Gipan
Volume 07, Issue 01, 2025. pp. 121–135
Research Article
DoI: https://doi.org/10.3126/gipan.v7i1.84240

Variation in Nepali Verb Roots: A Phonological Perspective

Bhim Narayan Regmi
Central Department of Linguistics, Tribhuvan University

Abstract

This study explores the explanability of the variation in Nepali verb roots from phonological perspective and the availability of clues of phonological processes in the written form. The data for this study are phonemically transcribed 1892 verb roots containing 3312 syllables selected from *Prajñā Nepālī Bṛhat Śabdakośa*. (2079BS). Among these 933 verb roots with variations are classified into syllable based variations that contains four types and segment based variations that contains ten types. CV is the most frequent syllable structure in Nepali followed by CVC. Nepali belongs to the group of languages with moderately complex syllable structure. The study finds that there are clues of phonological process in the written form, and explains the variations in the verb roots in terms of phonemic environment, syllable structure and syllable weight. Though not allowed in the surface, super heavy syllables are at the abstract underlying level in Nepali verb roots. Almost all the syllable based variations are resulted in course of the simplification of the super heavy syllable to make the structure permissible.

Keywords: verb root, syllable structure, variation, super heavy syllable, frequency

Email
bhimregmi@gmail.com

Article History
Received: 2025, April 01
Revised: 2025, July 12
Accepted: 2025, August 16

Cite
Regmi, B. N. (2025).Variation in Nepali verb roots: A phonological perspective. *Gipan*, *7*(1), 121–135. https://doi.org/10.3126/gipan.v7i1.84240

Introduction

Nepali is an Indo-Aryan language mainly spoken in Nepal and extended to some parts of neighbouring countries such as India, Bhutan and Myanmar.

Nepali grammarians, from the beginning, have discussed on the identification of verb root. Ayton (1820) and Turnbull (1887) mention that *-nu* should be removed from infinitive form to get the root of a verb. Turner (1921:101) mentions four infinitive markers *-nu, -nʌ, -ne, -na,* however, he does not mention the process of verb root identification. Turner (1931) takes the infinitive form with *-nu* as citation form for the entries of verbs. All the latter scholars – both the linguists and non-linguists – follow them and the citation form of verbs with infinitive marker *-nu* has become the norm for Nepali dictionaries. Dahal (1974), however, states that a type of simple verb bases are marked by an enunciating vowel. Though he does not say anything about this infinitive marker or the root identification method, he clearly indicates that there is something additional to infinitive marker removal while determining the root of a class of the verbs. He has presented four types of simple verb bases – consonant ending bases, bases marked by an enunciating vowel at the final position, vowel ending bases, and stem-bound bases either consonant or vowel ending. These bases include both primary and derived bases. I have taken only primary bases as data but not the derived ones. Thus I have used the less confusing term ROOT in this article.

Research Questions

This article explores the variations in the verb roots from the phonological perspective especially based on the segments and syllable structure. It also looks into the writing-speech connection in Nepali verb-roots. Thus this article seeks the answer of the following research questions:

- Are the variations in Nepali verb roots explainable in terms of phonology?
- Do the variations in the written forms have clues to the phonology?

Nepali Phonemes and Writing

Nepali has forty six segments including six monophthongs, ten diphthongs, twenty nine consonants and a suprasegmental phoneme - nasalization.

