Sonority Hierarchy Principle in
cvcc Syllable of Persian

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Abstract

In Persian, the only syllable type with consonant clusters is cvcc, where its coda can be filled with two consonants. The present article attempts to find whether these two consonant conform the sonority sequencing principle or not. For this reason, the Persian words with cvcc syllable type are gathered from Persian dictionaries and are classified based on the vowel filling the nucleus of the syllables and the consonants in the first or second slot of the coda and the following results were obtained:

    a. **Sonority sequencing principle is confirmed in clusters nuclei are /i,u,*a*/.**

    b. **Sonority sequencing principle is rejected in clusters with vowels /æ, e,o/.**

    c. **Based on sonority sequencing principle, vowels in Persian make up two natural classes namely / æ, e,o/ and /i,u,*a*/.**

Keywords: Syllable, Coda, Nucleus, Sonority Sequencing Principle.

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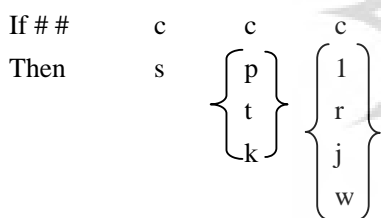2. M.A. in Linguistics, Tarbiat Modares University, Faculty of Humanities, Linguistics Department

1. Introduction

In what follows, special focus will be given on to the question of the representation of the cvcc syllable in Persian.

Linguistically, syllable is a significant unit, which must have its place in phonological theory. It can be argued that the most general and explanatory statement of phonotactic constraints in a language can be made only with reference to the syllabic structure of an utterance. Second, it is the only via one can give the proper characterization of the domain of application of a wide range of rules of segmental phonology (Selkirk: 1982, p.328).

The certain of complex onsets and codas in a syllable is severely restricted. An instance of sequential constraints is found in the onset of English syllable:

If ##   c   c   c

$$\text{Then} \quad s \quad \begin{Bmatrix} p \\ t \\ k \end{Bmatrix} \quad \begin{Bmatrix} l \\ r \\ j \\ w \end{Bmatrix}$$

It has been known for over a century that the construction of complex codas and onset is guided by a sonority sequencing principle, which requires onset to rise in sonority towards the nucleus and codas to fall in sonority towards the nucleus. It has long been observed that speech sounds can be ranked on the grounds of relative (sonority). According to Roca (1994:152) sonority is the amount of sound let out as the segment is pronounced. Obviously, the narrower the stricture,
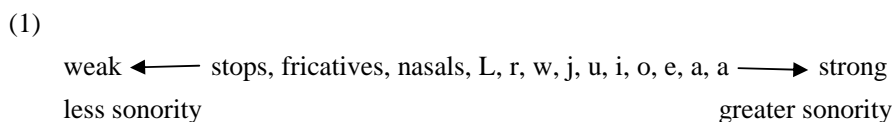
the lower the sonority level and conversely. According to Carr (1999:72) sonority is an acoustic effect: the more sonorous a sound, the more it resonates. Based on Lass (1984:264), the more sonorous elements tend to occur closer to the nucleus, and the least sonorous further away. Phonologists agree that the entire class of speech sound can be classed with vowels as the most sonorous and obstruents as the least, as it is shown below:

1. (Oral) stops   Least sonority
2. Fricatives
3. Nasals
4. Liquids
5. Glides
6. Vowels   Most sonority

(Kenstowicz ; 1994:254)

Since stops and fricatives are obstruents and nasals, liquids and glides are sonorants while vowels are sonorants, sonority scale can restated as below:

1. Obstruent   Least sonority
2. Sonorants
3. Resonants   Most sonority

Jensen (1993, p.52 and 2004, p.275) quotes from Kiparsky (1979) about "sonority hierarchy" which is given in (1), where the arrows show increasing sonority from the stops to the vowels.

(1)

weak ⟵ stops, fricatives, nasals, L, r, w, j, u, i, o, e, a, a ⟶ strong

less sonority   greater sonority

Speech exhibits a consonant rising and falling of sonority, with the points of highest sonority identified as the "sonority hierarchy", which correlates with the relative openness of the vocal tract. The least sonorous segments are the oral stops and most sonorous segment in the open back vowel [*a*], with the other segments arranged between according to the scale in (1).

Kiparsky ((1979) in Jensen, 2004, p. 276) observes that the syllable is normally composed of a peak preceded, in the "onset", by segments less sonorous than the peak in an order of rising sonority and followed in the "coda" by segments less sonorous than the peak in an order of decreasing sonority.

