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Syllable-Internal Structure in Iranian-Balochi Dialects

Bahareh Soohani[1], Abbas Ali Ahangar[2], Marc Van Oostendorp[3]

[1]Corresponding author, Ph.D., Metadata Services and Acquisition, Leiden University Libraries, the Netherlands, Email: bahareh.soohani@gmail.com

[2]Professor, English Language Department, Faculty of Literature and Humanities, Sistan and Baluchestan University, Zahedan, Iran, Email:ahangar@english.usb.ac.ir

[3]Professor, Department of Modern Languages and Cultures, Radboud University, the Netherlands, Email:m.vanoostendorp@let.ru.nl

Abstract

The present article dedicates to studying the syllable-internal structure in three Iranian Balochi dialects (IBDs) namely Mirjaveh Sarhaddi, Sarawani and Lashari dialects. The data analysis will be based on the onset-rhyme theory (e.g., Kurylowicz, 1948; Fudge, 1969; Vergnaud & Halle, 1979; Selkirk, 1982). Moreover, the syllable weight in IBDs will be discussed in the framework of mora theory (Hayes, 1985, 1989). The data have been collected during the research fieldwork in Sistan and Baluchestan province, Iran. The research findings demonstrate that the Balochi language is an example of a nucleus-weight language in which heavy syllables depend on the number of elements in the nucleus. Thus, CV and CVC are light syllables and CVV(C) syllable is counted as heavy syllable. Besides, the context-dependent weight of CVC syllables occurs in IBDs stress pattern system. Studying the syllable contact (word-medial consonant clusters) in IBDs shows that Balochi is among languages that admit all types of heterosyllablic clusters.

Keywords: syllable structure, syllable weight, sonority scale, internal coda, syllable contact, Iranian Balochi dialects

1. Introduction

The syllable is a prosodic category that orders segments in well-formed sequences according to their sonority values, it means that the syllable has a vowel (high sonorant segment) in the nucleus position which generally is preceded or followed by lower sonority segments, normally consonants. In the prosodic hierarchy, the syllable is located above the segment and below the word, so it is larger than the segments and smaller than the word (Zec, 2007, p.162). Besides, the syllable is the main part of phonological generalization and relates to both segmental and suprasegmental levels (Green, 2003).

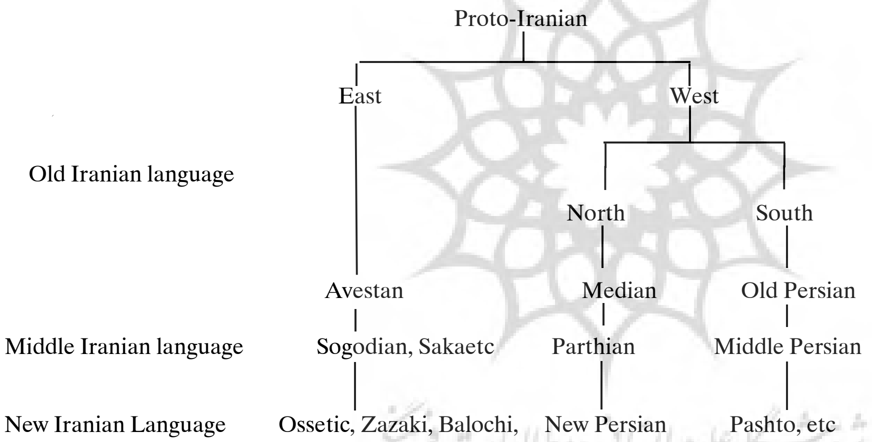
The number of works that have been done on the syllable structure of Balochi dialects (both Iranian Balochi dialects and non-Iranian Balochi dialects) is limited and no works have been done on the internal structure of any Balochi dialects based on Onset-Rhyme Theory. A special research on the phonology of Sarawani Balochi was done by Soohani (2003). This work comprises a contrastive investigation of the phonology of the Sarawani dialect of Balochi, from the point of view of the ruling linear and non-linear models of modern phonology. In this regard, she briefly introduces the syllable structure in this dialect. Also, Jahani and Korn (2009) provides a description of the phonology, morphology, and syntax of Balochi dialects. They briefly present the phoneme inventory, syllable structure and stress patterns of Balochi dialects. Besides, Ahangar et al. (2016) study the syllable structure in the Sarhaddi Baloch dialect of Granchin. In this research, the syllable structure of Sarhaddi Balochi is investigated based on the theory of CV phonology as a post-generative theory. It also examines the phonotactic distribution of consonants in initial and final clusters as well as the effect of the nucleus vowel of the syllable on the selection of dissimilar consonant clusters of the coda. Except for only some descriptions, no theoretical studies based on onset-ryhme theory have been previously done on the internal structure of syllables in Balochi. Thus, the present study can be regarded as the starting point for doing both descriptive and theoretical studies on the syllable structure of Iranian-Balochi dialects.

Iranian Balochi dialects (IBDs) display a reasonably complex syllable structure, including open and closed syllables, onset clusters as well as coda clusters. The relevant templates may be notated as CV, CVC, CVVC, CCVC, CVCC and CCVCC. In addition, most words are monosyllabic or disyllabic. Trisyllabic forms are rare. As every phonological analysis is theory-oriented, the theory chosen in the present research to illustrate the phonotactics of three Iranian Balochi dialects namely Mirjaveh Sarhaddi, Sarawani and Lashari dialects is an onset-rhyme theory (e.g., Kurylowicz, 1948; Fudge, 1969; Vergnaud & Halle, 1979; Selkirk, 1982), which distinguishes between onsets and rhyme (rime). Besides, the syllable weight in IBDs under study will be investigated in the framework of mora theory (Hyman, 1985; Hayes, 1989). We regard the present research as an opportunity to examine how onset- rhyme theory and mora theory treat the Balochi data. The value of a theory, in fact, is measured based on its insight and prediction in analyzing language data. This study is of interest to both descriptive linguists and theoretical phonologists. Furthermore, from the typological perspective, it can be significant and ultimately help our understanding of suprasegmental features of some Iranian Balochi dialects as modern Iranian languages.

