Syllable Structure in Pahari

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Abstract

The current study presents a comprehensive description of Syllable structure of Pahari, an undocumented language, spoken in Azad Jammu and Kashmir and Murree Hills. The study shows that: 1) all Pahari consonants occur on word initial position except / ; 2) only obstruent-liquid onset clusters and homorganic nasal-obstruent coda clusters are allowed; 3) rhyme can have 3-X positions maximum;4) minimum requirement for a syllable is a short vowel, but minimum requirement for a monosyllabic word is a long vowel or a diphthong;5) onset and coda are optional in a syllable;6) the language does not allow words to end with short vowels.

Keywords: *Syllable, structure, Pahari, vowels*

1. Introduction

Pahari is an Indo Aryan Language, spoken in Western part of Kashmir and Murree Hills (Abbasi, 2010). It is spoken by 4.5 million people in Azad Jammu and Kashmir (Lother & Lother, 2010). According to Khan (2012), Pahari has 30 consonants and 12 oral and 5 nasal vowels. Basically Pahari has 6 oral vowels that have duration and nasality contrast. It means duration and nasality are phonemic in this language. The syllable structure of the language has not yet been explored. This study is the first attempt to study and document the syllable structure of Pahari. For the current study a corpus of 4000 Pahari words was made by field visits to target population.

This study aims to:

- Investigate the onset and coda consonant clusters in Pahari
- Look into the rhyme pattern of the syllable
- Identify the syllable templates in Pahari

2. Background

2.1 Syllable and its Internal Structure

There has been debate for years over the definition and role of syllable. Phonetically, it is claimed that syllables are produced with a single chest pulse. Ladefoged and Maddieson (1990) are of the view that the syllables must strictly be viewed as a phonological unit. Kager (1999) defines syllable as "a prosodic category organizing segments in sequences according to their sonority values. Each syllable has a sonority peak (*nucleus*), usually a vowel, possibly surrounded on both sides by margin segments of lower sonority, usually consonants (*onset, coda*)". He mentions four points in favour of syllable as a phonological unit.

a) It is a major ingredient of phonological generalizations (e.g., defining phonotactics patterns).
b) It also governs the patterns of epenthesis and deletion.
c) It provides a level of prosodic organization between segments and higher level prosodic units i.e., foot, stress, prosodic word.
d) It functions in the demarcation of the morpheme edges, like defining the position of affixes and reduplication.

Besides this, different theories on stress assignment, such as Hayes (1981, 1991), Prince (1983) and Halle and Vergnaud (1987) agree with one another in that the stress placement is dependent on syllables and syllable internal structure. The light and heavy syllables are defined on the basis of syllable internal structure.

All of the above evidences provide support for the importance of the syllable as a phonological unit necessary for the description of any language. This study also takes syllable in terms of phonological unit that is the part of higher prosodic hierarchy shown in Figure 1. The following figure shows the four level prosodic hierarchy up to the prosodic word.

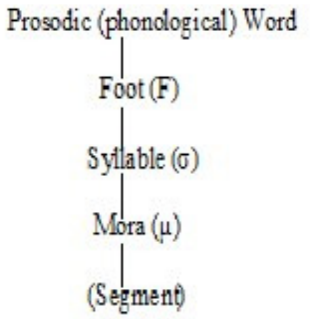

Figure 1. Prosodic Hierarchy (Nespor & Vogel, 1986)

Keeping in view the syllable as phonological unit, it is useful to look at the internal structure of a syllable for which there are two major contrasting theories. One theory assumes that there is no internal structure of syllable. It attributes the effects of apparent sub-syllabic units to language users. The second theory proposes a hierarchical structure of syllable with certain sub-syllabic constituents. This section briefly discusses the main characteristics of the two types of theories.