Bandhu et al. (1971) is the first linguistic study of Nepali phonology. The authors have identified six vowels i, e, ə, a, o, u and twenty seven consonant phonemes p, p^h, b, b^h, t, t^h, d, d^h, ʈ, $ʈ^h$, ɖ, $ɖ^h$, k, k^h, g, g^h, ʦ, $ʦ^h$, ʤ, $ʤ^h$, m, n, ŋ, r, l, s, ɦ in Nepali. Dahal (1974) has added two glides *j, v* (or more appropriately *w*) in the Nepali phonemic inventory. Pokharel (1989) has also agreed on the number of phonemes, however, he has shown different result from his experiments on the description of some of the phonemes. He presents open-mid and open back unrounded vowels (ʌ and ɑ) instead of central vowels, and alveolar plosives (t̪, $t̪^h$, d̪, $d̪^h$) instead of retroflex plosives presented by Bandhu et al. and Dahal. He has also identified ten diphthongs in Nepali gliding either toward front or toward back high vowel. These were taken as vowel sequences in both Bandhu et al. (1971) and Dahal (1974). Khatiwada (2008) has presented those alveolar plosives as retroflex but with defining the retroflex as the consonants produced with raised tongue-tip instead of the more common traditional definition, i.e., the consonants produced with tongue-tip curled back and lower surface as articulator. Besides, Pokharel (1989) has presented four non-phonemic sounds – three fricatives ɸ, ɣ, χ, and one tap ɽ – as result of phonological processes.

These 36 phonemes are written with more than 50 symbols available in Devanagari alphabet. The phonemes and the corresponding symbols are as follows:

Vowel (monophthongs)

i –	ि ी ई
e –	े ए
ʌ -	अ
ɑ -	ा आ
o –	ो ओ
u -	ु ू ऊ

Among these vowels, अ is inherent in the basic consonants because the Devanagari is basically a syllabic writing. Thus while transcribing the basic consonant there will be a sequence of a consonant followed by this vowel. All other vowels have two forms – dependent which is also called *mātrā* and independent which is called *varṇa.* Nepali has no length contrast however uses both short and long sound symbols for i and u. So there are four symbols each for these two vowels.

The symbol for syllabic trill consonant in Devanagari ऋ is pronounced as a sequence of trill and a vowel i (ri) in Nepali thus it is transcribed accordingly. The second symbol in Devanagari for syllabic consonant is the symbol for lateral approximant - ऌ which is not used in Nepali. The symbol for voiceless glottal fricative ः is used in Nepali writing in a few cases but it is not pronounced.

Vowel (Diphthongs)

ei –	ि इ ए ऐ	iu –	ि उ इ ऊ ई ऊ
ʌi –	ै अ इ	eu -	े उ ए ऊ
ɑi –	ा इ आ इ ई आ ई	ʌu –	ौ औ अ ऊ
oi –	ो इ ओ इ ई ओ ई	ɑu -	ा उ आ ऊ आ ऊ
ui –	ु इ उ ई उ ई	ou -	ो उ ओ ऊ ओ ऊ

There are symbols for only two diphthongs available in Devanagari alphabet - ै ऐ and ौ औ. All other diphthongs of Nepali are written as sequences of two monophthongs which can be either dependent symbol known as *matra* followed

by independent vowel symbol known as *varṇa* or both independent vowel symbols. As it is already mentioned, अ does not have dependent symbol thus diphthongs beginning with this sound are represented with the basic consonant symbol followed by the ending sound symbols of the diphthong.

Consonants

p –	प् प	p^h -	फ् फ
b –	ब् ब	b^h -	भ् भ
t –	त् त	t^h -	थ् थ
d –	द् द	d^h -	ध् ध
t̪ -	ट् ट	$t̪^h$ -	ठ् ठ
d̪ -	ड् ड	$d̪^h$ -	ढ् ढ
k –	क् क	k^h -	ख् ख
g -	ग् ग ज्ञ	g^h -	घ् घ
ʦ -	च् च	$ʦ^h$ -	छ् छ क्ष् क्ष् क्ष
ʣ -	ज् ज	$ʣ^h$ -	झ् झ् झ
m –	म् म	n –	न् न ञ् ञ् ञ ण् ण् ण
ŋ –	ङ् ङ	r –	र् र् र
l –	ल् ल	s –	स् स् स श् श् श ष् ष् ष
ɦ -	ह् ह् ह	j –	य् य् य
w –	व् व		

Among the consonant symbols available in Devanagari alphabet ञ ण श ष are pronounced as n, n, s and s respectively in Nepali. The symbol for retroflex nasal sound ण is sometimes pronounced as nasalization in the preceding vowel followed by alveolar or retroflex plosive (sometimes even as flap).

