in case of absence any other consonant.

In Persian, other than [w] the other consonants can occur syllable-initially. But consonant clusters are prohibited syllable-initially. When it comes to the coda, Persian allows one and two-consonant codas. The simple one-consonant codas can be include all consonants other than [w] and the complex two or three-consonant codas are formed only by junction of two morphological elements. There are no four-consonant clusters found in Persian (Yarmohammadi, 1381).

5. Hypothesis

Due to the non-presence of onset-consonant clusters in Persian, there is a possibility that Persian learners of English at initial state (Note 1) would face problems with these clusters. This paper aims to provide some underlying representations of the learners' syllabification of the onset-consonant clusters.

When learners learn a new language, the process of syllabification of consonant clusters may occur in the following ways (Chang, 2004):

Cluster reduction This is defined as “deletion of one or more consonants from a target cluster so that only a single consonant occurs at syllable margins” (Grunwell, 1987). For example, *blue* is pronounced as [bu].

Cluster Simplification The error occurs when two elements of a cluster are produced with one or both being produced in a manner not matching the target phoneme (Grunwell, 1987). For example, *green* is pronounced as [gwin]; *bread* is pronounced as [bwed].

Epenthesis This type means insertion of some vowel (frequently a schwa) between cluster elements (Dyson & Paden, 1983), such as *drive* (/draiv/) pronounced as [dɔraɪv].

Coalescence This occurs when the yielded pronunciation contains a new consonant composed of features from the original consonants—e.g., *swim* pronounced as [fim] because the [+fricative] feature of /s/ co-occurs with the [+labial] feature of /w/, resulting in a labial fricative, [f] (Dyson & Paden, 1983).

Based on the above, the following hypotheses have been proposed:

- 1) Persian learners of English at the initial state resort to cluster reduction in
 - a) Two-consonant onsets
 - b) Three-consonant onsets
 - c) Two-consonant codas
 - d) Three-consonant codas
 - e) Four-consonant codas

- 2) Persian learners of English at the initial state epenthesize another sound in
 - a) Two-consonant onsets
 - b) Three-consonant onsets
 - c) Two-consonant codas
 - d) Three-consonant codas
 - e) Four-consonant codas

6. Experiment

6.1 Participants

The experimental group consisted of twelve child Persian learners of English. Children between the ages of 4-6 were chosen for the study because the focus of the paper is on consonant cluster syllabification at the initial stage of language learning and children can be said to be at the initial state of second language learning when they were experimented for the study. Participants were chosen to be of this age because if the older learners had been chosen, it could not be said that these learners were at the initial state of second language learning as they are introduced to English at school.

6.2 Test

An oral production test for this study involved just the repetition task to test learners' syllabification of the target cluster forms. 53 pseudo-words were coined for the purpose of this study. These words were formed by taking into consideration and not violating the English Phonotactic rules mentioned previously. Among the 53 words, the CCVC, CCCVC, CVCC, CVCCC and CVCCC forms were under focus and were analyzed because these clusters violate the Persian phonotactic rules and CVC clusters acted as fillers.

The oral production task was administered individually by the author where the participants were asked to repeat the words said by the author twice. They were asked to repeat twice to see if their second repetition was similar to their first and because their first repetition may be just influenced by what they heard and they would just mimic the words. (Note 2) The second time would be less influenced. And just the repetition task was used for the paper and not other tasks like naming because the words that were used for the study were pseudo-words.

7. Result and Discussion

The participants' repetition of the words were recorded and then transcribed by the author. Transcription of the words under focus was carried out. The data presented below is from the repetition task.

7.1 Word-Initial Consonant Clusters

7.1.1 S- Obstruent Clusters

The table 2 shows that the learners of English tended to epenthesize a vowel sound, either /e/ or /i/ before the consonant cluster resulting in the word being syllabified as two or three syllables rather than one. For example, the pseudo-word *skul* which was meant to be one syllable was pronounced as /es.kul/ i.e. vC1C2 or even /e.se.kul/ i.e. vC1vC2. For the sake of convenience and clarity for the purpose of comparison, the English representations of the clusters (6) have been repeated so forth.