Selkirk (1984b, in Jensen. 2004, p. 276) refers to this as the "Sonority Sequencing Generalization (SSG)".

In a word like "plant", the most sonorous segment is the vowel [æ]. The onset contains the stops [P] followed by the more sonorous liquid [L] while the coda contains the nasal [n] followed by the less sonorous stop [t].

In Persian, the only syllable with consonant clusters is cvcc where the two slots of the coda can be filled with consonants. The aim of this study is to find how sonority sequencing principle is accounted in Persian. It is to show also that the nucleus of the syllable affects on the selection of the consonants in the coda. Such considerations indicate that a closer relationship exists between the vowel in the nucleus and the consonants in the coda. A detailed analysis of the phonotactics of Persian syllable shows that there are some restrictions between peak and coda.

2. Review of literature

In modern Persian, the study of sonority sequencing principle has been limited to the consonant clusters of the syllable's coda, comparing with Pahlavi where there existed consonant cluster in the coda and onset of the syllable. According to Panahpoor (1381) the construction of complex onsets and codas in Pahlavi is guided by sonority sequencing principle. Haghshenas (1370,1374) and Samareh (1977,1378) have not discussed sonority sequencing principle in their works. Darzi (1372) is of the view that sonority sequencing principle is violated in the construction of modern Persian's consonant clusters. Contrary to Darzi, Parmoon (1380: 626) believes that consonant clusters in the coda of Persian syllable are constructed based on sonority sequencing principle.

3. Methodology

In order to study sonority in Persian, the data, which were words with cvcc syllable structure, were collected from Persian dictionaries of Keshani (1372) and Moshiri (1371) then they were classified into two sections based on the vowels filling the nucleus of the syllable, namely, /æ,e.o/ and /i,u,*a*/. In each section the data were ordered based on the place of articulation of the first and the second consonant of the coda from lips backwards to glottis.

4. Data Presentation

In this part, some Persian words with cvcc syllable type are presented. Based on the vowel filling the nucleus, they are classified into two distinct parts. In the first part, the nucleus of the data are filled with vowels /æ,e,o/ and in the second part, vowels /*a*,i,u/ fill the nucleus of the coda.

4.1 cvcc Words With Vowels /æ,e,o/

In this part of the study, the data with vowels /æ,e,o/ are presented into two tables. In Table 1 the data are arranged based on the place of articulation of the first consonant of the coda, and in Table 2

they are arranged according to the place of articulation of the second consonant of the coda.

Table 1

æ	e	o
/tæbx/ 'cooking'	/zebh/ 'slaughtering'	/robʔ/ 'quarter'
/tæbʔ/ 'nature'	/zebr/ 'rough'	/sobh/ 'morning'
/næbʃ/ 'corner'	/debʃ/ 'acrid'	/jomn/ 'felicity'
/næbz / 'pulse'	/ʃebh/ 'like'	/homG/ 'stupidity'
/bæbr/ 'tiger '	/tebG/ 'according to'	/xoms/ 'one fifth'
/ʔæmr/ 'order'	/ʃemʃ/ 'bullion'	/ʔomr/ 'life'
/ʔæmn/ 'calm'	/sefr/ 'zero'	[fowG] 'top'
/dʒæmʔ/ 'sum-addition'	/tefl/ 'child'	[Gowl] 'promise'
/hæml/ 'carry'	/left/ 'lengthening'	[kown] 'creation'
/hæmd/ 'praise'	/gereft/ 'took'	[gowd] 'deep'
/ʔæfv/ 'forgiveness'	/ʃe.geft/ 'wonderful'	[lows] 'contamination'
/kæfʃ/ 'shoe'	/setr/ 'veil'	[ʃowr] 'consulting'
/læfz/ 'word'	/fetr/ 'fast break'	[lowh] 'plate-tombstone'
/kæ.ræfs/ 'celery'	/ketf/ 'shoulder'	[fer.ʔown] 'pharaoh'
/bæ.næfʃ/ 'violet'	/sedr/ 'lotus'	[fer.dows] 'paradise'
/dæ.ræfʃ/ 'awl'	/sedG/ 'truthfulness'	/dʒoft/ 'pair'
/mætn/ 'text'	/dʒens/ 'kind-sex'	/Gofl/ 'lock'
/bætn/ 'abdomen'	/xeng/ 'stupid'	/kofr/ 'blasphemy'
/tʃætr/ 'umbrella'	/ dendʒ/ 'cozy'	/goft/ 'said'
/hætm/ 'by all means'	/ rend/ 'cunning'	/ko.loft/ 'thick'
/xætm/ 'finishing'	/sendʒ/ 'cymbal'	/no.xost/ 'first'
/mædh/ 'compliment'	/be.rendʒ/ 'rice'	/notG/ 'speech'
/hæds/ 'guess'	/na.rendʒ/ 'sour orange'	/potk/ 'big hammer'
/ʔædl/ 'justice'	/mesl/ 'like'	/Gotb/ 'pole'
/Gædr/ 'value'	/mesr/ 'Egypt'	/Gotr/ 'diameter'
/bædv/ 'start'	/nesf/ 'half'	/lotf/ 'mercy'
/mæng/ 'confused'	/ʔesm/ 'name'	/Gods/ 'holiness'
/næng/ 'shame'	/te.lesm/ 'spell'	/donb/ 'tail'
/vænd/ 'affix'	/feh.rest/ 'list'	/ʔonf/ 'violence'
/væng/ 'grizzle'	/ʃa.jest/ 'befit'	/kondʒ/ 'corner'
/hæng/ 'regiment'	/ʔezn/ 'permission'	/kond/ 'dull'
/bænd/ 'joint'	/hezb/ 'party'	/gong/ 'dumb'
/pændʒ/ 'five'	/kezb/ 'falsehood'	/long/ 'waist- cloth'