There are many symbols to represent consonant clusters in Devanagari - followed by liquid and semivowels, and the geminates. There are also the symbols for sound clusters preceded by voiced, unaspirated dental plosive.

Inherent अ is not pronounced in many words at final position and even at medial in the compound words in Nepali which is widely studied phonological process known as schwa deletion in the literature of historical studies of the Indo-Aryan languages descended from Sanskrit.

Nasalization

ँ ं

There are two dependent symbols to represent nasalization –a dot inside the upward facing semicircle and a dot, both of which are placed at the top of the symbol. First one always represents nasalization whereas the second also represents one of the nasal consonants - bilabial, alveolar and velar.

All the above symbols used and the conventions followed in Nepali writing help in establishing the relationship between writing and speech. However, writing of the verbs in Nepali is closer to speech in comparison to other word classes and verb roots are even closer though there are still many differences which are rooted to the phonological processes.

Syllables in Nepali

Syllable is a phonological unit consisting a nucleus, and optionally an onset and a coda with one or more consonants from the segments available in the language. Because of the various combinations of the obligatory and optional segments, syllable can have different structures such as containing only a vowel (V), a consonant as onset and a vowel (CV), two consonants as onset and a vowel (CCV), three consonants as onset and a vowel (CCCV), a consonant as coda and a vowel (VC), a vowel and two consonants as coda (VCC), a vowel and three consonants as coda (VCCC), a vowel and two consonants as onset and coda each (CVC), a vowel and three consonants - two as onset and one as coda (CCVC), a vowel and four consonants – two as onset and two as coda (CCVCC) and so on. However, Languages use a subset of universal set of syllable structures based on whether or not to fill the coda position, and number of consonants in onset and coda positions as well as order of consonants in onset and coda positions in case there are more than one. These differences based on the number and arrangement of segments within a syllable are chosen for the basis of classification of the structure of syllable.

Maddieson (2013) has classified syllable structures into three groups in terms of their complexity as - simple, moderately complex and complex. A simple syllable structure includes (C) V, i.e., nucleus only or one consonant as onset and a nucleus. A moderately complex syllable structure includes CVC, CCV, CCVC, i.e., a nucleus preceded by a consonant as onset and followed by a consonant as coda, a nucleus preceded by two consonants as onset and followed by a consonant as coda. However, there is a limitation in the order of the consonants in onset position in this type as the second segment can only be a liquid (r, l) or glide (j, w) consonant. A complex syllable structure includes (C)(C)(C)V(C)(C)(C)(C), i.e., a nucleus preceded by two or more consonants as onset and followed by two or more consonants with no restriction in the order of the consonants. With this criterion CCV and CCVC types of syllables within moderately complex syllable structure can be complex syllable structure if there is no limitation on the type and order of the consonants in the onset position. When the type of consonants and vowels need to be specified in this structure, G is used to represent the liquid and glide, and VV or Vv is used to represent long vowels and diphthongs. Languages can have consonants as nucleus. The consonants in the nucleus position are also represented with V in this structure.

Dahal (1974) has not given syllable types and structure, however, he has presented nine formula for the prediction of syllable division within a word. From these formula, the following conclusion can be drawn – maximum two consonants can occur as onset and maximum two consonants can occur as coda. Pokharel (1989; also Pokharel (2064BS) and Pokharel & Pokharel (2079BS)) has identified Nepali syllable structure as (C)(C)(C)V(C) which include eight possible structures V, CV, CCV, CCCV, VC, CVC, CCVC, CCCVC. Among these, he has presented CCCV as possible but not attested structure. Regmi (2006) has presented syllabification rules based on written Nepali. He has identified eight types of syllable structures in Nepali V, CV, CCV, CCCV, VC, CVC, CCVC, CCCVC with examples. Clements & Khatiwada (2015) have identified four basic syllable types - V, CV, VC and CVC – and two CG initial syllable types – CGV and CGVC in Nepali. Pun (2019) has identified CVCC which was not in Pokharel (1989) but a few examples of this structure are presented in Dahal (1974). These syllable types can be illustrated as in (1).