This article is organized as follows: Section (2) introduces language background, section (3) deals with the theoretical framework employed, section (4) provides the description and analysis of IBDs syllable constituency, and finally, section (5) represents the conclusion.

2. Language Background

From the historical point of view, the position of Balochi among western Iranian languages is controversial. While Paul (2003, p.61) claims that Balochi seems to be more a south-western Iranian language, Elfenbein (1989) and Korn (2003) introduce this language among the north-western group of Iranian languages, which also includes other new Iranian languages such as Kurdish, Zazaki, Gilaki, Mazandarani, and Taleshi, whereas Persian, Lori-type languages, etc., are classified as south-western Iranian languages. Geographically, Balochi is spoken in the south-eastern part of the Iranian language area. Korn (2003, p. 50) shows the position of Balochi among other Iranian languages in the form of a family tree as below:



So Balochi is one of the north-west Iranian languages, which is spoken in south-western Pakistan, and by a large number of people in Karachi. It is also spoken in south-eastern Iran, in the province of Sistan and Baluchestan, and by the Baloch who have settled in the north-eastern province of Khorasan and Golestan. It is, furthermore, spoken by small communities in Afghanistan, in the Persian Gulf States, in the Marw/Marie region of Turkmenistan, in India, East Africa and today also by a considerable number of Baloch in North America, Europe and Australia (Jahani & Korn, 2009).

Balochi has a wide variety of dialects, which are distinguished by various features of their phonology, lexicon, and morphology. The most systematic classification of Balochi dialects has been done by Elfenbein (1989). He presents his results in several articles and books. According to Elfenbein (1989, pp. 636-637), Balochi consists of two main groups of dialects, Eastern, and Western, which are dividable into six major dialects:

1) Rakhshani with its three subdialects:
   a. Sarhaddi (including Balochi of Sistan and Balochi of Turkmenistan)
   b. Panjuri
   c. Kalati
2) Sarawani
3) Lashari
4) Kechi
5) Coastal dialects
6) Eastern Hill Balochi

This last dialect (Eastern Hill Balochi) represents the Eastern group while the rest (1-5) belong to Western Balochi. Jahani and Korn (2009, p. 636) have broadly divided the Balochi dialects into the three groups of Eastern, Western, and Southern Balochi. In their Balochi dialects division, Sarawani and Panjuri are considered as transitional dialects between Western and Southern Balochi in Iran and Pakistan, respectively. Moreover, in their classification, Southern Balochi dialects include the Lashari, Sarbazi, Kechi, and Coastal dialect

According to the Balochi dialects divisions that have been illustrated above, the corpus data for the present research can be classified as belonging to the Southern group (Lashari Balochi), Southern-Western group (Sarawani Balochi) and a subdialect of the Rakhshani or Western group (Sarhaddi Balochi).

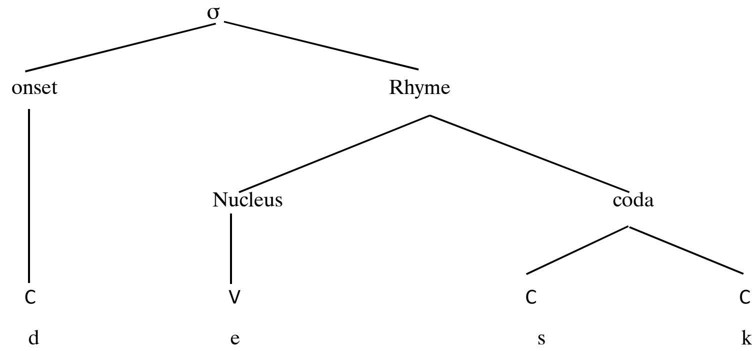
3. Theoretical Considerations

Many proposals have been made concerning the internal structure of syllables. Some current views are mentioned in Blevins (1995) as: Flat structure (e.g., Kahn, 1976), Moraic approaches (e.g., Hayes, 1985, 1989), Binary branching with Body (e.g., McCarthy, 1979), Ternary branching (e.g., Hockett, 1955), and Binary branching with Rhyme (e.g., Selkirk, 1982).

The focus of the present research is on the proposal named onset-rhyme theory. In this view, a syllable has a hierarchical internal structure[1]. As the name suggests, in onset-rhyme theory, the syllable is analyzed as consisting of two immediate constituents: the onset, containing any consonant or consonant cluster in the initial position preceding the vowel. For example, the onset of the word *key* is /k /and the onset of *trip* is /tr/. The rhyme of the syllableis the vowel and whatever follows it. Besides, the rhyme can contain any vowel without any following consonants. For example, the rhyme of the word *see* is /i/. Alternatively, the rhyme can comprise one or two postvocalic consonants, as in *doll*, whose rhyme is /a:l/, and *desk*, whose rhyme is /esk/. We present the internal structure of the word *desk* based on onset-rhyme theory as shown in figure (2):

[1] In Flat model (e.g., Hooper, 1972), the syllable is seen as a liner string of phonemes. In other words, in this view, the syllable itself has no internal structure.

2) Syllable internal structure (English word *desk*)
(C= Consonant, V= vowel)



4. Syllabic Constituency in IBDs: Data Description and Analysis

The present section deals with the description and analysis of the syllable internal structure of IBDs. Sub-sections 4.1, 4.2, and 4.3 are dedicated to describing the structure of onset, coda and nucleus in IBDs respectively. Sub-section 4.4 investigates syllable contact in IBDs, and finally, sub-section 4.5 presents and discusses the internal codas and final codas asymmetry in IBDs.