2.2 Non-structural Models

Early theories (discussed below), which refer to boundaries, claim no internal structure of syllable. Kohler (1966) claims that the syllable is "either an unnecessary concept... or an impossible one... or even a harmful one". The Sound pattern of English (SPE) shows that phonological representation consists of a

linear arrangement of segments which are separated by boundaries. SPE does not present any specific explanation about the role of syllable in phonological description. One major phonological argument for doing without the syllable that emerges from SPE is that phonological descriptions seem to be satisfactorily done without the concept of syllable if segmental information is fully exploited. According to SPE, all the major phonological observations may be described without resorting to the syllable. It is quite understandable that Chomsky and Halle (1968) and Kohler (1966) do not recognize the syllable because, as Halle and Keyser (1971) point out, the notion of syllable is used as "the equivalent of sequence of speech sounds consisting of one syllabic sound preceded and followed by any number of consecutive non-syllabic sounds". Kahn (1976) argues against this strict linear arrangement of segments and boundaries and suggests that phonemes and syllable nodes are on separate tiers linked with associated lines. In this approach, the syllable structure is basically flat as shown in Figure 4.2 below.

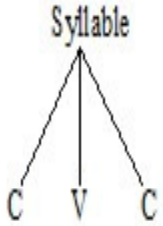

Figure 2: Non-structural Representation of Syllable by Kahn (1976)

Disallowing sub-syllabic units implies that no syllable terminal segment is inherently more closely related to any other, i.e., the nucleus is no more closely related to either the prevocalic or postvocalic consonant(s). Many researchers, such as Clements and Keyser (1983) and Davis (1989) argue for a syllable structure where the syllable node directly dominates each segment, with no sub-syllabic units like Onset-Rime. Clements and Keyser (1983) posit a CV tier between the segmental tier and the syllable tier, ruling out internal hierarchical syllable structure. According to this approach, the Pahari word [plot] *'stone'* may have the following structure:

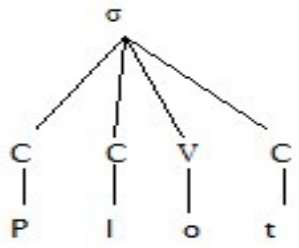

Figure 3: CV Representation of Syllable

The representation in figure 3 is just like Kahn's (1976) flat structure except that it has an intermediate CV tier between segments and syllable nodes. Clements and Keyser (1983), however, note the necessity of the nucleus as part of the internal structure of the syllable which should be represented on a different tier. In the CV framework, either a VV or a VC sequence within a syllable forms a heavy syllable for the purpose of stress assignments.

According to Clements and Keyser (1983), such sequences would be projected as part of the nucleus projection for stress assignment. Selkirk (1982) strongly argues that syllable structure is necessary for "the most general and explanatory statement of phonotactic constraints", for "the proper characterization of the domain" of phonological rules, and for "an adequate treatment of suprasegmental phenomena such as stress and tone".

2.3 Structural Models

Once the syllable is accepted as a formal unit of phonological description, different proposals on the syllable internal structures have been suggested. Davis (1985) discusses three of these proposals.

- Rhyme Structure Analysis
- Body-structure Analysis
- Level-Syllable Structure

Of the theories that favour syllable internal structure, OR is the most popular. This theory claims that the relation between the syllable's vowel (nucleus) and following consonants (coda) is special in that they are the immediate daughters of a distinct constituent called the rhyme. The initial consonant or consonant cluster is outside this constituent and forms on its own another distinct constituent called the onset. This model is strongly supported in Selkirk (1982) and in Halle and Vergnaud (1980). This particular model is also known as right branching. It is the rhyme that branches into nucleus and coda as in [bɪl] *'dew'*.

