

Sonority in cvcc Syllables in 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. Finding whether these two consonants conform to sonority sequencing principle is the aim of this article. For this reason, the Persian words with cvcc syllable type were selected from Persian dictionaries and were classified based on the vowel filling the nucleus of the syllable and the consonant in the first or second slot of the coda and the following results were obtained:

- a. Sonority sequencing principle is confirmed in clusters whose 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/.

Key words: Syllable, coda, nucleus, sonority sequencing principle.

ی س ر ا ف ن ا ب ز cvcc ی ا ج ه ر د ی ی ا س ر : ن ا و ن ع

ای ز و ب م ا ک و ل ن ا ر ف ع ز د ر ک ه ی ل ا ع و ش ی ر س ی ر ا ق ف ل ا و ذ ی د ه م : ن ا گ د ن س ی و ن
ی ی ا س ر ب ت ا ر م ه ل س ل س ل ص ا ، ه ت س ه ، ه ن ا ی ا پ ، ا ج ه : ا ه ژ ا و د ی ل ک

ه د ی ک چ :

ی م ن آ ی ه ن ا ی ا پ ه ک ت س ا cvcc د ش ا ب ی م ی ن ا و خ م ه ی م ش و خ ی ا ر ا د ه ک ی ی ا ج ه ا م ن ت ، ی س ر ا ف ن ا ب ز ر د
ن ا ب ز ر د ی ی ا س ر ب ت ا ر م ه ل س ل س ل ص ا ی س ر ر ب م ل ا ق م ن ی ا ز ا ف د ه . د و ش ر ب ن ا و خ م ه و د ا ب د ن ا و ت
ه ک ا و ع و ن س ا س ا ر ب cvcc ی ن ا و خ م ه ی م ش و خ ی ا ر ا د ی س ر ا ف ی ا ه ه ژ ا و و ر ن ی ا ز ا . د ش ا ب ی م ی س ر ا ف
م و د ا ی ت س خ ن ه ا گ ی ا ج ر د ه ک ی ن ا و خ م ه ع و ن س ا س ا ر ب ز ی ن و د ن ک ی م ر ب ا ر ا ج ه ی ه ت س ه ه ک ی ا
د م آ ت س د ه ب ر ی ز ج ی ا ت ن و د ن د ش ب ت ا ر م د ر ی گ ی م ر ا ر ق ه ن ا ی ا پ
د و ش ی م ه د ه ا ش م /i,u,a/ ی ا ه ه ک ا و ی ا ر ا د ی ن ا و خ م ه ی ا ه م ش و خ ر د ی ی ا س ر ب ت ا ر م ه ل س ل س ل ص ا . ف ل ا
د و ش ی م ن ه د ه ا ش م /æ,e,o/ ی ا ه ه ک ا و ی ا ر ا د ی ن ا و خ م ه ی ا ه م ش و خ ر د ی ی ا س ر ب ت ا ر م ه ل س ل س ل ص ا . ب
ا ر ی ع ی ب ط ی ه ق ب ط و د ی س ر ا ف ن ا ب ز ر د ا ه ه ک ا و ی ی ا س ر ب ت ا ر م ه ل س ل س ل ص ا ی ا ن ب م ر ب . ج
. /æ,e,o/ ی ا ه ه ک ا و ی ن ع ی د ن ه د ی م ل ی ک ش ت

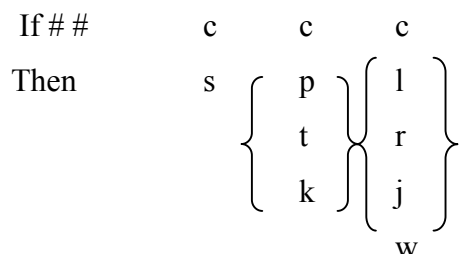
م و ر گ ی ن ا س ن ا م و ل ع ه د ک ش ن ا د س ر د م ت ی ب ر ت ه ا گ ش ن ا د د م ح ا ل ل ا ل ج ع ط ا ق ت ن ا ر ه ت : س ر د آ
ی س ا ن ش ن ا ب ز

3625 ی ل خ ا د 8011001 : ن ف ل ت

8028236 : ر ا گ ن ر و د

1. Introduction

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



It has been known for over a century that the construction of complex codas and onsets is guided by a sonority sequencing principle, which requires onsets 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 sounds can be classed with the vowels as the most sonorous and obstruents as 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 resonants, sonority scale can be restated as below:

- | | |
|---------------|----------------|
| 1. Obstruents | Least sonority |
| 2. Sonorants | |
| 3. Resonants | Most sonority |

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.