4.1. Onsets

This constituent seems obligatory in Balochi dialects, whenever the concatenation of morphemes would result in an onset less syllable, epenthetic [ʔ][2] or [j] are inserted, as the following example demonstrates. (In all following data [˜] stands for nasalization, [ʰ]stands for aspiration and [ː] stands for vowel length)

(3) [ʔ] and [j] Insertion in a Word-medial Onset Position

a.i	*mollɑ-ok*	[mollɑ-ʔok]	'butterfly'
a.ii	*do-om*	[do-ʔoʃm]	'second'
a.iii	*hædidʒæ-ok*	[hædidʒæ-ʔok]	'ladybird'
a.iv	*dʒolɑː-ok*	[dʒolɑː-ʔok]	'spider'
b.i	*seː-om*	[seː-jõm]	'third'
b.ii	*wɑːdʒæ-iː*	[wɑːdʒæ-jiː]	'a man'
b.iii	*distæ-iː*	[distæ-jiː]	'(s)he saw'

[2] Lombardi (2002, p.4) assumes that the glottal stop has a pharyngeal place specification and suggests that the hierarchy of ranked markedness constraints according to the place of articulation as proposed by Prince/ Smolensky (1993) should be modified to include *Phar in the rightmost position. This hierarchy is reproduced in as below:
*Lab, *Dor>> *Cor>> *Phar
With this hierarchy "/ʔ/ will be [the] optimal epenthetic consonant [and] its place markedness violation is even lower than that of the relatively unmarked /t/" (Naderi & van Oostendorp, 2011, p. 154).

The data in (3) show that when a suffix starts with a vowel and the preceding stem ends with a vowel, a consonant [ʔ] or [j] is inserted as vowel hiatus resolution. These consonants provide the following syllable with an onset. Moreover, [ʔ] mainly occurs in word-initial position before a vowel, given words like [ʔõmr] 'age', [ʔækl] 'wisdom', [ʔæ̃mb] 'mango', [ʔɑːpos] 'cow in calf'.

Simple onsets can be filled by any consonant, with notable exception: [ɻ] can occur at the end of the word as in *klieɽ* 'lizard', but not at the beginning **ɽerkæbs.* Furthermore, word-initial consonant clusters are also allowed in IBDs. Consider the following examples (the diacritic symbol [ʰ] stands for aspiration):

(4) Word-initial Consonant Clusters

a.i	*tʃlimp*	[tʃʰlĩmp]	'bubble-bubble'
a.ii	*pli:ʃtok*	[pʰliʃtok]	'martin'
a.iii	*klieɽ*	[kʰlieɻ]	'lizard'
a.iv	*blek*	[blek]	'write!'
a.v	*gla:bi*	[glɑːbi]	'pink'
b.i	*tʃra:g*	[tʃʰrɑːg]	'lamp'
b.ii	*bra:s*	[brɑːs]	'brother'
b.iii	*kru:tʃ*	[kʰruːtʃ]	'a kind of date'
b.iv	*gru:g*	[gruːg]	'storm'
b.v	*trond*	[tʰroʃnd]	'rough'
b.vi	*drueg*	[drueg]	'lie'
b.vii	*pra:h*	[pʰrɑːh]	'wide'
c.i	*ʃwa:næk*	[ʃwɑ̃ːnæk]	'shepherd'
c.ii	*bwa:n*	[bwɑ̃ːn]	'read!'
c.iii	*gwær*	[gwær]	'chest'
c.iv	*dwa:zdæh*	[dwɑːzdæh]	'twelve'
c.v	*dʒwa:n*	[dʒwɑ̃ːn]	'young'
c.vi	*swa:r*	[swɑːr]	'rider'

Based on the examples in (4), we can draw the following table (+ denotes that a combination exists, -indicates that it does not exist or is very marginal)

Table 5

Word- initial Consonant Clusters in IBDs

C_2 / C_1	l	r	w
p	+	+	–
b	+	+	–
t	–	+	+
d	–	+	+
k	+	+	–
g	–	+	+
dʒ	–	–	+
tʃ	+	–	–
s	–	–	+

Table (5) demonstrates that the first segment of a cluster is always a 'simple' obstruent and the second consonant in a cluster is either one of the liquids [l, r] or the glide [w]. You can see that all cells are not filled in the table (5). In particular, the combinations [tl, dl,] and [pw] are missing. Since the first two, all involve a coronal obstruent followed by a coronal liquid and the second double all a labial obstruent followed by a labial glide. In other words, Balochi onsets satisfy the following rule:

The two segments in the onset cannot have the same place of articulation.

Balochi onset clusters fit the theory of Sonority Sequencing Generalization (SSG). "SSG states the relative sonority within complex onsets: in a biconsonantal onset cluster, the second consonant should be more sonorant than the first" (Zec, 2007, p.189). So within the onset, fewer sonorant consonants precede more sonorant consonants. In order to provide better explanations, consider the sonority scale (the early works of Siever, 1881)

Sonority Scale

Obstruents < nasals < liquids < glides < vowels

1 2 3 4 5

If we use the number in sonority scale and transfer them into columns of asterisk, the syllable structure of the word *grɑ̃:n* 'heavy, expensive' can be represented as in figure (6):

Figure 6

Sonority Scale of grɑ̃:n 'heavy'

		*	
		*	
	*	*	
	*	*	*
*	*	*	*
g	r	ɑ:	n
1	3	5	2

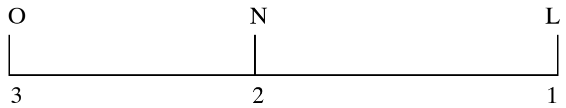
This structure shows that the segments before the nucleus (the highest element) gradually rise in sonority, whereas those following the nucleus (peak) fall.