1)	a.	ऊ	/u/	'he/she'	V
	b.	को	/ko/	'who'	CV
	c.	क्या	/kja/	'what'	CCV
	d.	स्त्री	/stri/	'woman'	CCCV
	e.	प्ल्यात्	/pljat/	'sound of a lump of mud hitting ground'	CCCVC
	f.	प्वाल	/pwal/	'hole'	CCVC
	g.	काम	/kam/	'work'	CVC
	h.	उस	/us/	'he'	VC
	i.	चन्द	/tsʌnd/	'Chand (a Nepali surname)'	CVCC

Among the above structures (1d) is available in Sanskrit and English loanwords, (1e) is only available in onomatopoeic words, and (1i) is available in English loanwords but the example here is a native word which is also generally pronounced either as /tsʌn/ (CVC) or as /tsʌn.dʌ/ (CVC and CV two syllables). Thus these three types of structures are very limited.

Pokharel (1989) has also presented a statistics of the seven types of structures available in the total 663 syllables as – CV - 461 (69.5%), CVC - 118 (17.7%), V - 35 (5.2%), CCV - 27 (4%), VC - 17 (2.5%), CCVC - 5 (0.7%), CCCVC - 0 (0%). This shows that CV is the most common syllable structure in Nepali followed by CVC.

Dahal (1974), Pokharel (1989; 2064BS), Pokharel and Pokharel (2079BS) have discussed various types of phonological processes, and Clements and Khatiwada (2015) have discussed co-occurrence constraints on aspirates in Nepali. Findings from these works will be helpful in explaining the variations in Nepali verb roots.

Methodology

This study is based on the data from a monolingual dictionary of Nepali *Prajñā Nepālī Bṛhat Śabdakośa* (2079BS). The verbs included in the dictionary as Nepali verb with infinitive markers other than *–nu* were removed as they are either not from the Nepali language or from the dialects of Nepali other than the standard one. Those verb forms which the researcher is confirm that these are not the basic forms i.e. either derived from verbs or other classes of words also removed. The remaining 1892 basic verb roots are taken for the study. Within these verb roots, there are total of 3312 syllables.

These roots are transcribed phonemically in IPA and syllabified. The syllable types are counted for their frequency. The verb roots are classified as 'with variations' and 'without variation', and the verb roots with variations are further classified with specified phonemes involved in variation. The variations are explained in the background of Nepali syllable structure, orthography and phonemic processes of Nepali.

The Data and Discussion

Verb Roots

There are 1892 total verb roots taken in this study as data which are monosyllabic, bisyllabic and trisyllabic. The total number of syllables - tokens - in these roots are 3312. The syllables have various types of structures as presented in §4.2. The verb roots are grouped into 'with variation' and 'without variation'. The roots with variations are further grouped in terms of the types of variations. The types of roots both in terms of number of syllable and variations as well as the number of syllables within each type is presented in (2).

2)	Verb roots								
		Monosyllabic		Bisyllabic		Trisyllabic		Total	
		roots	syllables	roots	syllables	roots	syllables	roots	syllables
	Without variation	528	528	351	702	80	240	959	1470
	With variation	63	63	831	1662	39	117	933	1842
	Total	591	591	1182	2364	119	357	1892	3312

Structure of syllables in Nepali verb roots

Six types of syllable structures are found in Nepali verb roots as result of this study which are presented in (3).

3)	Structure	Example
	a. V	/ʌ.rɑu/ 'order'
	b. CV	/bʌs/ 'sit'
	c. CCV	/tsjau/ 'peer'
	d. VC	/ot/ 'cover'
	e. CVC	/kin/ 'buy'
	f. CCVC	/kwak/ 'cut with tip of a sickle'

Among these structures first three are open syllable structures in which the coda position is empty and the last three are close syllable structures in which the coda position is filled with segment(s).