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/dʒæ.fæŋ/ ' nonsense'	/rezG/ 'daily bread'	/hosn/ 'goodness'
/tʃæ.rænd/ 'nonsense'	/ferz/ 'quick'	/rost/ 'ordinate'
/xo.rænd/ ' worthy'	/kerm/ 'worm'	/sost/ 'slack'
/de.ræŋ/ 'pause'	/gerd/ 'round'	/Gosl/ 'ablutions'
/ræ.vænd/ 'process'	/dʒerz/ 'pier'	/ʃost/ 'washed'
/næsb/ 'installation'	/tʃert/ 'nonsense'	/do.rost/ 'right'
/væsf/ 'description'	/ʃe.gerd/ 'method'	/næ.xost/ 'first'
/væsl/ 'joining'	/ʃa.gerd/ 'pupil'	/?ozr/ 'excuse'
/hæst/ 'exists'	/zel?/ 'herdal'	/dʒoz?/ 'part of '
/ʃe.kæst/ 'broke'	/dʒelf/ 'rude'	/dʒozv/ 'part of '
/pæ.ræst/ 'worship'	/helm/ 'forbearance'	/hozn/ 'grief '
/ne.ʃæst / 'sat'	/selk/ 'range'	/dozd/ 'thief '
/?æzm/ 'resolution '	/?elm/ 'science'	/?ozv/ 'member'
/fæzl/ 'grace '	/kelk/ 'reed'	/gord/ 'hero'
/ræzm/ 'battle'	/hedʒr/ 'separation'	/horm/ 'flame'
/jæzd/ 'Name of a city'	/keʃt/ 'grew'	/gorz/ 'mace'
/gæ.væzn/ 'deer '	/reʃk/ 'nit'	/gorg/ 'wolf'
/fær?/ 'branch'	/xeʃt/ 'dried brick'	/tord/ 'brittle'
/færd/ 'individual'	/pe.zeʃk/ 'physician'	/bo.zorg/ 'big'
/færG/ 'difference'	/tæ.meʃk/ 'raspberry'	/so.torg/ 'large'
/Gærz/ 'borrowing'	/ze.reʃk/ 'barberry'	/sær.gord/ 'major'
/Gærn/ 'century'	/se.reʃk/ 'tear'	/tʃort.ke/ 'abacus'
/tæ.gærg/ 'hail'	/se.reʃt/ 'nature'	/molk/ 'real estate'
/næ.værd/ 'rolling pin'	/be.heʃt/ 'paradise'	/sols/ 'one third'
/næ.bærd/ 'battle'	/gon.dʒeʃk/ 'sparrow'	/solh/ 'peace'
/ke.ʃa.værz/ 'farmer'	/ne.veʃt/ 'wrote'	/zolm/ 'oppression'
/ladʒ.værd/ 'azure'	/fejz/ 'grace'	/hodʒb/ 'modesty'
/bæl?/ 'swallowing'	/Gejd/ 'bond'	/?odʒb/ 'self-conceit'
/tælx/ 'bitter'	/kejd/ 'deceit'	/?oʃr/ 'one – tenth'
/tælG/ 'mica '	/kejf/ 'enjoyment'	/xoʃk/ 'dry'
/dʒælb/ 'arrest'	/?ejn/ 'eye-like'	/koʃt/ killed
/mædʒd/ 'greatness'	/?ejʃ/ 'pleasure'	/do.roʃt/ 'large'
/vædʒd/ 'joy'	/ro.tejl/ 'tarantula'	/?æn.goʃt/ 'finger'
/sædʒ?/ 'riming prose'	/bekr/ 'intact'	/hokm/ 'theorem'
/vædʒh/ 'face'	/zekr/ 'to mention'	/rokn/ 'pillar'