In IBDs, [gr] and [kr] are fine clusters, rising from the 1 of [g] and [k] to the 3 of [r], but [gn] is not, and neither is any other cluster of obstruent and the following nasal.

The reason for this is that the dispersion between an obstruent and a nasal is not large enough, which can be explained by Minimal Sonority Distance (MSD) imposed on a pair of onset segments (Steriade, 1982; Selkirk, 1984a; Levins, 1985, among others). Based on the scale in (b), [g] is separated from [r] by two intervals, while only one interval separates [g] from [n]. Because the minimal sonority distance in the Balochi is at least two intervals. In sum, any two consonants that are at least two intervals apart can form a complex onset in Balochi.

Figure 7

Sonority Distance



Zec (2007, p.189) gives the range of values for MSD, based on the scale in figure (7) as follows (O= obstruent, N= nasal, L= liquid):

a)	MSD0	OO, NN, LL
b)	MSD1	ON, NL
c)	MSD2	OL

Sequences with flat sonority have the value MSD0, those with the steepest rise, MSD2, and the sequences with a less steep rise are given the value MSD1.

Balochi, which allows OL onset clusters, provides an example of a language with minimal sonority distance MSD2.

As data (3) and (4) show, in Balochi, both simple onsets and complex onsets are allowed. Moreover, in the onset cluster, less sonorant consonant precedes more sonorant segment.

However, IBDs have a number of word-initial clusters which violate the sonority sequencing generalization. These are words such as in (8).

(8) Word-initial Consonant Clusters Against (SSG)

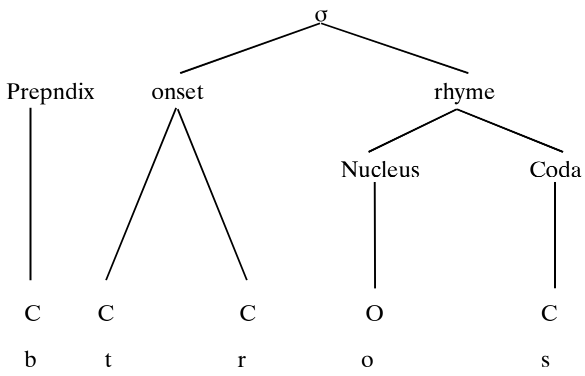
a.i.	*spiːt*	[spiːt]	'white'
a.ii	*spiʈʈ*	[spiʈʈ]	'speed'
a.iii	*spænk*	[spæ̃nk]	'story'
b.i	*bkæp*	[bkæp]	'fall down!'
b.ii	*bhænd*	[bhæ̃nd]	'laugh!'
b.iii	*bzuːr*	[bzuːr]	'take!'
b.iv	*pkoʈʈ*	[pkoʈʈ]	'beat!'
b.v	*psuːtʃ*	[psuːtʃ]	'burn!'

In examples (8a.i- a.iii), coronal /s/ is followed by plosives /t, p/. In addition, in the imperative forms the prefix *b-* or *p-* is added to the present stem-like in (8b.i- b.v). Not only do these words all start with two obstruents, in spite of the demands on dispersion which Balochi data otherwise shows, but words like *bgwæp* 'knit!' and *btrændʒ* 'hang!' even start with three consonants.

One common strategy to explain such cases as in other languages such as English, Dutch and Greek is to consider the initial consonant of onset clusters (here in Balochi dialects *s*, *p* and *b*) not to be part of the core syllable, but to form a prependix which is considered to be outside the domain of normal syllabification process. This extra consonant has an extra syllabicity property, i.e. not belonging to the syllable structure (Ewenand van der Hulst, 2001, pp. 138,148). Thus a word like *btros* 'fear!' might have the structure in (9):

Figure 9

btros [btros] ‘fear!’



However, such sequences cannot appear at the beginning of the medial cluster. They are split between two syllables, as shown in (10).

(10) MedialsC in IBDs

a.i	*da:sta:n*	[dɑ:s] $_σ$ [tʰɑ̃:n] $_σ$	‘story’
a.ii	*bæstæ*	[bæs] $_σ$ [tʰæ] $_σ$	‘box’
a.iii	*ræstæg*	[ræs]$_σ$ [tʰæg]$_σ$	‘ripe’

The initial consonant of the medial cluster must be syllabified as a rhyme of the preceding syllable and the final consonant of the medial cluster belongs to the onset in the following syllable. In fact, the medial clusters in (10) are heterosyllabic.

3.2. Codas

Now, we turn to the coda position in IBDs. Data illustrates that every consonant can occur in this position, except [w] and [ʔ]: *ʃæh* ‘king’, *mi:r* ‘sir’, *bɪl* ‘dog’, *ta:s* ‘bowl’, *pa:n* ‘drug’ and etc.

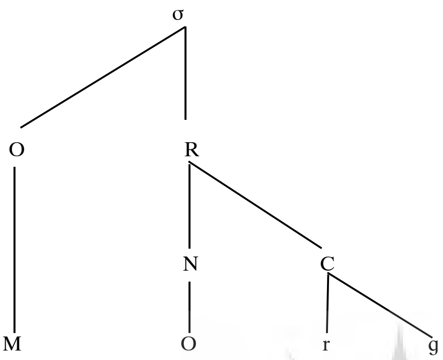
(11) Word-final Consonant Clusters

a.i	*lonḍ*	[lõnḍ]	‘fellow’
a.ii	*bænd*	[bæ̃nd]	‘rope’
a.iii	*ṭueng*	[ṭʰueʃng]	‘knee’
a.iv	kelent	[kʰelẽnt]	‘shovel’
a.v	*neginz*	[neg̃inz]	‘lentil’
a.vi	*næmb*	[næ̃mb]	‘dew’
b.i	*kælb*	[kʰælb]	‘heart’
b.ii	*ha:lg*	[hɑ:lg]	‘peach’
b.iii	*hæjk*	[hæjk]	‘eyeball’
b.iv	*hord*	[hord]	‘small’
b.v	*morg*	[morg]	‘bird’
b.vi	*bærp*	[bærp]	‘snow’