As can be seen in figure(6) above in English the onsets can branch to permit the consonant clusters to be syllabified as just one onset whereas Persian learners of English syllabify the consonant cluster as in figures(7) or (8) based on the Persian parameter which doesn't allow consonant clusters in onset position. This is the parameter that has to be reset as the learners try to advance their English. So the hypothesis in 1a (if the first consonant is *s*) has been rejected whereas the hypothesis in 2a (if the first consonant is *s*) has been approved due to the re-syllabification by the learners following epenthesis.

7.1.2 Obstruent - Liquid Clusters

It can be seen in the table 3 above that the learners tended to preserve the segment as it is but more than preservation there was epenthesis of a vowel sound between the two consonants in the obstruent-liquid clusters. This resulted in something like /fe.lak/ for the pseudo-word *flak*. Figure (9) below shows the English representation of the word *flak* if existed in English whereas (10) shows the re-syllabification done by learners based on the Persian parameter permitting just one consonant sound syllable-initially (here word-initially, since all the words used in this study were one syllable).

The above two show the re-syllabification by epenthesis but different from s-obstruent clusters discussed in 7.1.1. Here the epenthesis is between the two consonants which results in the two consonants acting as onsets of two

syllables rather than a branching onset. So the obstruent is the onset of the first syllable while the liquid is syllabified as the onset of the second syllable. So the hypothesis in 1a can be rejected while 2a is approved.

7.1.3 Obstruent / Nasal - Glide Clusters

The obstruent-glide and the nasal-glide clusters did not pose problems for the learners and their syllabification was as in figure (1) even though such a cluster may be non-existent in Persian whereby the learner has reset the Persian parameter to accommodate this sound word-initially. For instance, the pseudo-word *twas* beginning with the obstruent-glide consonant cluster was pronounced as /twas/ (c1c2) with no re-syllabification whereas *swal* was pronounced as /se.wal/ (c1vc2).

7.1.4 Three-Consonant Onset Clusters

As can be seen below, the 3-consonant onsets have posed pronunciation problems to the learners which can be due to negative transfer from Persian (see table 5). This is because in Persian, 3-consonant onsets are prohibited. Say for example, the pseudo-word *splane* /splen/ has been pronounced mostly as /es.pe.len/ or as /e.se.pe.len/.

Figures 11, 12 and 13: Persian learners' syllabification of the pseudo-word *splane*

Figure (11) above shows the English representation of the three-consonant onset where in the onset undergoes ternary branching violating the Binarity theorem. Figures (12) and (13) show the learners' syllabification of (11) whereby a single syllable has been syllabified into three syllables (12) or even at times four syllables (13) by epenthesis /e/. So the learners have to reset this parameter in English allowing more than one consonant to be the onset. Then hypothesis 1a has been rejected while 2a is approved since learners follow epenthesis and not cluster reduction by deletion.

7.2 Word-final Consonant Clusters

So far the discussion was on onset clusters. We have seen that learners predominantly epenthesized a vowel sound to be able to produce the English pseudo-words. Now moving on to coda clusters, it has to be seen whether learners syllabify according to the English or Persian parameter. First, we discuss the two-consonant codas; second, we discuss the three-consonant codas; third, we move on to three-consonant codas; finally, we finish off with four-consonant codas.

7.2.1 Two- Consonant Codas

The two-consonant codas are discussed in three parts depending on the consonants that are clustered.

7.2.1.1 Liquid -Obstruent Codas

Table (6) shows that with regards to the liquid-obstruent clusters, the liquid has been deleted by the child learners in their initial state of interlanguage.

The English representation of the pseudo-word *serb* /sərb/ is shown in figure (14) and the re-syllabified representation of the learners is shown in (15).

In English, onset of empty-headed syllable (OEHS) is allowed where the liquid is syllabified as the coda of the first syllable and the obstruent is in the onset position of the second syllable (Steele, 2000). The obstruent has been preserved while the liquid has been deleted maybe due to head preservation since the obstruent is in the head position of the OEHS. Hence, it can be said that the hypothesis 1c has been approved while 2c has been rejected regarding the liquid-obstruent clusters.