/ gæʃt/ 'cruise'	/ʃekl/ 'shape'	/sokr/ 'intoxication'
/ræʃt/ 'Name of a city'	/fekr /'thinking'	/ʃokr/ 'thank'
/kæʃk/ 'dried whey'	/ke.rext/ 'benumbed'	/toxm/ 'seed'
/hæʃv/ 'redundancy'	/seGl/ 'gravity'	/doxt/ 'daughter'
/pæ.læʃt/ 'dirty'	/seGt/ 'abortion'	/loxm/ 'boneless'
/Go.zæʃt/ ''passed	/feGh/ 'jurispru dance'	/boGz/ 'grudge'
/ʃækl/ 'shape'	/mehr/ 'affection	/dʒoGd/ 'owl'
/mæks/ 'pause'	/zehn/ 'mind'	/ʃoGl/ 'occupation'
/ mækr/ 'deceit'	/ʃe?r/ 'poem'	/soGm/ 'falsehood'
/zæxm/ 'wound'	/fe?l/ 'verb'	/soGd/ 'Name of a city'
/sæxt/ 'hard'		/mohr/ 'seal'
/ʃæxs/ 'person'		/boht/ 'amazement'
/fæxr/ 'honour'		/fohʃ/ 'foul language'
/læxt/ 'lax'		/zohd/ 'asceticism'
/ræGs/ 'dancing'		/bo?d/ 'farness'
/sæGf/ 'ceiling'		/ro?b/ 'fear'
/?æGd/ 'treaty'		
/?æGl/ 'wisdom'		
/fæGr/ 'poverty'		
/fæhm/ 'understanding'		
/Gæht/ 'famine'		
/Gæhr/ 'anger- cross'		
/læhn/ 'tone'		
/tæ?m/ 'flavor'		
/tæ?n/ 'sneering'		
/Gæ?r/ 'bottom'		
/kæ?b/ 'cube'		
/læ?l/ 'garnet'		
/læ?n/ 'ban'		
/næ?ʃ/ 'corpse'		

Table 2

æ	e	o
/dʒænb/ 'beside'	/hezb/ 'party'	/dʒonb/ 'movement'
/kæsb/ 'acquisition-business'	/kezb/ 'lie'	/ro?b/ 'fear'
/dʒæzb/ 'absorption'	/Gejb/ 'invisible'	[zowb] 'melt'
/dʒælb/ 'arrest'	/?ejb/ 'deficiency'	/hodʒb/ 'modesty'
/næzm/ 'order'	/helm/ 'forbearance'	/zolm/ 'oppression'
/hæzm/ 'digestion'	/?elm/ 'science'	/hokm/ 'commandment'
/bæzm/ 'party'	/tʃeʃm/ 'eye'	/toxm/ 'seed'
/dʒæzm/ 'definite'	/dejm/ 'dry farming'	[jowm] 'day'
/?æzm/ 'resolution'	/dʒerm/ 'body'	[sowm] 'fast'
/dælv/ 'bucket'	/senf/ 'trade'	/dʒozv/ 'part of'
/næʃv/ 'growth'	/dʒelf/ 'rude'	/?ozv/ 'member'
/hædʒv/ 'satire'	/hejf/ 'pity'	/?onf/ 'violence'
/mæhv/ 'disappear'	/sejf/ 'summer'	[xowf] 'fear'
/sæhv/ 'error-slip'	/tejf/ 'spectrum'	/?orf/ 'common law'
/læhv/ 'debauchery'	/zeʃt/ 'ugly'	/lotf/ 'mercy'
/lænf/ 'lymph'	/keʃt/ 'grew'	/zolf/ 'ringlet'
/hæzf/ 'deletion'	/bejt/ 'nouse'	/moʃt/ 'fist'
/kæʃf/ 'discovery'	/seGt/ 'abortion'	/poʃt/ 'back' ·
/zæ?f/ 'weak point'	/tʃeft/ 'hasp'	[mowt] 'death'
/bærf/ 'snow'	/feh.rest/ 'list'	[sowt] 'sound'
/Gælt/ 'roll'	/ʃa.jest/ 'befit'	[fowt] 'death'
/sæbt/ 'register'	/ʃe.geft/ 'wonderful'	/tʃort.ke/ 'abacus'
/zæbt/ 'record'	/ge.reft/ 'took'	/zo.moxt/ 'coarse'
/næʃt/ 'leakage'	/sær.ne.veʃt/ 'fate'	/do.rost/ 'right'
/hæst/ 'is'	/ne.veʃt/ 'wrote'	/næ.xost/ 'first'
/ræʃt/'name of *a* city'	/ʃe.gerd/ 'method'	/ko.loft/ 'thick'
/pæ.læʃt/ 'dirty'	/ʃa.gerd/ 'pupil'	/no.xost/ 'first'
/go.zæʃt/ 'passed'	/rend/ 'cunning'	/tond/ 'quick'
/ʃe.kæst/ 'broke'	/dʒeld/ 'cover'	/kond/ 'dull'
/pæ.ræst/ 'worship'	/zejd/ 'proper name'	/mozd/ 'wage'
/ne.ʃæst/ 'sat'	/?ezn/ 'permission'	/dozd/ 'thief'
/?æGd/ 'treaty'	/hejn/ 'while'	/roʃd/ 'growth'
/Gæsd/ 'intention'	/bejn/ 'between'	/hozn/ 'grief'