Examples in (11) and geminates in the word-final position (Soohani et al., 2014) are pieces of evidence for Balochi having a complex coda, which have the following structure (O: onset, R: rhyme, N: nucleus and C: coda)

Figure 12

morg [morg] 'bird, hen'



The sonority profile of the codas in (11) is always the same: a liquid (as in *morg*) or nasal (as in *namb*) followed by an obstruent. A coda cluster, therefore, is the mirror image of the onset cluster. All final clusters in (11) support the sonority sequencing generalization in word-final position: within the coda, more sonorant consonants precede fewer sonorant consonants (Ewenand van der Hulst, 2001).

On the other hand, there are a number of examples in IBDs that complex codas violate the sonority sequencing generalization in the coda position. Consider the following examples:

(13) Word-final Consonant Clusters Against (SSG)

a.i	*pohl*	[p^{h}ohl]	'bridge'
a.ii	*ketl*	[k^{h}etl]	'kettle'
a.iii	*kosl*	[k^{h}osl]	'ablution'
a.iv	*nogl*	[nogl]	'candy'
a.v	*ʔækl*	[ʔæk^{h}l]	'wisdom'
a.vi	*ɣopl,kobl*	[ɣopl], [k^{h}obl]	'lock'
b.i	*mohr*	[mohr]	'tight'
b.ii	*pekr*	[p^{h}ekr]	'thought'
b.iii	*kæbr*	[k^{h}æbr]	'grave'
b.iv	ʔæsr	[ʔæsr]	'afternoon'
c.i	*kæhn*	[k^{h}æhn]	'Qanat'
c.ii	*læhm*	[læhm]	'slow, soft'
d.i	*kæbg*	[k^{h}æbg]	'partridge'
d.ii	*hæpt*	[hæpt]	'seven'
d.iii	*pæʈk*	[p^{h}æʈk]	'the sound of bullets'
d.iv	pætk	[p^{h}ætk]	'cooked'

Based on examples in (13 a-c), consider table (14):

Table 14

Word-final Consonant Clusters in IBDs

C2 C1	l	r	n	m
h	+	+	+	+
t	+	-	-	-
s	+	+	-	-
g	+	-	-	-
k	+	+	-	-
b	+	+	-	-
p	+	-	-	-

Table (14) shows that the first segment of the final clusters is a ‘simple’ obstruent and the second consonant in a cluster is either one of the liquids [l, r] or the nasals [n, m]. So, there is a sequence of obstruent/ sonorant which is an example of rising sonority with MSD2 values which is against the SSP.

For dealing with SSG violations, there are a number of proposals such as the core and affix, syllable appendix and etc. (Yu Cho and Holloway king 2003). The present proposal in which we analyze the data in (13) relies on the notion of semisyllables. Semisyllables are syllables that have no mora. Semisyllables are known as degenerate syllables, minor syllables, headless syllables, and consonantal syllables. Properties of semisyllables are as follows (Yu Cho & Holloway king, 2003, p. 187):

(15) Properties of Semisyllables

“a. No nucleus

b. No codas

c. No stress/accent/tone

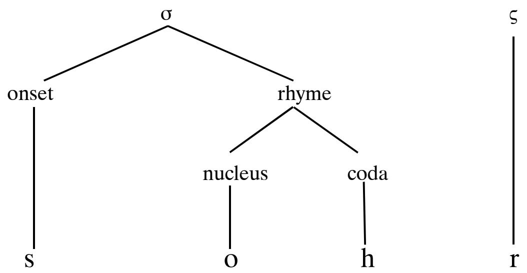
d. Prosodically invisible

e. Well-formed onset clusters

f. Restricted to morpheme peripheral positions”

Semisyllables are defined as syllables that contain no mora. Sonority sequencing principle applies to consonant clusters including semisyllables, because they form a syllable which has an onset but no nucleus. Since there is no syllable peak, there is only rising sonority in semisyllables. While moraic full syllables are represented with regular sigma (σ), semisyllables are represented with a final-position sigma (ς). The semisyllables in Balochi are restricted to the right edge of the word. The representation of the word *sohr* ‘hot’ is as given in figure (16):

(16) *sohr* [sohr] ‘hot’ word



Moreover, in (13d) there are a number of examples with the sequences of two obstruents (stop+ stop) at coda position, they show flat sonority which has MSD0 values based on Zec (2007). Table (16) shows the plateau clusters in the data (13d).

Table 17

Plateau Coda Clusters in IBDs

C2 / C1	g	k	t
b	+	-	-
p	-	-	+
t	-	+	-
ʈ	-	+	-

Indeed, table (17) displays examples of harmonic clusters like [bg, tk, ʈk] which are formed by a sequence of [-dorsal][+ dorsal] stop (Yu Cho and Holloway King 2003).The harmonic clusters involve homogeneity of laryngeal features, no homogeneous clusters of [-dorsal][+dorsal] are not found in Balochi data as in *pg *bk *tg *ʈgjust like in Georgian harmonic clusters (Yu Cho & Holloway King, 2003).

Whereas coda clusters in data (11) show the falling sonority in coda clusters, the data in (13d) provides a type of coda clusters with flatting sonority.