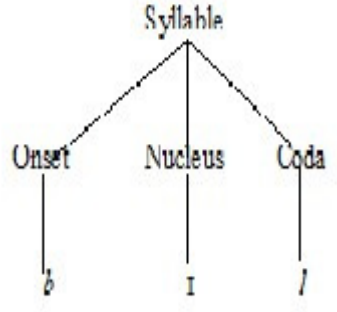

Figure 4: Rhyme Structure Analysis Representation

Wheeler (1981) proposes body structure analysis to explain the phonotactic constraints in Korean. In contrast to the languages (like English) having onset rhyme internal structure syllable, body structure analysis proposes 'onset+nucleus' (referred to as "Body") vs. Coda. This has also been proposed for languages including Korean (Yoon & Derwing, 2001) and Japanese (Yoshiba, 1981; Katada, 1990). Derwing and his colleagues (1992) used a variety of experimental techniques in order to support the body-coda model for Korean syllables. In a blending experiment, Derwing et al. (1993) show that blends of the type 'body + coda' significantly outnumber those of the type 'onset + rhyme' in Korean. Similar results were obtained by the method of 'sound similarity judgment' used in Yoon and Derwing (2001).

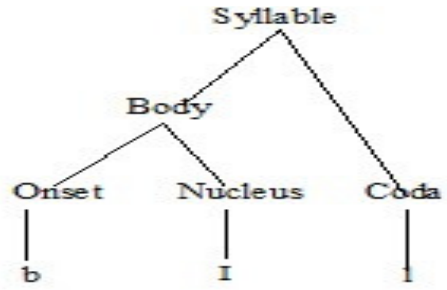

Figure 5: Body Structure Analysis Representation

Davis (1985) reviews all the claims made by the supporters of rhyme structure analysis and body structure analysis against various language data, such as stress, phonotactic constraints and languages games. He suggests that rhyme does not have to be universal and argues for the flat structure as shown below.

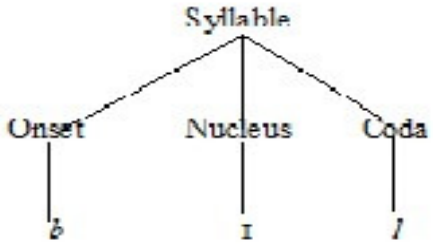

Figure 6: Level Syllable Structure Analysis Representation

The above discussed theories show that in general, phonologists are in agreement that a syllable consists of a nucleus, preceded by an optional onset and followed by an optional coda. Languages differ with respect to various typological parameters, such as optionality of onsets, admissibility of codas, and

the allowed complexity of the syllable constituents. For example, onsets are required in German, while Spanish prohibits complex codas. For phonological purposes, however, a further sub-grouping is relevant, namely (1) the onset, C1, and (2) the core or rhyme, consisting the phonetic peak and coda combined, V1C2. In line with this structure, the typical Pahari monosyllabic word can be analyzed as in Figure 7.

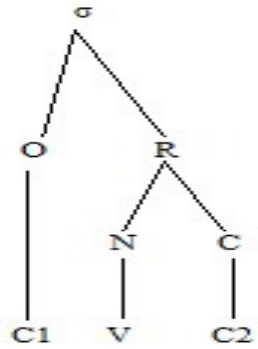

Figure 7: A Syllable with Rhyme

So far, we have discussed different evidence for the syllable as a phonological unit and theories of syllable structure in terms of a set of principles and parameters, which express what is common to all languages and also allowing variations in terms of parameters. The following section focuses on the syllable structure of Pahari language.

3. Syllable Structure of Pahari

This section discusses onset (simple and complex), coda (simple and complex) and Rhyme phonotactics in Pahari, with particular emphasis on the constraints that underlie their well- or ill-formedness. It further focuses on the internal structure of syllable.

3.1 Onset Phonotactics

In examining the distribution of simple onsets, it is found that all consonant can occur as a one- segment onset either word-initially or word-internally except /ɽ/. The following words illustrate the distribution of simple onsets.