/gærd/ 'dust'	/zehn/ 'mind'	/jomn/ 'felicity'
/gænd/ 'stink'	/dejn/ 'debt'	/rokn/ 'base'
/kænd/ 'dug'	/dʒens/ 'kind'	/hosn/ 'goodness'
/fæ.ɾa.jænd/ 'process'	/hejs/ 'respect'	[fer.ʔown] 'pharaoh'
/ræ.ha.værd/ 'result'	/ʔers/ 'inheritance'	[dʒowz] 'walnut'
/sæ.rænd/ 'riddle'	/hers/ 'greed'	[howz] 'tank'
/sæ.hænd/ 'name of a mountain'	/xers/ 'bear'	/porz/ 'nap'
/kæ.mænd/ 'lasso'	/hejz/ 'menstruate'	/gorz/ 'mace'
/xo.rænd/ 'worthy'	/Gejz/ 'indignation'	/boGz/ 'grudge'
/vænd/ 'affix'	/fejz/ 'grace'	[dʒowz] 'walnut'
/bænd/ 'joint'	/ferz/ 'quick'	[howz] 'tank'
/zænd/ 'Dynasty's name'	/hefz/ 'memorization'	/porz/ 'nap'
/væzn/ 'weight'	/sedr/ 'lottus'	/gorz/ 'mace'
/ʔæmn/ 'safe'	/zebr/ 'rough'	/boGz/ 'grudge'
/dʒæʃn/ 'ceremony'	/kebr/ 'haughtiness'	/ʔomr/ 'life'
/ʃæʔn/ 'dignity'	/Geʃr/ 'skin'	/sokr/ 'intocication'
/tæʔn/ 'sneering'	/bekr/ 'intact'	/ʃokr/ 'thank'
/kæfn/ 'shroud'	/ʃekl/ 'shape'	[dʒowr] 'oppression'
/gæ.væzn/ 'deer'	/feʔl/ 'verb'	[dowr] 'round'
/hæds/ 'guess'	/mejl/ 'desire'	/Gofl/ 'lock'
/hæbs/ 'prison'	/nejl/ 'attainment'	Gosl/ 'ablutions'
/ʃæms/ 'sun'	/xejl/ 'troops'	[howl] 'round'
/læms/ 'touch'	/ro.tejl/ 'tarantula'	[Gowl] 'narration'
/mæks/ 'pause'	/hendʒ/ 'cosy'	/boxl/ 'jealousy'
/fæls/ 'scale'	/sendʒ/ 'cymbol'	/bordʒ/ 'tower-solar month'
/kæ.ræfs/ 'celery'	/lendʒ/ 'motor boat'	/dordʒ/ 'jewel-box'
/tænz/ 'scoffing'	/be.rendʒ/ 'rice'	[mowdʒ] 'wave'
/næbz/ 'pulse'	/na.rendʒ/ 'sour orange'	[ʔowdʒ] 'highness'