4.3. Nucleus

Considering the rhymes consisting of two constituents, the nucleus and coda, in this part the distribution of vowels in the nucleus position in the syllable structure of IBDs is presented. Certain restrictions may govern in this distribution, something which needs to be described. The vowel distribution of IBDs is as follows:

(18) The Distribution of Vowels in IBDs

i. In all three dialects, an open syllable with a consonant, i.e., CV, both front and back monophthongs and diphthongs.

ii. All vowels i.e., front, back and diphthongs can occur in the nucleus position of the CVC syllable structure.

iii. In CCVC structure, all front and back vowels except /ɪ/ and /ʊ/can occur, and among diphthongs only /ou/ cannot occur in the nuclease position.

iv. All short front, back and diphthong except /ou/ can occur in the nucleus position of the CVCC syllable.

In sum, Iranian-Balochi dialects are dialects in which onset is obligatory and does not allow onsetless syllables, all consonants except [ŋ,ɽ] can occur in an onset position. Moreover, codas are permitted, i.e. syllables maybe closed, all consonants except [w] can occur as coda. Furthermore, it allows complex onsets and codas. In word-initial clusters, the first segment is generally an obstruent which is followed by a liquid or a glide. The second segment in the word-final clusters is normally an obstruent which precedes a liquid or a nasal. However, there are clusters in both word-initial and word-final positions which violate sonority sequencing generalization; we consider the first consonant of violated onset cluster as prependix and the final offending consonant of coda cluster as appendix. They have extrasyllabicity property: not belonging to the syllable structure. Finally, only vowels are syllabic in IBDs.

4.4. Syllable Contact (SC) in IBDs

Syllable contact law favors a preceding coda be higher in sonority than the following onset (Davis, 1998 & Gouskova, 2004, among others). In other words, the heterosyllabic cluster must have descending sonority. In this subsection, the structure of the syllable contact (word-medial consonant clusters) in IBDs will be evaluated based on the syllable contact scale proposed by Zec (2007, p. 190). In syllable contact scale, the sequences of flat sonority have SC0 value, sequences of rising sonority are given the value SC+1/+2, and those sequences with falling sonority have SC-1/-2 value. (O stands for obstruent, N stands for nasal and L stands for liquid)

Table 19

Syllable Contact (SC)

SC+2	OL
SC+1	ON, NL
SC0	OO, NN, LL
SC-1	LN, NO
SC-2	LO

As Table (19) shows the sequences of OL, ON and NL have positive values, so they are not preferred in word-medial clusters, while the syllable contact with negative values is highly preferred. Besides, the sequences of OO, NN and LL have flat sonority.

Now consider data (20) which illustrate the syllable contact in IBDs. (20a) is the sequence of NO and LO, (20b) gives the sequence of LO, and (20c) presents the sequence of OO

(20) Syllable Contact in IBDs

(a) Falling Sonority NO/ LO

a.ii	*dombiːtʃk*	[dõm.biːtʃk]	'bird tail'
a.iii	*kuːnzæk*	[kʰũːn.zæk]	'heel'
a.iv	*tʃiːntʃok*	[tʃʰĩːn.tʃʰok]	'pinky'
a.v	*hærgoʃk*	[hær.goʃk]	'rabbit'
a.vi	*kaːrtʃok*	[kʰɑːr.tʃʰok]	'knife'
a.vii	*pelpel*	[pʰel.pʰel]	'pepper'
a.viii	*ʃælgom*	[ʃæl.gõm]	'turnip'

(b) Rising Sonority ON/ OL

b.i	*ʔasmaːn*	[ʔɑs.mɑ̃ːn]	‘sky’
b.i	*dokmæ*	[dok^h.mæ]	‘button’
b.iii	*kohnæg*	[k^{h}oh.næg]	‘old’
b.iv	*gehniːtʃ*	[geh.niːtʃ]	‘coriander’
b.v	*pæhluːnk*	[p^{h}æh.lũːnk]	‘the side’
b.vi	*bæːdræng*	[bæːd.ræ̃ng]	‘cucumber’
b.vii	*sobræ*	[sob.ræ]	‘floor cloth’
b.viii	*megraːz*	[meg.rɑːz]	‘scissors’

(c) Flat Sonority OO

c.i	*kæptaːg*	[k^{h}æp.t^{h}ɑːg]	‘shoulder’
c.ii	*hoʃter*	[hoʃ.t^{h}er]	‘camel’
d.iii	*redʒgu*	[redʒ.gu]	‘marmot’
c,iv	*bæstæg*	[bæs.t^{h}æg]	‘yogurt’
c.v	*neʃtæg*	[neʃ.t^{h}æg]	‘single’
c,vi	*sohteg*	[soh.t^{h}eg]	‘burn’

The data in (20) exhibit that Balochi is among languages that admit all types of the heterosyllabic clusters. However, some languages like Sidamo (Zec2007) are more restricted in this respect and only prefer clusters in the negative range of syllable contact scale and disfavor clusters in the positive range of scale.

Furthermore, there is one more type of falling sonority syllable contact in IBDs which consists of the sequence of glide (G) and obstruent (O) as shown in (21).

(21) Falling Sonority GO

a.i	*ʃejtaːn*	[ʃej.tɑ̃ːn]	‘evil’
a.ii	*zejtuːn*	[zej.tuːn]	‘olive’
a.iii	*mejdaːn*	[mejdɑ̃ːn]	‘square’
a.iv	*kejtʃiːn*	[k^{k}ej.tʃ^{h}ĩːn]	‘scissor’

4.5 Internal Codas and Final Codas Asymmetry in IBDs

As it has already been discussed, in IBDs both individual consonants and consonant clusters are allowed in the final position (coda) namely CVC and CVCC. However, the data in (20) and (21) illustrate that medial clusters are heterosyllabic and there are no complex internal codas in IBDs, so only a CVC pattern is allowed word-internally and not CVCC. As onsetless syllables are disallowed in Balochi, thus the second component of medial consonant clusters is considered as the onset of the following syllable.