7.2.1.2 Nasal-Obstruent Codas

The nasal-obstruent codas did not seem to be problematic to the learners and the production was native-like. The English representation of the nasal-obstruent cluster is similar to the liquid-obstruent cluster discussed previously (See table 7).

7.2.1.3 Obstruent-Liquid Codas

As far as the obstruent-liquid clusters are concerned, the following has been noted: the obstruents are deleted and not the liquids; there has been epenthesis between the two consonants; or there have been few cases of deletion of the liquid followed by aspiration (See table 8).

The English representation of the pseudo-word *tipple* /ti.pɪ/ is shown in figure (16), deletion of liquids in (17), and epenthesis in (18). The liquids in English are syllabic like the nasals and also they are lateralised syllable-finally whereas the liquids in Persian are not syllabic (Yarmohammadi, 1381).

The learners have either deleted the liquid without aspirating the last consonant or by aspirating the last consonant. This has been found cross-linguistically (Goad & Brannen 2000) by child learners which is the result of the final obstruent represented as an onset. Also, sometimes the learners have epenthesis a vowel between the two syllables due to negative transfer from Persian. Thus, it can be said that the hypotheses 1c and 2c both can be approved regarding the obstruent-liquid codas.

7.2.2 Three-Consonant Codas

As far as the three-consonant codas are concerned, the learners maintained mostly native-like syllabification by preserving the segments but occasionally they also deleted the second consonant which was also native-like since even native speakers, in conversation, may resort to deletion for simplification of production (see table 9).

Hence, hypothesis 1d can be approved while 2d is rejected. But it should be noted that segmental preservation was noticed in most of the cases and thereby there is no need for learners to reset this parameter.

7.2.3 Four-Consonant Codas

Similar to the three-consonant codas, the learners maintained segmental preservation in more than 50% of the cases. In some cases, the learners either deleted the second or the third consonant but never the first consonant which is native-like. Hence, this parameter need not be reset by learners (See table 10).

8. Conclusion

This paper has provided some evidence as to the transfer from native language to the second/foreign language, here from Persian to English, in favour of the partial transfer hypothesis (Young-Scholten, 1995) in their initial state of interlanguage. In this study, it has been found that the syllable-initial clusters are re-syllabified by the learners resorting to epenthesis rather than deletion where one syllable was re-syllabified into two (two-consonant clusters), three (two/three-consonant clusters) or even four syllables (three-consonant clusters). This is said to have happened due to the non-existence of such consonant clusters syllable-initially and hence, negative transfer from Persian. This result is consistent cross-linguistically with results found in a study where the English words borrowed into Urdu have been analyzed (Usman, Ali & Masood, 2004). This re-syllabification is not random but influenced by some governing rules. As far as the two-consonant codas are concerned, the nasal-obstruent clusters were native-like which the liquid-obstruent or obstruent liquid clusters were non-native-like where the learners deleted the liquid while keeping the obstruent for the purpose of head preservation. Coming to the three/four-consonant codas, it has been found that the learners deleted some segments in few cases but this was native-like and hence not subject to analysis.

References

- Chang, F. (2004). *Chinese-speaking EFL learners' performances of processing English consonant clusters*. National Chiayi University.
- Chomsky, N. (1981). *Lectures on Government and Binding*. Dordrecht: Foris.
- Clements, G.N. (1990). The role of the sonority cycle in core syllabification. In J. Kingston & M. Beckman (Eds.), *Papers in laboratory phonology 1: Between the grammar and physics of speech* (pp.283-333). New York: Cambridge University Press.
- Dyson, A. T., & Paden, E. P. (1983). Some phonological acquisition strategies used by two-year-old. *Journal of Childhood Communication Disorder*, 7, 6-18.
- Goad, H. & K. Brannen. (2000). Syllabification at the right-edge of words: Parallels between child and adult grammars. In J. Van de Weijer (ed.), *Title forthcoming*. Amsterdam/Philadelphia: Benjamins.
- Grunwell, P. (1987). *Clinical phonology* (2nd ed.). London: Croom Helm.
- Hayes, B. (1991). *Metrical stress theory: Principles and case studies*. Ms., UCLA.
- Itô, J. (1986). *Syllable theory in prosodic phonology*. Doctoral Dissertation, University of Massachusetts, Amherst.
- Jabbari, A.A. (2005). *Introducing phonetics and phonology*. Qom, Mashoor.