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/sæbz/ 'green'	/ʔejʃ/ 'pleasure'	[zowdʒ] 'pair'
/Gæbz/ 'bill'	/ʃemʃ/ 'bullion'	/fohʃ/ 'foul language'
/ræmz/ 'secret'	/pelk/ 'eyelid'	/torʃ/ 'sour'
/værz/ 'to knead'	/selk/ 'range'	/molk/ 'real estate'
/keʃa. værz/ 'farmer'	/kelk/ 'reed'	/moʃk/ 'musk'
/næzr/ 'vow'	/pejk/ 'messenger'	/tork/ 'Turk'
/bæzr/ 'seed'	/ʃerk/ 'polytheism'	/kork/ 'down'
/dʒæzr/ 'ebb-tide'	/pe.zeʃk/ 'physician'	/potk/ 'big hammer'
/Gædr/ 'value'	/tæ.meʃk/ 'raspberry'	/tong/ 'carafe'
/bæbr/ 'tiger'	/gon.dʒeʃk/ 'sparrow'	/dʒong/ 'miscellany'
/ʔes.tæxr/ 'pool'	/ze.reʃk/ 'barberry'	/gong/ 'dumb'
/se.tæbr/ 'thick'	/se.reʃk/ 'tear'	/long/ 'waist-cloth'
/bæzl/ 'munificence'	/xeng/ 'stupid'	/ʔorg/ 'organ'
/hæzl/ 'facetiae'	/leng/ 'leg'	/bo.zorg/ 'big'
/ræzl/ 'mean'	/reng/ 'dancing tune'	/so. torg/ 'large'
/ræzl/ 'desposal'	/senx/ 'class'	/sorx/ 'red'
/ʔæzl/ 'grace'	/ʃejx/ 'clergy man'	/homG/ 'stupidity'
/næʔl/ 'horseshoe'	/nerx/ 'rate'	/ʔomG/ 'depth'
/ʔes.tæbl/ 'stable'	/ke.rext/ 'benumbed'	[zomG] 'verve'
/pærtʃ/ 'rivet'	/sedG/ 'truthfulness'	[sowG] 'impelling'
/næsdʒ/ 'tissue'	/tebG/ 'according to'	[towG] 'ruff'
/hærdʒ/ 'chaos'	/ʔeʃG/ 'love'	/solh/ 'peace'
/xærdʒ/ 'expense'	/ʔerG/ 'root'	/sobh/ 'morning'
/dærdʒ/ 'insertion'	/vefG/ 'adoption'	/Gobh/ 'indecency'
/næhdʒ/ 'manner'	/zebh/ 'slaughtering'	[lowh] 'plate-tomb stone'
/ʔa.rændʒ/ 'elbow'	/ʃebh/ 'similar'	/robʔ/ 'quarter'
/ʔes.fændʒ/ 'sponge'	/feGh/ 'jurisprudence'	/dʒozʔ/ 'part of'
/Go.lændʒ/ 'colic'	/melh/ 'salt'	/vosʔ/ 'ability'

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/ʔærʃ/ 'heaven'	/zelʔ/ 'herbal'	
/næGʃ/ 'role'	/ʃejʔ/ 'object'	
/pæxʃ/ 'distribution'	/melh/ 'salt'	
/ræxʃ / 'Rostam's horsein shahname, letterof king'		
/næʔʃ/ 'corps'		
/næbʃ/ beside		
/dæ.ræfʃ/ 'awl'		
/bæ.næfʃ/ 'violet'		
/ræʔj/ 'vote'		
/sæʔj/ 'effort'		
/sæbk/ 'style'		
/kæbk/ 'partridge'		
/mæʃk/ 'water-skin'		
/ʔæʃk 'tear'		
/ræʃk/ ' envy'		
/hætk/ 'tearing'		
/mæng/ 'confused'		
/næng/ 'shame'		.
/væng/ 'grizzle'		
/hæng/ 'regiment'		
/tæng/ 'tight'		
/ræng/ 'color'		
/zæng/ 'call'		
/pæ.læng/ 'panther'		
/to. fæng/ 'gun'		
/dʒæ.fæng/ 'nonsense'		
/næ.hæng/ 'whale'		
/de.ræng/ 'pause'		
/fær.hæng/ 'culture'		
/tælx/ 'bitter'		
/tæbx/ 'cooking'		
/tʃærx/ 'wheel'		
/næfx/ 'swelling'		
/mæsx/ 'metamorphosis'		

/fæsx/ 'dissolution'		
/tælG/ 'mica'		
/hælG/ 'pharynx'		
/dælG/ 'coarse'		
/sæmG/ 'gum'		
/bærG/ 'electricity'		
/mædh/ 'compliment'		
/mæsh/ 'anointing'		
/ʃærh/'explanation'		
/tærh/ 'design'		
/næfh/ 'blowing'		
/mæn?/ 'prohibition'		
/tæb?/ 'nature'		
/væz?/ 'condition'		
/bæl?/ 'swallowing'		
/dʒæm?/ sum-addition'		
/xæl?/ disposal'		
/sæm?/ 'listening'		

4. 2 cvcc Words With Vowels /a,i,u/

This part of the study contains the data with vowels /a,i,u/ which are presented through two tables. In Table 3 and 4 the data are arranged based on the place of articulation of the first and second consonants of the coda, respectively.