The vowel at the nucleus position of the syllable can be monophthong or diphthong. This difference of the vowel type can affect the phonological process. Thus, the vowel need to be specified whether it is monophthong (V) or it is a diphthong (VV). Four among the six types mentioned above have diphthongs which can be taken as subtypes of three open types and one close type syllables as in (4).

4)	Structure	Example
	a1. VV	au 'come'
	b1. CVV	gau 'sing'
	c1. CCVV	kʰwau 'feed'
	e1. CVVC	tʌul 'weigh'

Among the six types presented in (3) including the four subtypes presented in (4), there are three structures with consonant cluster in onset position – structures (3c), (4c1) and (3f). The first and second members should be specified in order to identify whether the clusters have limitations or not. On the basis of limitation, the syllable structure can be judged whether it is moderately complex or it is complex following Maddieson (2013). These CC structures have limitations in the data used in this study. Only three consonants j, w, and r are found to appear as second consonant of this CC cluster as in (5).

5)	Structure	Example	First C of CC	Second C of CC
	2c. CCV	/ʦjau/ 'peer'	ʦ	j
		/ʦwau/ 'get leak'	ʦ	w
		/mʌn.trʌ/ 'apply hymn'	t	r
	2f. CCVC	/kwak/ 'cut with tip of a sickle'	k	w
		/ʦjat/ 'tear'	ʦ	j
	3c1. CCVV	/kʰwau/ 'feed'	kʰ	w

cluster where second C is r in the whole data. This cluster is only available in the people's speech whose educational background is Sanskrit but not in common people's speech.

Consonants occurring as second member of the consonant cluster brings this type of structure within moderately complex category of syllable structure as it has limited (only three including the rare case of r) number of consonants in the second position of consonant cluster at the onset.

Frequency of Syllables in Nepali Verb Roots

Frequency of the syllable types of total 3312 syllables contained in this study is presented in (6).

6)	Structure	Frequency	Percent
	a. V	58	1.75
	a1. VV	11	0.33
	b. CV	1318	39.79
	b1. CVV	202	6.09
	c. CCV	11	0.33
	c1. CCVV	70	2.11

6)	Structure	Frequency	Percent
	d. VC	106	3.20
	e. CVC	1504	45.41
	e1. CVVC	4	0.12
	f. CCVC	28	0.84
	Total	3312	

When the subtypes of the syllable structures (with V as nucleus and VV as nucleus) are merged, the frequencies are summed up and arranged in a decreasing order, the result will be as follows: CV – 1520 (45.89%), CVC – 1508 (45.53%), VC – 106 (3.20%), CCV – 81 (2.44%), V – 69 (2.08%), and CCVC – 28 (0.84%). If we compare this with the findings of Pokharel (1989), CV ranks first and CVC ranks second in both the results, and CCVC ranks last in both the results since CCCVC in Pokharel (1989) is the structure without example. Though the results are not comparable because the size, source and coverage of both data are different, indication of both the results to CV and CVC as the most frequent syllable structures in Nepali is notable.

Variation in Verb Roots: Syllable Based Explanation

Different types of variations available in the data are grouped and discussed under the following headings.

Variation in Front or Back High Vowels

This type of variations are found in bisyllabic roots in the dictionary entries in which either /u/ or /i/ is present as nucleus of the second syllable which is open syllable as in example (7) below.