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 clusters 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 (1379, 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 divided into two parts. In the first part, the nucleus of the syllable

are filled with vowels /æ, e, o/ and in the second part, vowels /a, i, u/ fill the nucleus of the syllable.

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 based on the place of articulation of the second consonant of the coda.

Table (1)

æ	e	o
/tæbx/ 'cooking'	/zebħ/ 'slaughtering'	/rob?/ 'quarter'
/tæb?/ 'nature'	/zebr/ 'rough'	/sobħ/ 'morning'
/næb]/ 'corner'	/deb]/ 'acid'	/jomn/ 'felicity'
/næbz / 'pulse'	/jebħ/ 'like'	/homG/ 'stupidity'
/bæbr/ 'tiger'	/tebG/ 'according to'	/xoms/ 'one fifth'
/?æmr/ 'order'	/jem]/ 'bullion'	/?omr/ 'life'
/?æmn/ 'calm'	/sefr/ 'zero'	[fowG] 'top'
/dʒæm?/ 'sum-addition'	/tefl/ 'child'	[Gowl] 'promise'
/hæml/ 'carry'	/left/ 'lengthening'	[kown] 'creation'
/hæmd/ 'praise'	/gereft/ 'took'	[gowd] 'deep'
/?æfv/ 'forgiveness'	/je.geft/ 'wonderful'	[lows] 'contamination'
/kæf]/ 'shoe'	/setr/ 'veil'	[lowr] 'consulting'
/læfz/ 'word'	/fetr/ 'fast break'	[lowh] 'plate-tombstone'
/kæ.ræfs/ 'celery'	/ketf/ 'shoulder'	[fer.?own] 'pharaoh'
/bæ.næf]/ 'violet'	/sedr/ 'lotus'	[fer.dows] 'paradise'
/dæ.ræf]/ 'awl'	/sedG/ 'truthfulness'	/dʒoft/ 'pair'
/mætn/ 'text'	/dʒens/ 'kind-sex'	/Gofl/ 'lock'
/bætn/ 'abdomen'	/xeng/ 'stupid'	/kofr/ 'blasphemy'
/tjætr/ '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'
/?ædl/ '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'
/dʒæ.fæng/ 'nonsense'	/rezG/ 'daily bread'	/hosn/ 'goodness'
/tʃæ.rænd/ 'nonsense'	/ferz/ 'quick'	/rost/ 'ordinate'
/xo.rænd/ 'worthy'	/kerm/ 'worm'	/sost/ 'slack'
/de.ræng/ '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'	/ʔozr/ 'excuse'
/hæst/ 'exists'	/zelʔ/ 'herdal'	/dʒozʔ/ 'part of'
/ʃe.kæst/ 'broke'	/dʒelf/ 'rude'	/dʒozv/ 'part of'
/pæ.ræst/ 'worship'	/helm/ 'forbearance'	/hozn/ 'grief'
/ne.ʃæst/ 'sat'	/selk/ 'range'	/dozd/ 'thief'
/ʔæzm/ 'resolution'	/ʔelm/ 'science'	/ʔozv/ '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'
/færʔ/ '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'	/mol/ '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'
/bælʔ/ 'swallowing'	/Gejd/ 'bond'	/ʔodʒb/ 'self-conceit'
/tælx/ 'bitter'	/kejd/ 'deceit'	/ʔoʃr/ 'one – tenth'
/tælG/ 'mica'	/kejf/ 'enjoyment'	/xoʃk/ 'dry'

/dʒælb/ ‘arrest’	/ʔejn/ ‘eye-like’	/koʃt/ ‘killed’
/mædʒd/ ‘greatness’	/ʔejʃ/ ‘pleasure’	/do.roʃt/ ‘large’
/vædʒd/ ‘joy’	/ro.tejʃl/ ‘tarantula’	/ʔæn.golʃt/ ‘finger’
/sædʒʔ/ ‘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’	/ʃeʔr/ ‘poem’	/soGm/ ‘falsehood’
/zæxm/ ‘wound’	/feʔl/ ‘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’		/boʔd/ ‘farness’
/sæGf/ ‘ceiling’		/roʔb/ ‘fear’
/ʔæGd/ ‘treaty’		
/ʔæGl/ ‘wisdom’		
/fæGr/ ‘poverty’		
/fæhm/ ‘understanding’		
/Gæht/ ‘famine’		
/Gæhr/ ‘anger- cross’		
/læhn/ ‘tone’		
/tæʔm/ ‘flavor’		
/tæʔn/ ‘sneering’		
/Gæʔr/ ‘bottom’		
/kæʔb/ ‘cube’		
/læʔl/ ‘garnet’		
/læʔn/ ‘ban’		
/næʔʃ/ ‘corpse’		