In some languages, final consonants and internal codas are symmetrical like Spanish, but in many languages final consonants shape in a different way than internal codas, thus in these languages final consonants are referred as exceptional. Two reasons deal with the final coda exceptionality: (a) segmental immunity which allows more consonants in the final position than in the internal codas. (b) metrical invisibility which ignores the final consonants in the metrical process (Côté, 2011, pp. 848, 845). The segmental immunity occurs in IBDs. Whereas only one consonant is permitted in internal codas, two consonants may appear in final positions. Côté (2011) discuses five factors which trigger the segmental immunity: alignment, positional faithfulness, licensing parameters, perceptual factors and morphology.

Patterns in (22) postulate the number of consonantal slots in internal codas vs. final position (Côté 2011, p. 854), here the examples are ignored.

(22)	Internal codas		Final position
	a.	ø	C
	b.	C	CC
	c.	ø	ø
	d.	C	C
	e.	C	ø
	f.	CC	C

Type (22a) and (22b) show languages that allow more consonants in final position, type (22c) and (22d) indicate the symmetrical languages and finally (22e) and (22f) identify the languages that permit more consonants in internal coda position(Côte ́, 2011).

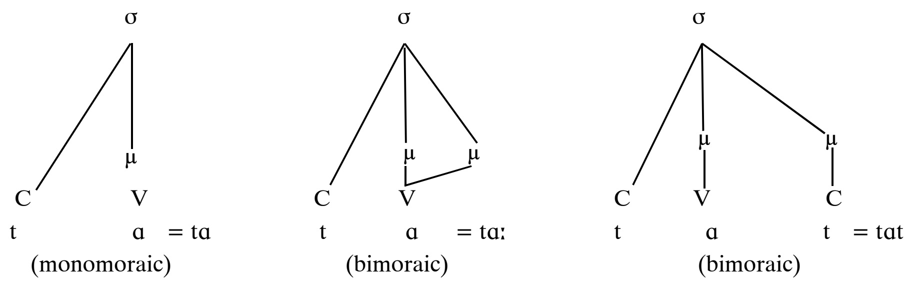
Type (22b) is found in IBDs, which illustrates ‘final immunity’ effects. Consequently, the set of permissible codas in final position, which include all consonants except [w] and [ʔ], is more than the number of consonants in medial coda. Likewise, complex codas are tolerated in final position and not in internal coda. Table (23) gives the list of final position consonants and internal coda consonants based on the data in IBDs:

(23)	Internal Coda Consonants	Final Coda Consonants
	P, b, d, k ,g,s,ʃ, h, dʒ	*p, b, t, d, ʈ, ɖ, k, g, s, z, ʃ, ʒ, h,χ*
	m, n, l, r, j	*m, n, l, r,ɽ, j*

4.6. Syllable Weight System in IBDs

Syllable weight or syllable quantity is a concept based on the distinction between light (short) and heavy (long) syllables (Davis, 2011). The moraic theory (Hyman, 1985; Hayes, 1989) is the representational theory of syllable weight. Unlike onset-rhyme theory, in mora theory syllables are not divided into immediate constituents called onset and rhyme, but into weight units or moras (from the Latin word meaning ‘a short period of time’ or ‘delay’). Based on mora theory, heavy syllables are bimoraic since they contain at least two moras, while light syllables contain only one mora, they are monomoraic (Ewen & van der Hulst, 2001, p. 150). Now, suppose we are dealing with a language in which closed syllables and syllables with a long vowel are heavy, whereas the other syllables are light. We can represent syllable structure in this language based on mora theory in the following way (Hayes, 1989) (Where σ=Syllable, μ=Mora, C= Consonant, V=Vowel):

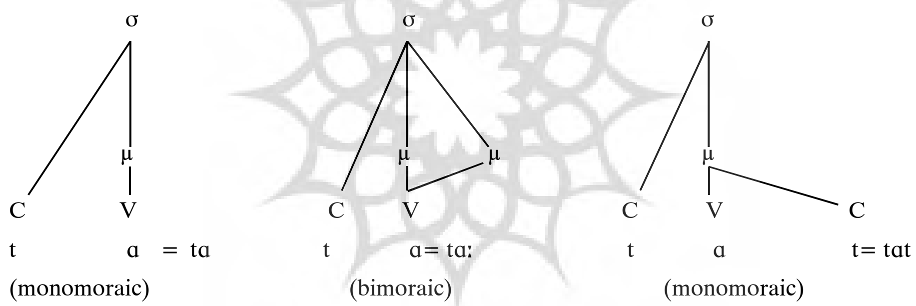
(24) a. light b. heavy c. heavy



Indeed, a closed heavy syllable as in (24c) reflects the syllable where the rule Weight-by- Position applies. Hayes (1989) assumes Weight-by-Position as language–specific rule. If this rule applies, it makes a surface coda consonant moraic, so a closed syllable (CVC) in that language will behave as bimoraic. If it does not apply, closed syllables should pattern as light or monomoraic as in (25c).

In the language in which only long vowels count as heavy, we get the following structures (Ewen & van der Hulst, 2001):

(25) a. light b. heavy c. light



As (24) and (25) show, the number of mora represents the contrast between light and heavy syllables. In (24), in languages (such as Latin) CVV and CVC syllables count as heavy and CV as light, while in (24), in other languages (such as Lardi) only CVV is heavy and both CVC and CV are light. Thus, in Latin, Weight- by- Position applies to CVC and makes it bimoraic, but in Lardi Weight-by- Position does not apply, hence CVC behaves as monomoraic syllable (Hayes, 1989, p.255).Furthermore, as seen in both (24) and (25), initial consonants do not contribute to the weight of a syllable, so the first consonant in a CVC and CV will not belong to the separate mora[3].