3.2 Simple onsets

Table 1: Simple onsets in Pahari

Sounds		Initial	Medial	
p	pʊl	bridge	sro:.pʊɽ	wraper
pʰ	pʰət	strike with axe	rəpʰ.pʰʊɽ	dispute
b	ba:l.nɑ̃:	to burn	sa:.bʊt̪	whole
t̪	ta̤:li	clapping	kit̪a:b	book
t̪ʰ	t̪ʰək.nɑ̃:	tire	gʊt̪ʰ.t̪ʰi	bag
d̪	da̤:l	pulse	mel.di:.ja̤:l	name of tribe
t	to:.ka:	cutter	kʰət.ta:	bitter
tʰ	tʰək.nɑ̃:	To dip	kən.da:	thorn
d	dɜl	part	da:.da:	hard
k	kət.ta:	calf	lo:.ka:	light
kʰ	kʰo:l	open	si:.kʰa:	learnt
ɡ	ɡɑ̃: .nɑ̃:	song	--------	---------
f	fa:l.tṳ:	spare	sa:.fi:	Completely
v	ve:.la:	time	əg.va:l	Lawn
s	sət.nɑ̃:	throw	ləs.si	Leben
z	zo:r	power	mez.za	enjoyment
ʃ	ʃo:k	interest	a:.ʃʊk	Lover
x	xa:.li:	empty	ma:.xi:	honey
ɤ	ɤəm	sorrow	tʃe:.ɤʊn	tomato
ɦ	hət.ti	shop	-------	--------
tʃ	tʃən	moon	rɪm.tʃa:	spoon
tʃʰ	tʃʰa:p	ring	bətʃʰ.ʃʰa	calf
dʒ	dʒət̪	hair	kʰo:.dʒi	searcher
m	ma:l	animal	ma:.li:	gardener
n	nɑ̃: .nɑ̃:	grandfather	rət.nɑ̃:	cramming
l	lo:.ta:	mug	dʒɪ.la:v	loose motion
r	rʊl.nɑ̃:	miserable condition	po:t.ra̤:	grandson
ɽ	-------	-------	ma:.ɽa:	Mine
j	ja:r	friend	ro.pej.ja:	rupee

3.3 Complex onsets

Pahari allows complex onsets. However, the segmental structure of such syllable-initial consonant clusters is restricted as all the complex onset clusters consist of an obstruent and a liquid. It means these constraints are un-dominated. It is important to note that not all obstruent-liquid clusters constitute well formed onsets. All the 26 logically possible combinations (the 13 obstruent phonemes /p/, /pʰ/, /b/, /t/, /ʈ̪d/, /ʈ̪k/, /kʰ/, /g/, /s/, /z/ /ʃ/, /x/, /dʒ/ combine with three liquids /l/, /r/ and /ɽ/. Not liquid forms cluster with all thirteen obstruents (see table 4.4). These clusters occur word initially only, and are broken word medially. It means onset clusters are possible only word initially in Pahari. The following table illustrates consonant clusters in Pahari.

Table 2: Complex Onsets in Pahari

		Initial		Medial
pr	pra:t̪	big plate	o:p.ra:	Strange
pl	plæ:r.	fence	op.la:. t̪a:	superficial
pɽ	pɽək	rattle	kəp.ɽe:	Clothes
pʰl	pʰlo:r.nɑ̃	turning over	--------	---------
pʰɽ	pʰɽək	sudden	rəpʰ.ɽ a:	Dispute
br	bra:.bʊr	equal	təb.ri:	Wife
bl	blo:r.nɑ̃	sprinkle	jəb.li:	nonsense
bɽ	bɽẽ:	down	dʒəb.ɽe:	Jaws
t̪r	tro:̪ɽ.ɑ̃:	to break	po:t.ra:̪	grandson
d̪r	dra:.ti:̪	sickle	əd̪.ra:	half-done
d̪l	dla:l̪	pimp	d̪ʊd̪.la:	Whitish
kr	krʊp.nɑ̃:	cut	tʃæk.ri:	Fraud
kl	Klo	slab of stone	sek.la:	skin of tree
kɽ	kɽəm	a kind of vegetable	t̪ək.ɽa:	Strong
kʰr	kʰro:s.nɑ̃	drag	pəkʰ.ru:	butterfly
kʰl	kʰlo:r.nɑ̃	dig	bokʰ.la:	Upset
kʰɽ	kʰɽək	sudden	læɽ.ki:	Girl
gr	grɑ̃	village	əg.ro:.ti:	initiative
gl	glo:.ɽi:	knot	bəg.la:	big piece of land