Table (2)

æ	e	o
/dʒænb/ 'beside'	/hezɪb/ 'party'	/dʒɔnb/ 'movement'
/kæsb/ 'acquisition-business'	/kezɪb/ 'lie'	/roʊb/ 'fear'
/dʒæzb/ 'absorption'	/Geɪb/ 'invisible'	[zowb] 'melt'
/dʒælb/ 'arrest'	/ʔejb/ 'deficiency'	/hodʒb/ 'modesty'
/næzm/ 'order'	/helm/ 'forbearance'	/zɔlm/ 'oppression'
/hæzm/ 'digestion'	/ʔelm/ 'science'	/hokm/ 'commandment'
/bæzm/ 'party'	/tʃeɪm/ 'eye'	/toxm/ 'seed'
/dʒæzm/ 'definite'	/deɪm/ 'dry farming'	[jowm] 'day'
/ʔæzm/ 'resolution'	/dʒerm/ 'body'	[sowm] 'fast'
/dælv/ 'bucket'	/senf/ 'trade'	/dʒozv/ 'part of'
/næʃv/ 'growth'	/dʒelf/ 'rude'	/ʔozv/ 'member'
/hædʒv/ 'satire'	/heɪf/ 'pity'	/ʔonf/ 'violence'
/mæhv/ 'disappear'	/seɪf/ 'summer'	[xowf] 'fear'
/sæhv/ 'error-slip'	/teɪf/ 'spectrum'	/ʔorf/ 'common law'
/ləhv/ 'debauchery'	/zeɪt/ 'ugly'	/lotf/ 'mercy'
/lænf/ 'lymph'	/keɪt/ 'grew'	/zolf/ 'ringlet'
/hæzf/ 'deletion'	/beɪt/ 'nouse'	/moɪt/ 'fist'
/kæf/ 'discovery'	/seɪt/ 'abortion'	/pɔɪt/ 'back'
/zæʔf/ 'weak point'	/tʃeɪt/ 'hasp'	[mowt] 'death'
/bærf/ 'snow'	/feh.rest/ 'list'	[sowt] 'sound'
/Gælt/ 'roll'	/ʃa.ɛst/ 'befit'	[fowt] 'death'
/sæbt/ 'register'	/ʃe.ɛft/ 'wonderful'	/tʃort.ke/ 'abacus'
/zæbt/ 'record'	/ge.refɪt/ 'took'	/zo.moxt/ 'coarse'
/næɪt/ 'leakage'	/sær.ne.veɪt/ 'fate'	/do.rost/ 'right'
/hæst/ 'is'	/ne.veɪt/ 'wrote'	/næ.xost/ 'first'
/ræɪt/ 'name of a city'	/ʃe.ɛrd/ 'method'	/ko.loft/ 'thick'
/pæ.læɪt/ 'dirty'	/ʃa.ɛrd/ 'pupil'	/no.xost/ 'first'
/go.zæɪt/ 'passed'	/rend/ 'cunning'	/tond/ 'quick'
/ʃe.kæst/ 'broke'	/dʒeld/ 'cover'	/kond/ 'dull'
/pæ.ræst/ 'worship'	/zeɪd/ 'proper name'	/mozd/ 'wage'
/ne.ɪ.æst/ 'sat'	/ʔezn/ 'permission'	/dozd/ 'thief'
/ʔæGd/ 'treaty'	/heɪn/ 'while'	/roɪd/ 'growth'
/Gæsd/ 'intention'	/beɪn/ 'between'	/hozn/ 'grief'
/gærd/ 'dust'	/zehɪn/ 'mind'	/jomn/ 'felicity'
/gænd/ 'stink'	/deɪn/ 'debt'	/rokn/ 'base'