7)	**u ~ i**		
	a.	/ku.ɦu/ ~ /ku.ɦi/	'rot'
	b.	/ʦu.ɦu/ ~ /ʦu.ɦi/	'leak'
	c.	/tu.ɦu/ ~ /tu.ɦi/	'abort'
	d.	/du.ɦu/ ~ /du.ɦi/	'milk'
	e.	/nu.ɦu/ ~ /nu.ɦi/	'bent down'
	f.	/ru.ɦu/ ~ /ru.ɦi/	'gin'

Dahal (1974) has described this class of verb roots to which an enunciating vowel is attached at the end. Pokharel (1989) as well as the latter works such as Pokharel (2064) and Pokharel and Pokharel (2079BS) describe these group of roots as most unpredictable in terms of the vowel they have at the end. We have only /u/ and /i/ at the end and consistently /u/ as first vowel in these data. There will be other vowels in these positions when we gather derived and inflected forms from this root. These class of roots can be more plausibly explained if these are taken as /ɦ/ ending roots. Various independent phonological processes and explanations can be connected with this class of roots. First, 'enunciating vowel at the end' of this class of root as presented by Dahal (1974) and the root is identified without this enunciating vowel. Second, the absence of syllable structure with /ɦ/ at coda position in Nepali can be taken as the reason for use of enunciating vowel. This explanation is supported by the fact that such enunciating vowel is not necessary where the following suffix begins with a vowel or a glide as in *duɦijo* 'milked'. The use of such vowel addition is commonly applied in the loan words to make the syllable structure permissible which is well discussed in Dahal (1974), Pokharel (1989), and Clements and Khatiwada (2015). Third, vowel harmony is

common across /ɦ/ in Nepali. This characteristic of Nepali phonology is reflected in the dictionary entries of the verb roots with variations as headword.

ʌ ~ i variation

There are a few bisyllabic roots in Nepali which end in either /ʌ/ or /i/ as presented in example (8).

8)	a.	/ut.rʌ/ ~ /ut.ri/	'climb down'
	b.	/um.rʌ/ ~ /um.ri/	'germinate'
	c.	/gul.ʈ̪ʌ/ ~ /gul.ʈ̪i/	'roll down'
	d.	/tʌr.sʌ/ ~ /tʌr.si/	'frighten'
	e.	/tʌi.rʌ/ ~ /tʌi.ri/	'float'
	f.	/tʌu.lʌ/ ~ /tʌu.li/	'weigh'
	g.	/pʌi.rʌ/ ~ /pʌi.ri/	'wear'
	h.	/pʌu.ɖ̪ʌ/ ~ /pʌu.ɖ̪i/	'swim'
	i.	/biũ.ʤ̪ʌ/ ~ /biũ.ʤ̪i/	'wake'
	j.	/ɦʌu.sʌ/ ~ /ɦʌu.si/	'get excited'

Vowels /ʌ/ and /i/ are the 'enunciating vowels' according to Dahal (1974). The explanation that these vowels are not the part of the root is justified because this variation is seen where there is consonant cluster at the coda position. As CC at coda position is not permitted in Nepali syllable structure, an enunciating vowel is used to break the CC cluster and make the structure permissible. The fact that the enunciating vowel is not present in the inflected or derived forms from these roots if the suffix begins with a vowel or a glide as in *umrjo* 'germinated', *tʌuljo* 'weighed', *tʌrsjo* 'frightened' etc. supports this explanation. The roots with variations in either presence or absence of enunciating vowels in Nepali is reflected in the dictionary entries.

Presence or Absence of ʌ

This set of data present either presence or absence of the enunciating vowel /ʌ/ as in example (9). However, the phonological context is different from the examples in (8) as there is no CC cluster at coda position.

9)	a.	/tʌu.lʌ/ ~ /tʌul/	'weigh'
	b.	/dʌu.ɖ̪ʌ/ ~ /dʌuɖ̪/	'run'

These examples have VV as nucleus. CC at coda position and VV as nucleus followed by C at coda position are the same in terms of syllable weight. In terms of syllable weight open syllable with short monophthong (represented with V) as nucleus is light, open syllable with long vowel or diphthong (represented with VV) as nucleus and close syllable with single consonant as coda is heavy syllable, and close syllable with long vowel or diphthong (represented with VV) followed by a single consonant and close syllable with CC cluster at coda position is super heavy syllable. These super heavy syllables are complex syllables according to Maddieson (2013). In this background the enunciating vowel /ʌ/ is used in these examples for the same function, i.e., to simplify the super heavy syllable into heavy syllable by making it bisyllabic.