gɽ	gɽə	a kind of grain	pəg.ɽi:	turban
sr	sro:.pʊɽ	wraper	mæs.ru:f	busy
sl	sla:.ta:	round dtone	təs.la:	krispy
zr	zru:ri:	important	gæz.ra	Boy
ʃr	ʃra:.rʊ t̪	mischief	mæʃ.ru:t̪	conditioned
xr	xra:v.	spoiled	əx.ro:t	walnut
tʃl	tʃlʊ.nɑ̃	extract	mætʃ.la:	naughty
dʒr	dʒra:v.	socks	odʒ.ri:	intestines
dʒl	dʒla:v.	diarriaha	ʊdʒ.la:	clean

Table 2 shows that 28 word initial consonant clusters are possible. Only obstruent-liquid combination is possible. It is important to mention here that all-obstruent-liquids are not possible. The following clusters, though in obstruent-liquid combination, are not well-formed clusters word initially. *[t̪l, ʈɽ, d̪ɽ, tʰl, tʰr, tʰɽ, tl, tr, tɽ, tʰl, tʰr, tʰɽ, dr, dl, dɽ, sɽ, zl, zɽ, fr, fl, fɽ, vr,vs, vɽ, ʃl, ʃɽ, xl, x ɽ, ʏr, ʏl, ʏɽ, tʃr, tʃɽ, dʒɽ, tʃʰr, tʃʰl, tʃʰɽ]. Table 3 shows that onset clusters are found only word initially and are broken word medially, when they are at intervocalic position. The onset clusters do not break when the preceding syllable has already a coda consonant but are very limited, as shown below.

Table 3: Onset Consonant Clusters don't Break.

/kl/	mʊʃ.kla:ʈ̪	Hardships
/kl/	kɪr.kli:	A kind of lizard

3.4 Coda Phonotactics

After discussing onset phonotactics in the previous section, the present section describes the coda phonotactics including both simple and complex.

Simple Codas

It is seen that any consonantal phoneme of the language can occur as a simple onset in Pahari except /ɽ /. When it comes to codas, all except three /pʰ, ɦ, j/ occur at coda position word finally and / ɦ, j/ word medially as well, as shown in table 4.

Table 4: Simple Codas in Pahari

	Medial		Final	
p	kəpɽe:	clothes	səp	snake
pʰ	rəpʰ.ɽa:	quarrel	-----	------
b	təbri:	wife	dəb	cottage
ʈ	bæʈ.mi:.z	rude	ləʈ	leg
ʈʰ	kəʈʰ.la:	a kind of vegetable	həʈʰ	hand
ɖ	ɖʊɖ.la:	whitish	ləɖ	load
t	bæt.kæ:r	name of a tree	kʰət	bed
tʰ	mitʰ. tʰa:	sweet	mʊtʰ	fist
d	gæd. vi:	water container	kəd	extract
k	lək.ɽi:	wood	mək	corn
kʰ	ɖʊkʰ.ɽa:	sad story	əkʰ	eye
g	əg.va:l	lawn	əg	fire
f	ɖæf.na:.nã	to bury	sa:f	clear
v	kæv.rʊs. ʈa:n	graveyard	gæ:v	cow
s	Kæv.rʊs. ʈa:n	graveyard	kʰos	hole
z	gæz.ra:	boy	ba:z	eagle
ʃ	mʊʃ. kʊl	difficult	ʈa:ʃ	cards
x	næx.ra:	proud	me:x	nail
ɤ	kã:ɤ.ɽi:	thin but strong	ka:ɤ	crow
ɦ	-----	----------	------	------
tʃ	mætʃ.la:	naughty	na:tʃ	Dance
tʃʰ	pɪtʃʰ. va:l	backyard	rɪtʃʰ	Bear
dʒ	odʒ.ri:	instentines	kədʒ	Cover
m	kʰəm.ba:	pole	ʈʰəm	pillar
n	bən.ta:	a small glass ball	kən	ear
ŋ	tʃlʊŋg.nã:	extract	ləŋ	pass
l	bʊl.bæl	nightingale	ʈre:l	serving dish
r	bær.mã	drill	ɖær	door
ɽ	kæɽ.va:l	dry grass	sa:ɽ	pain
j	------	----------	-----	--------