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Table 3

i	u	a
/bist/ 'twenty'	/kuft/ 'knocked'	/jaft/ 'found'
/ʔist/ 'stop'	/ruft/ 'swept'	/baft/ 'wove'
/tʃist/ 'what is it?'	/pust/ skin	/taft/ 'twisted'
/zist/ 'life'	/dust/ 'friend'	/baŋg/ 'cry'
/kist/ 'who is he?'	/susk/ 'beetle'	/daŋg/ 'share'
/di.vist/ 'two. hundred'	/kuʃk/ 'palace'	/xand/ 'read'
/rixt/ 'poured'	/guʃt/ 'meat'	/rand/ 'drove'
/bixt/ 'bolted'	/duxt/ 'wove'	/mand/ 'remained'
	/suxt/ 'burnt'	/ʃanz.dæh/ 'sixteen'
		/xast/ 'wanted'
		/rast/ 'right'
		/kast/ 'decreased'
		/mast/ 'yoghurt'
		/ʔard/ 'flour'
		/partʃ/ 'jar'
		/pars/ 'Persia'
		/fars/ 'Name of a province'
		/Gartʃ/ 'mushroom'
		/kard/ 'large knife'
		/xark/ 'Name of an island'
		/tʃaʃt/ 'early lunch'
		/daʃt/ 'had'
		/kaʃt/ 'grew'
		/baxt/ 'lost
		/taxt/ 'invaded'
		/saxt/ 'made'
		/næ.vaxt/ 'played'
		/pær.daxt/ 'paid'
		/ʃe.naxt/ 'knew'

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Table 4

i	u	a
/bist/ 'twenty'	/kuft/ 'knocked'	/tʃaʃt/ 'early lunch'
/ʔist/ 'stop'	/ruft/ 'swept'	/daʃt/ 'had'
/tʃist/ 'what is it?'	/pust/ skin	/kaʃt/ 'grow'
/zist/ 'life'	/dust/ 'friend'	/baxt/ 'lost'
/kist/ 'who is he?'	/guʃt/ 'meat'	/taxt/ 'invaded'
/di.vist/ 'two. hundred'	/duxt/ 'wove'	/saxt/ 'made'
/rixt/ 'poured'	/suxt/ 'burnt'	/jaft/ 'found'
/bixt/ 'bolted'	/susk/ 'beetle'	/baft/ 'wove'
	/kuʃk/ 'palace'	/xast/ 'wanted'
		/rast/ 'right'
		/kast/ 'reduced'
		/mast/ 'yoghurt'
		/taft/ 'twisted'
		/ʃe.naxt/ 'knew'
		/næ.vaxt/ 'played'
		/pær.daxt/ 'paid'
		/rand/ 'drove'
		/ʔard/ 'flour'
		/kard/ 'large knife'
		/xand/ 'read'
		/mand/ 'remained'
		/pars/ 'Persia'
		/fars/ 'Name of a province
		/ʃanz.dæh/ 'sixteen'
		/partʃ/ 'jar'
		/Gartʃ/ 'mushroom'
		/xark/ 'name of a Island'
		/bang/ 'cry'
		/dang/ 'share-one sixth'

5. Data Analysis

Referring to the data in (4.1) and (4.2) it becomes clear that the words with cvcc syllable structure are numerous when the nucleus of the syllable is filled with vowels /as/ and *lal*. Besides, when the nucleus of the syllable is filled with vowels */a*,i,u/, sonority sequencing principle is verified as well. When the nucleus of the mono-syllabic word is filled with vowels / æ,e,o/ the sonority sequencing principle is verified if the first consonant of the coda is /r,L,j,n/ and [w] or the second consonant of the coda is /d.?.dž, x[1] , ʃ [2] .k,g.t/. In poly-syllabic words with vowels / æ,e,o/, sonority sequencing principle is verified except in /gævæzn/ 'deer'. Since the instances of the violation of sonority sequencing principle in case of/ æ,e,o/ in the nucleus of the cvcc syllable is numerous, it is claimed that sonority sequencing principle is verified after vowels /i,u,*a*/ but is rejected after vowels / æ,e,o/.