This suggests that Nepali does not allow super heavy syllables in any form whether it is CC cluster at coda position or it is close syllable with VV as nucleus. The conditions based on syllable weight is reflected in the dictionary entries of the verb roots with variation.

Metathesis

Change of order between segments is metathesis. There are some roots with variation which have different order of certain segments in the data as in example (10).

10)	a.	lʌ ~ ʌl	/uk.lʌ/ ~ /u.kʌl/	'climb up'
	b.	rʌ ~ ʌr	/ut.rʌ/ ~ /u.tʌr/	'climb down'
	c.	t̪ʌ ~ ʌt̪	/ʤʰʌp.t̪ʌ/ ~ /ʤʰʌ.pʌt̪/	'attack'
	d.	pʌ ~ ʌp	/ɦʌɖ.pʌ/ ~ /ɦʌ.ɖʌp/	'capture'
	e.	kʌ ~ ʌk	/ɦʌɖ.kʌ/ ~ /ɦʌ.ɖʌk/	'scold'
	f.	ɖʌ ~ ʌɖ	/pʌk.ɖʌ/ ~ /pʌ.kʌɖ/	'catch'

This variation can be explained as two alternative strategies either to use enunciating vowel in Dahal (1974)'s sense or to insert a vowel in order to break the CC cluster at coda position to make the structure permissible. All the examples on the left have /ʌ/ at the end and all the examples on the right have /ʌ/ before the final consonant. The following variation also supports the argument as only initial part of a diphthong is involved in this variation. There is methathesis of /ar/ and /ra/ but not of /aur/ and /rau/.

11)	ɑr ~ rɑu	/lo.pɑr/ ~ /lop.rɑu/	'peel off'

The simple and straight forward metathesis could be *aur ~ rau* resulting into super heavy syllable as **lo.paur*. Creation of super heavy syllable is prevented by involving part of a diphthong in this example instead of whole diphthong.

There is an example in this class as in (12) which shows idiosyncratic behaviour.

12)	ʤr ~ rʤ	/bʌʤ.rʌ/ ~ /bʌr.ʤʌ/	'collide'

The root in example (12) has metathesis between coda of the first syllable and onset of the second syllable which has no plausible explanation.

Variation in Verb Roots: Segment Based Explanation

Variation in Non-high Back or Non-high Front Vowel

There are two types of variations within this class of roots - ɑ ~ e and ʌ ~ e. All the examples in (13) has following /l/ at the coda position as environment, and there is /l/ in two examples and another coronal consonant /t̪/ in the third as environment in (14).

13)	ɑ ~ e		
	a.	/u.kʰɑl/ ~ /u.kʰel/	'uproot'
	b.	/sɑ̃.gɑl/ ~ /sɑ̃.gel/	'collect'
	c.	/rʌ.jɑl/ ~ /rʌ.jel/	'mix (liquid)'
(14)	ʌ ~ e		
	a.	/rʌ.ŋʌl/ ~ /rʌ.ŋel/	'mix (liquid)'
	b.	/rʌ.jʌl/ ~ /rʌ.jel/	'mix (liquid)'
	c.	/lʌ.pʌt̪/ ~ /lʌ.pet̪/	'wrap'

Nothing more can be said on this type of variation and it needs further investigation.

Presence or Absence of Nasalization

There are some roots with variations – both monosyllabic and bisyllabic – differing in nasalization as in (15) below.

15)	a.	ʌ̃ ~ ʌ	/ʌ̃.ʦeʈ/ ~ /ʌ.ʦeʈ/	'press'
	b.	ɑ̃ ~ ɑ	/ɑ̃k/ ~ /ɑk/	'calculate'
	c.	ũ ~ u	/kũ.kɑu/ ~ /ku.kɑu/	'cry'
	d.	ĩ ~ i	/kʰĩʦ/ ~ /kʰiʦ/	'pull'

Variation of nasal vowel and non-nasal vowel in the example above need further investigation as there is no environmental clue to explain these.