3.5 Complex Codas

When it comes to complex codas in Pahari, the possibilities are even more limited. Only 5 complex codas exist word finally and none word medially. At word final position, the first segment is one of the nasals /m, n, / and the second element is one of the obstruents /b, d, ɖ, ɡ, dʒ/. It is found that both the

consonants, C1 (nasals) and C2 (obstruents), are voiced. It is also found that C1 and C2 match their place of articulation. Here nasal /n/ articulated from alveolar region is preceding both dental and alveolar voiced stops. Another commonality among all coda complex clusters is that they are preceded by short vowels as in [kəənd] *'back'* and [gəəmb] *'hole'*. This shows that coda clusters break to satisfy maximal onset principle (MOP).

Table 5: Complex Codas in Pahari

	Medial		Final	
mb	nɪm.bu:	lemon	gəəmb	hole
nd	bɪn.di:	a small wall	kəənd	back
nd̪	ba:.sɪn.dær̪	bed room	kəənd̪	wall
ndʒ	əən.dʒa:.n	stranger	əəndʒ	joint
g	lʊ.gi:	turbon	bəəg	bangle

Table 6 shows that coda clusters break when they occur at intervocalic position. On the other hand as the examples below show, coda clusters do not break, when following syllable has onset.

Table 6: Complex Codas in Pahari

/nd̪/	hɪnd.və̃: .nə̃:	water melon
/g/	məg.nə̃:	Begging
/nd/	bənd.nə̃:	Distribute

3.6 Rhyme Phonotactics

The rhyme consists of the peak and coda. The peak of the element contains the syllabic elements and is more sonorous than both onset and coda. All the languages contain vowels as syllabic elements. However, a few languages, like English, also allow syllabic consonants. Pahari allows monophthongs and diphthongs in peak, as shown below, but no consonant.

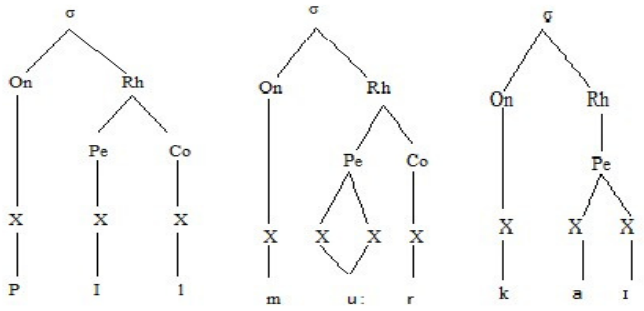

Figure 7: Peak Phonotactics Representation

The above diagrams show the association of vowels with X-position. They are shown in the form of rules below.

- A Short vowel is associated with one X-position
- A long vowel is associated with two X- positions
- Each element of a diphthong is associated with one X-position

A peak can have two X-positions maximum. Other segment of rhyme is coda. As discussed in section 3.2.2, maximally two consonants are possible at coda position in Pahari, so it takes two X-positions maximally. It is not possible to have all the four X-positions in a single word i.e., if peak takes two X-positions, then coda will take one ([ba:n] *'rope'* has [VVC] and vice versa as in [kəənd] *'back*[VCC]'. The following figure illustrates the rhyme of a monosyllabic word in Pahari.