In Iranian-Balochi dialects the distinction between heavy and light syllables is simply a matter of the number of segments in the nucleus: branching nucleus syllables are heavy, non-branching nucleus syllables are light (as shown in (25)). Thus CV and CVC are light syllables, whereas CVV is heavy syllable. Besides, the "CVG"= word-final geminate[4] consonants are counted as heavy syllable in IBDs as well. Examples in (26a-c) illustrate the light and heavy syllables in IBDs.

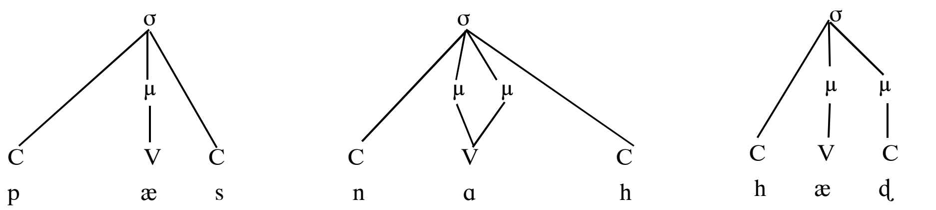
[3]Ewen and van der Hulst (2001, p. 149) assume that initial consonants are 'extra moraic'.

(26) IBDs syllable weight

(Where σ=Syllable, μ=Mora, C=Consonant, V=Vowel, G=Geminate).

a. light syllable (monomoraic) b. heavy syllable (bimoraic) c. heavy syllable (bimoraic)

pæs 'sheep' (CVC) *na:h* 'date' (CVVC) *hæḍḍ* 'bone' (CVG)



However, weight inconsistency occurs in IBDs. It means CVC syllables sometimes pattern as heavy syllable and sometimes as light. Therefore, the weight of CVC syllables depends on the context within a word in IBDs. Context dependent weight is quite common phenomenon like in Kashmiri (Davis, 2011, p.127).

In IBDs, context dependent weight of CVC syllables occurs in stress pattern system. Normally in IBDs rightmost CVV(C) syllable (bimoraic) gets the primary stress, but if a word has no CVV(C) syllables, then stress falls on the rightmost CVC syllable (Soohani et al., 2011). So this is an example of context dependent weight: a CVC syllable is bimoraic only in words without long vowels. Consider the following examples:

(27) Context Dependent Weight in IBDs

a.i	` ´	*bìbí:*	'grandmother'
a.ii	` ´	*guèlu:́*	'calf'
a.iii	` ´	*kòru:́s*	'rooster'
a.iv	´ `	*ba:́kæ̀s*	'match'
a.v	` ´	*ʔà:pta:́b*	'sun light'
b.i	´ `	*ka:́hgèl*	'thatch'
b.ii	` ´	*hæ̀ngu:́r*	'grape'
c.i	´ `	*kótʃæ̀k*	'dog'
c.ii	´ `	górdʒæ̀	'tomato'
c.iii	` ´	hòʃtér	'camel'
d.i	´ `	*ba:́lèʃt*	'pillow'
d.ii	´ `	*ʔa:́dìnk*	'mirror'

The generalization illustrated by the stress patterns in (27) is that the presence of heavy syllables affects stress: in (27a.i, a.ii, a.iii, a.v) or in (27b.ii) mono-morphemic words ending in (CVV(C)) syllable receive final stress, whereas mono-morphemic words ending in the light syllable (CV) or (CVC) as in (27a.iv) or (27b.i) receive penultimate stress. However, in (27c.i- c.iii) words do not have any (CVV(C))

[4] IBDs have two types of geminate: Word-medial and word-final geminate consonants which are underlyingly moraic (Soohani et al., 2014).

syllables, so in the absence of long vowels, the final CVC syllable becomes bimoraic and attracts the primary stress. (27d.i, d.ii) proves that the CVV syllable is heavier than the CVCC syllable.

Moreover, Gordon (2002) proposes that the coda weight is predictable from syllable structure. As sonorant consonants have greater energy than obstruent and voiced segments have more phonetic energy than voiceless segments, the sonority and voicing of coda play important roles in the language-specific weight of CVC. The results of evaluating coda consonants of 62 languages show that languages with light CVC syllables have lower [+voice] to [-voice] and [+sonorant] to [-sonorant] ratios coda consonants than the languages with heavy CVC syllables. Besides CVC syllables in languages with mismatches [+sonorant] to [-sonorant] and [+voice] to [-voice] may either occur as heavy or light, and it is language-specific indeed (Gorden, 2002).

IBDs data supports Gordon hypothesis, the number of sonorant consonants in IBDs is less than the number of obstruents in the coda position, but the number of voiced segments is more than the number of voiceless consonants in the final position (Soohani, 2017). As a result, Balochi is among languages with mismatching between these two features namely sonority and voicing. Thus the CVC syllable in IBDs may be either heavy or light, as has been already explained.

5. Conclusion

In this article, the internal structure of syllables in three Iranian-Balochi dialects was investigated. It was shown that in IBDs, onset is obligatory and onsetless syllables are not allowed. Besides, codas are permitted, i.e. syllables may be closed. Also, the set of permissible codas in the final position is more than the number of consonants in the medial coda. Further, it allows complex onset and codas. In word-initial clusters, the first segment is generally an obstruent which is followed by a liquid or a glide. The second segment in the word-final clusters is normally an obstruent which is preceded by a liquid or a nasal. However, there are word-final syllables that violate the SSG because they contain s(C) clusters. Investigating syllable contact illustrated that Balochi is among languages that admit all types of heterosyllabic clusters.

Moreover, in IBDs the distinction between heavy and light syllables depends on the number of segments in the nucleus: branching nucleus syllables are heavy, non-branching nucleus syllables are light. So CV and CVC are light, but CVV is heavy. Additionally, the context-dependent weight of CVC syllables occurs in the stress pattern system, thus in the absence of CVV syllables, the final CVC becomes heavy (bimoraic) and gets the primary syllable.

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