Kaye, J. (1990). 'Coda' licensing. *Phonology*, 7, 301-330.

Roach, P. (2000). *English Phonetics and Phonology: A Practical Course*. Cambridge University Press.

Schwartz, B.D. & R.A. Sprouse. (1994). Word order and Nominative Case in nonnative language acquisition: A longitudinal study of (L1 Turkish) German Interlanguage. In T. Hoekstra & B.D. Schwartz, eds., *Language Acquisition Studies in Generative Grammar*. Amsterdam: John Benjamins. pp. 317-68.

Steele, J. (2000). L2 learner's modification of target language syllable structure: Prosodic licensing effects in interlanguage phonology. In J. Leather & A. James (eds.), *New Sounds 2000*. Klagenfurt, Austria: University of Klagenfurt.

Steele, J. (2001). Ultimate attainment in L2 syllabification. *Working papers in linguistics*, McGill University.

Usman, M., S. F. Ali & A. Masood. (2004). Syllabification of English words when spoken in Urdu. [Online] Available: http://www.crupl.org/Publication/Crupl_report/CR04_09E.pdf (August 22, 2009)

Yarmohammadi, L. (1381). A contrastive analysis of Persian and English (Grammar, Vocabulary and Phonology). Payame Noor University.

Young-Scholten, Martha. (1995). The negative effects of positive evidence on L2 phonology. *The current state of interlanguage* ed. By Lynn Eubank, Larry Selinker, and Michael Shrwod-Smith, 107-121. Amsterdam: John Benjamins.

Notes

Note 1. Wherever mentioned initial state in this paper, it refers to the children's initial state of language learning.

Note 2. It should be mentioned that the author who conducted the test was a native English speaker. Therefore, the participants were not exposed to Persian phonology of consonant clusters.

Table1. Cluster bank

CVC	ccvc	ccvc	ccvc	ccvc	CVCC	Cvcc	Cvcc	Cvccc	Cvccc
	S+ obstruent	Obstruent + liquid	Obstruent/ nasal+ glide	S+ obstruent + liquid/ glide	Liquid+ obstruent	Nasal+ obstruent	Obstruent +liquid/ nasal	Nasal+ 2 obstruents	Nasal + 3 obstruents
Fek	spn	Blok	twas	splane	serb	tund	pubble	fanks	shempts
pel	stul	plim	swal	spram	merk	peng	sibre	linst	limpsed
mil	spik	flak	dwil	stram	salp	femp	tipple	minked	dempts
tul	skup	throl	mupe	skrom	durt	remb	padle	shelped	sincts
	spal	prak	mune	skul /skjul/	salc	lenk	faten	shinks	finkts
							sagen	kempt	tempt

Table 2. Learners' syllabification of word-initial s-obstruent clusters in percentage

No. Of Participants	Segmental Preservation	Deletion		Epenthesis		
		Del C1	Del C2	vC1C2	C1vC2	vC1vC2
12	-	-	-	85	-	15

Table 3. Learners' syllabification of obstruent-liquid clusters in percentage

No. Of Participants	Segmental Preservation	Deletion		Epenthesis		
		C1C2	Del C1	Del C2	vC1C2	C1vC2
12	25	-	-	-	75	-

Table 4. Learners' syllabification of the obstruent/nasal-glide clusters in percentage

No. Of Participants	Segmental Preservation	Deletion		Epenthesis		
		C1C2	Del C1	Del C2	vC1C2	C1vC2
12	95	-	-	-	5	-

Table 5. Learners' syllabification of three-consonant onset clusters (C1= s, C2 =obstruent, C3= obstruent)in percentage

No. Of Participants	Segmental Preservation	Deletion			Epenthesis		
		C1C2C3	Del C1	Del C2	Del C3	vC1C2C3	vC1C2vC3
12	-	-	-	-	30	65	5

Table 6. Learners' syllabification of the liquid-obstruent codas in percentage

No. Of Participants	Segmental Preservation	Deletion		Epenthesis		
		C1C2	Del C1	Del C2	vC1C2	C1vC2
12	15	85	-	-	-	-