6. Conclusion

Following points were inferred during the course of data presentation and analysis.

1. Sonority sequencing principle is confirmed in words with cvcc syllable structure when the nucleus of the syllable is filled with vowels '/*a*,i,u/.

2. Sonority sequencing principle is rejected in words with cvcc syllable structure when the nucleus of the syllable is filled with vowels / æ,e,o/.

3. Based on sonority sequencing principle, vowels in Persian make up two natural classes, namely / æ,e,o/ and */a,i,u/.*

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1 . Except /tæbx/ 'cooking'
2 Except /næ? ʃ / & /næb ʃ / 'comer',

7. References

[1] Carr, Philip (1999). *English phonetics & Phonology, An Introduction*, Blackwell publishers LTD.

[2] Darzi, Ali (1372). "Compensatory Lengthening in modern colloquial Persian", *Linguistics Journal*, Tehran: Iran University Press, 10, No 2. p. 58-76.

[3] Haghshenas, A. M. (1370). "Poly systems of vowels in Persian", *Literary Linguistic Articles*, Tehran: Niloofar Press, p 285-306.

[4] Haghshenas, A. M. (1374). *Phonetics*, Tehran: Agah Publishers.

[5] Jensen,J.T.(1993) *English Phonology*, University Of Ottawa, p. 52-53.

[6] Jensen, J.T.(2004) *Principle Of Generative Phonology An Introduction*, John Benjamins North America.USA. p. 275-6.

[7] Kenstowicz, Micheal (1994). *Phonology in Generative Grammar*. Cambridge MA & Oxford UK: Blackwell Publishers.

[8] Keshani, Kh. (1372). *Dictionnaire Inverse de la langue Persane*, Téhéran: Presses Universitaires d'Iran.

[9] Lass, Roger (1984). *Phonology*. Cambridge: Cambridge University Press.

[10] Moshiri, M. (1371). *Dictionary of Persian*, Tehran: IRIB Publishers.

[11] Panahpoor, y. (1381), "Study of sonority reduction hypothesis in Pahlavi Syllable", *Ferdowsi University Journal of Humanities*, Mashhad: 35, No. 3 & 4, p. 725-731.

[12] Parmoon, Y. (1380). *Phonology of Today's Standard Colloquial Persian: A Generative, Metrical and Lexicalist Approach*, unpublished

dissertation in linguistics, Tarbiat Modares University Faculty of Humanities.

[13] Roca, I & Johnson, W. (1999) *A Course in Phonology*, Blackwell publisher Ltd, Oxford, UK, p.241-259

[14] Samareh,Yadollah (1977). *The Arrangement of Segmental Phonemes in Farsi*. Tehran University Press.

[15] Samareh, Y. (1378). *Phonetics of Persian*, 2ed Edition, Tehran: Iran University Press.

[16] Selkirk, Elisabeth O.(1982) "The Syllable" in *Phonological Theory*: The Essential Reading, Edited by John A. Goldsmith (1999), Blackwell Publishers Ltd. Oxford ox41JF,UK, p. 328-350

اصل سلسله مراتب رسایی در هجای cvcc در زبان فارسی

عالیه کرد زعفرانلوکامبوزیا[1]، **مهدی ذوالفقاری سریش**[2]

در زبان فارسی، تنها هجای دارای خوشۀ همخوانی هجای cvcc است که پایانۀ آن می‌تواند با دو همخوان پر شود. هدف از نگارش این مقاله بررسی اصل سلسله مراتب رسایی در زبان فارسی می‌باشد. ازاین‌رو واژه‌های فارسی با خوشۀ همخوانی cvcc در پایانه براساس نوع واکه‌ای که هستۀ هجا را پر می‌کند و نیز براساس نوع همخوانی که در جایگاه نخست یا دوم پایانه قرار می‌گیرد، مرتب شدند و نتایج زیر به دست آمد:

الف.   اصل سلسله مراتب رسایی در خوشه‌های همخوانی دارای واکه‌های /i,u,a/ مشاهده می‌شود.

ب.   اصل سلسله مراتب رسایی در خوشه‌های همخوانی که دارای واکه‌های /æ,e,o/ مشاهده نمی‌شود.

ج.   بر مبنای اصل سلسله مراتب رسایی واکه‌ها در زبان فارسی دو طبقۀ طبیعی را تشکیل می‌دهند، یعنی واکه‌های /æ,e,o/ و /a,i,u/

واژگان کلیدی: هجا، پایانه، هسته، اصل سلسله مراتب رسایی.

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