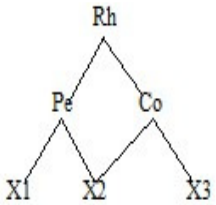

Figure 8: Rhyme Structure of Monosyllabic Words in Pahari

Figure above shows that:

- Rhyme can have 3 X-positions maximum
- X3 is optional
- X1 is always associated with peak, while X2 may be associated with peak or coda
- X3 is associated with coda

After identifying onset, coda, peak and rhyme phonotactics, the overall picture can be summarised in terms of syllable template for Pahari monosyllabic words in figure 9.

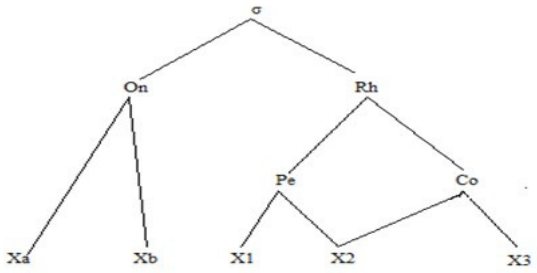

Figure 9: Syllable Template for Pahari Monosyllabic Words.

Figure above reads as:

- Onset can have maximum two consonants
- Xa-b are optional
- Rhyme can have maximum 3 X-positions
- Xa – X3 are associated with a single sonority peak
- X1 is always associated with peak, while X2 may be associated with peak or coda
- X3 is associated with coda

4. Syllable Inventory of Pahari

Based on the consonant clusters and examples discussed above, there are a total of 11 syllable templates in Pahari as displayed in Table 7.

Table 7: Pahari Syllable Templates

Syllable Type	Lexeme	Gloss
VV	a:	come
CV.CVVC	fə.ki:r	beggar
VC	ətʰ	eight
VVC	o:s	dew
CVV	t̪aɪ	aunt
CVVC	sa:ɾ	pain
CVC	ʈ̪ɪl	mole
CVCC	kənd	back
CCVV	kloɪ	a slab of stone
CCVC	pʰɽək	rattled
CCVVC	tra:̪ɾ	plain stone

The syllable templates show that minimum requirement for a syllable is a short vowel, but minimum requirement for a monosyllabic word is a long vowel or a diphthong. Syllable with a short vowel cannot be a monosyllabic word. Example [a:] 'come' in Table 7 further shows that syllable is formed only by a long vowel. It means that syllables without onset and coda are allowed. In rhyme, minimal requirement is a short vowel (V). This template is not possible word finally as the language does not allow words to end with short vowels. Short vowel also does not come alone in a word. It is either preceded or followed by consonant as in [fə.ki:r.] "beggar" [**CV**.CVVC]. Onset is optional, but it takes maximally two consonants (C1) and (C2) word initially. Word medial onset clusters are not possible. Table 2 indicates that (C1) and (C2) are always occupied by obstruents and liquids, respectively. Table 7 illustrates when a syllable is without onset and coda, nucleus takes VV slots. When there is a coda in the syllable, V2 becomes optional. It means a rhyme minimally occupies one time slot. Table 7 further shows that coda is also optional, but maximally two optional coda consonants are allowed.

5. Conclusion

All Pahari consonants except /ɽ/ occur word initially and medially. Pahari allows consonant clusters word initially, whereas clusters at word medial positions are not allowed. Only 27 obstruent-liquid clusters are possible word initially. Pahari allows all consonants except /pʰ, ɦ, j / word finally and /ɦ, j/ word medially. Coda consonant clusters are very restricted. Only 5 clusters are possible word finally. Only homorganic nasal-obstruent clusters are permissible. Rhyme can have 3 X-positions maximum. X2 and X3 are optional. X1 is always associated with peak, while X2 may be associated with peak or coda. X3 is always the part of coda. The study shows that both onsets and codas are optional in the language. The minimum requirement for a rhyme is a short vowel (V), but it is interesting that it doesn't make a syllable on its own. It requires a onset to form a syllable, but as a part of disyllabic or trisyllabic words. The possible reason could be that the language doesn't allow words to end with a short vowel. The minimum requirement for a monosyllabic word is a long vowel or diphthong.

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