Table 7. Learners' syllabification of the nasal-obstruent codas in percentage

No. Of Participants	Segmental Preservation	Deletion		Epenthesis		
		C1C2	Del C1	Del C2	vC1C2	C1vC2
12	100	-	-	-	-	-

Table 8. Learners' syllabification of the obstruent-liquid codas (h indicates instances of aspiration.)in percentage

No. Of Participants	Segmental Preservation	Deletion			Epenthesis
		Del C1	Del C2	DelC2h	C1vC2
12	-	-	50	25	25

Table 9. Learners' syllabification of the three-consonant codas in percentage

No. Of Participants	Segmental Preservation	Deletion		
		Del C1	Del C2	Del C3
	C1C2C3			
1	79.25	-	20.75	-

Table 10. Learners' syllabification of the four-consonant codas in percentage

No. Of Participants	Segmental Preservation	Deletion			
		Del C1	Del C2	Del C3	Del C4
	C1C2C3C4				
12	58.5	-	12.5	29	-

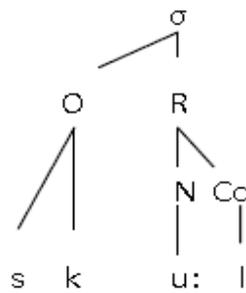
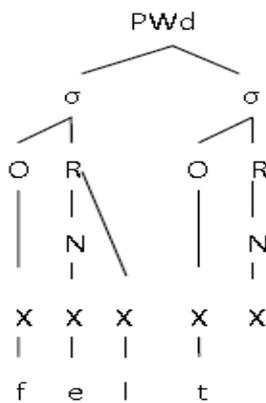


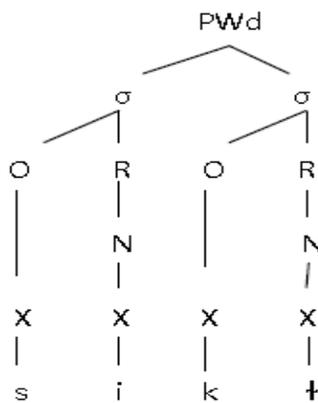
Figure 1. English syllable structure of *school*



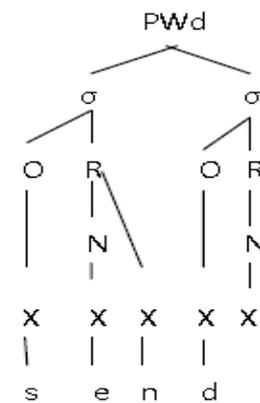
Figure 2. English syllable structure of *split*



(3) *felt* /felt/ → [felt]