/kænd/ 'dug'	/dʒens/ 'kind'	/hosn/ 'goodness'
/fæ.ra.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'
/dʒæ]n/ 'ceremony'	/kebr/ 'haughtiness'	/ʔomr/ 'life'
/]æʔn/ 'dignity'	/Ge]r/ 'skin'	/sokr/ 'intocication'
/tæʔn/ 'sneering'	/bekr/ 'intact'	/]okr/ 'thank'
/kæfn/ 'shroud'	/]ekl/ 'shape'	[dʒowr] 'oppression'
/gæ.væzn/ 'deer'	/feʔl/ 'verb'	[dowr] 'round'
/hæds/ 'guess'	/mejl/ 'desire'	/Gofl/ 'lock'
/hæbs/ 'prison'	/nejl/ 'attainment'	Gosl/ 'ablutions'
/]æms/ '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'
/sæbz/ 'green'	/ʔej]/ 'pleasure'	[zowdʒ] 'pair'
/Gæbz/ 'bill'	/]em]/ 'bullion'	/foh]/ 'foul language'
/ræmz/ 'secret'	/pelk/ 'eyelid'	/tor]/ 'sour'
/værz/ 'to knead'	/selk/ 'range'	/mol/ 'real estate'

/ke.ʃ a. vɛrʒ/ 'farmer'	/kelk/ 'reed'	/mo ʃ k/ 'musk'
/næʒr/ 'vow'	/pejk/ 'messenger'	/tork/ 'Turk'
/bæʒr/ 'seed'	/ʃerk/ 'polytheism'	/kork/ 'down'
/dʒæʒr/ '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'
/bæʒl/ 'munificence'	/xeng/ 'stupid'	/ʔorg/ 'organ'
/hæʒl/ 'facetiae'	/leng/ 'leg'	/bo.zorg/ 'big'
/ræʒl/ 'mean'	/reng/ 'dancing tune'	/so. torg/ 'large'
/ræʒl/ 'desposal'	/senx/ 'class'	/sorx/ 'red'
/ʔæʒl/ '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/ 'indecenty'
/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'
/ʔærʃ/ 'heaven'	/zelʔ/ 'herbal'	
/næGʃ/ 'role'	/ʃejʔ/ 'object'	
/pæxʃ/ 'distribution'	/melh/ 'salt'	
/ræxʃ/ 'Rostam's horse in shahname, letter of king'		
/næʔʃ/ 'corps'		
/næbʃ/ 'beside'		
/dæ.ræfʃ/ 'awl'		

/bæ.næf/ ‘violet’		
/ræ?j/ ‘vote’		
/sæ?j/ ‘effort’		
/sæbk/ ‘style’		
/kæbk/ ‘partridge’		
/mæ j k/ ‘water-skin’		
/?æ j k ‘tear’		
/ræ j k/ ‘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’		
/tjærx/ ‘wheel’		
/næfx/ ‘swelling’		
/mæsx/ ‘metamorphosis’		
/fæsx/ ‘dissolution’		
/tælg/ ‘mica’		
/hælg/ ‘pharynx’		
/dælg/ ‘coarse’		
/sæmg/ ‘gum’		
/bærg/ ‘electricity’		
/mædh/ ‘compliment’		
/mæsh/ ‘anointing’		
/jærh/ ‘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/

In this part of the study, the data with vowels /a,i,u/ are presented into 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.

Table (3)

i	u	a
/bist/ 'twenty'	/kuft/ 'knocked'	aft/ 'found'
/ʔist/ 'stop'	/ruft/ 'swept'	baft/ 'wove'
/tʃist/ 'what is it?'	/pust/ 'skin'	taft/ 'twisted'
/zist/ 'life'	/dust/ 'friend'	/bang/ 'cry'
/kist/ 'who is he?'	/susk/ 'beetle'	/dang/ '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'

Table (4)

i	u	a
/bist/ 'twenty'	/kuft/ 'knocked'	/tʃaft/ 'early lunch'
/ʔist/ 'stop'	/ruft/ 'swept'	/daft/ 'had'
/tʃist/ 'what is it?'	/pust/skin	/kaft/ 'grow'
/zist/ 'life'	/dust/ 'friend'	/baxt/ 'lost'
/kist/ 'who is he?'	/guft/ 'meat'	/taxt/ 'invaded'
/di.vist/ 'two. hundred'	/duxt/ 'wove'	/saxt/ 'made'
/rixst/ 'poured'	/suxst/ 'burnt'	/jaft/ 'found'
/bixst/ '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 /æ/ and /a/. Besides, when the nucleus of the syllable is filled with vowels /a, i, u/, sonority sequencing principle is verified. 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,ʔ,dʒ,x¹,ʃ²,k,g,t/. In poly-syllabic words with vowels /æ, e, o/, sonority sequencing principle are verified except in /gæ.væzn/ '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

In the following, the conclusions inferred from the data presented and analyzed are stated.

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/ 'corner'.

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