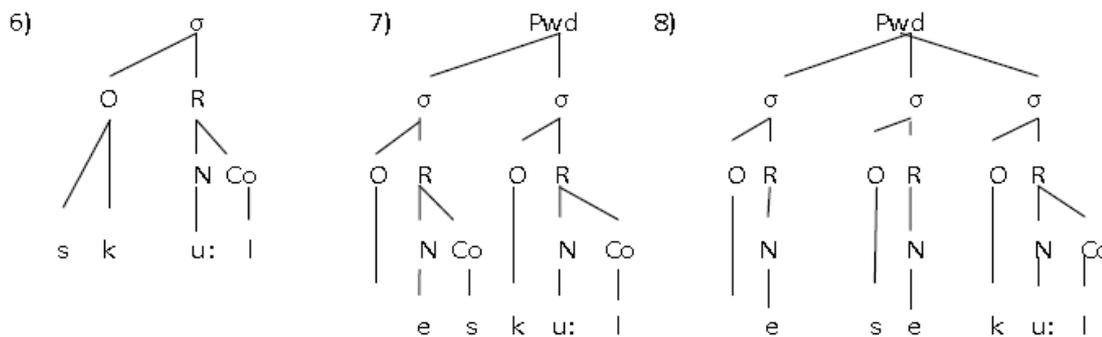


(4) *sickle* /sikl/ → /si.kl/

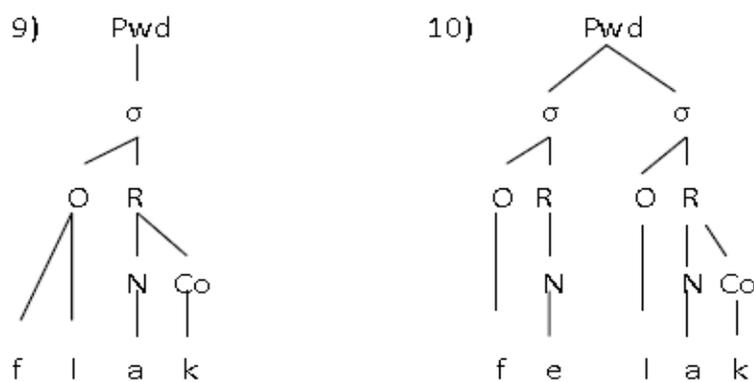


(5) *send* /send/ → /send/

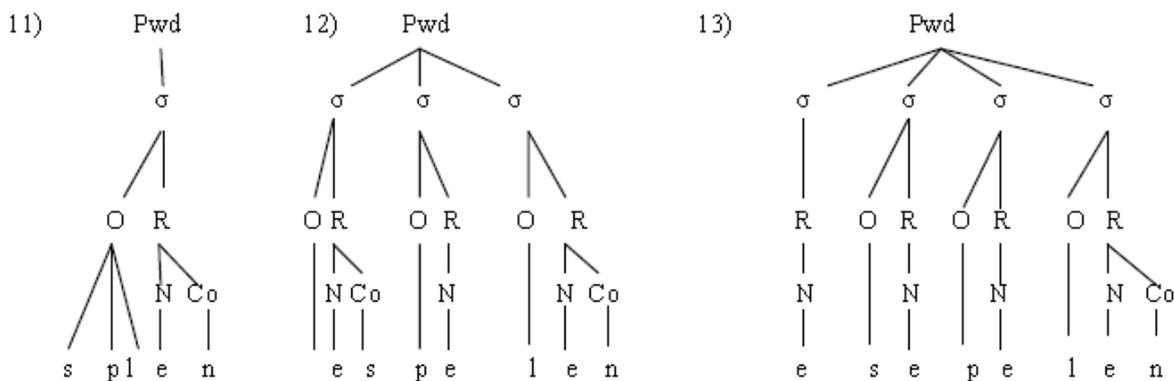
Figures 3, 4, and 5. English syllable structures in *felt*, *sickle* and *send*



Figures 6, 7, and 8. Persian learners' syllabification of *school*

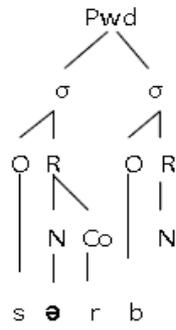


Figures 9 and 10. Persian learners' syllabification of the pseudo-word *flak*

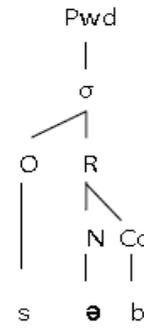


Figures 11, 12 and 13. Persian learners' syllabification of the pseudo-word *splene*

14)

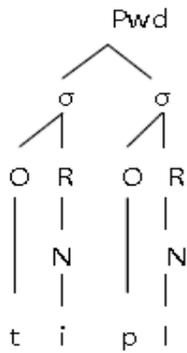


15)

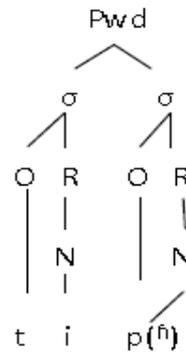


Figures 14 and 15. Persian learners' syllabification of the pseudo-word *serb*

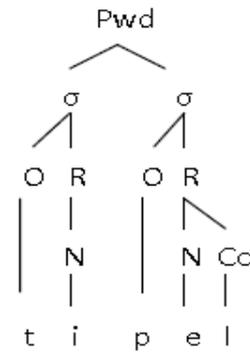
16)



17)



18)



Figures 16, 17 and 18. Persian learners' syllabification of the pseudo-word *tiple*