Presence or Absence of Intervocalic ɦ

The following example has three-way variation as result of vowel harmony, /ɦ/ deletion, gemination and shortening. Among these, three forms at different levels of phonological processes are available in writing.

16)	ʌ ~ o	/mo.ɦʌr/ ~ /mo.ɦor/ ~ /mor/	'wrap'

Vowels across /ɦ/ harmonize, /ɦ/ between the identical vowels is deleted, the sequence of the two same vowels changes into a long vowel, and the long vowel changes into short vowel. Availability of these three varying roots in the dictionary reflects phonological processes of Nepali.

Glide Maintaining or Avoiding

Clements and Khatiwada (2015) mention glide avoiding as tendency in Nepali speakers. The examples (17) and (18) present the roots with variation in maintaining and avoiding glide.

17)	ɑ ~ jɑ			
	a.		/gi.ʤɑu/ ~ /gi.ʤjɑu/	'tease'
	b.		/ʤʰim.kɑu/ ~ /ʤʰim.kjɑu/	'blink'
	c.		/lop.rɑu/ ~ /lop.rjɑu/	'peel off'
18)	e ~ jɑ		/gʰʌ.ʦeʈ/ ~ /gʰʌ.ʦjɑʈ/	'push'

Those verb roots on the left in both the examples above do not have glide but those on the right do.

Oral-nasal (Consonant or Vowel) Variation

There are two types of variations with nasal - (1) oral consonant and nasal consonant and (2) nasalization followed by oral consonant and nasal consonant.

19)	a.	bʰ ~ m	/ʌn.bʰʌ/ ~ /ʌn.mʌ/	'leave maternal house at marriage'
			/ʌn.bʰʌ.ri/ ~ /ʌn.mʌ.ri/	'come or go'
	b.	ɖ ~ n	/ʤʰun.ɖi/ ~ /ʤʰun.ni/	'hang'

In example (19) there are nasal consonants as environment and can be explained as nasal transfer.

20)	a.	ʌ̃g ~ ŋ	/kʰʌ̃.gɑr/ ~ /kʰʌ.ŋɑr/	'cut the braches'
	b.	ĩg ~ ŋ	/rĩg/ ~ /riŋ/	'revolve'
	c.	ũg ~ ŋ	/rũg/ ~ /ruŋ/	'wait, care'

In example (20), voiced velar stop together with nasalization of the preceding vowel varies with velar nasal. These examples have a common feature, i.e., variation in homorganic oral and nasal stops.

Stop/Liquid or Tap

Example (21) presents the roots that contain varying phonemes /ɡ̪/ ~ /t̪, r, l/.

21)	a.	ɡ̪ ~ t̪	/ʌɡ̪.kʌ/ ~ /ʌt̪.kʌ/	'stuck'
	b.	ɡ̪ ~ r	/ʤʰɑɡ̪/ ~ /ʤʰɑr/	'sift'
			/u.bʰʌɡ̪/ ~ /u.bʰʌr/	'appear'
			/tʰo.pʌɡ̪/ ~ /tʰo.pʌr/	'impose'
	c.	ɡ̪ ~ l	/u.kʰɑɡ̪/ ~ /u.kʰɑl/	'uproot'

Dahal (1974) and Pokharel (1989) both mention that there is flapping rule in Nepali that changes retroflex (Dahal's term) or alveolar (Pokharel's term) stop into tap/flap at intervocalic position with following low back vowel and syllable final position.

However, tap/flap sound is not phonemic in Nepali thus there is no separate symbol used to write it. Thus it is written as t̪, t̪ʰ, ɡ̪ or ɡ̪ʰ. Example (21a) supports this explanation. At first glance this example seems as variation in voicing thus can be explained as so but the explanation as stop ~ tap/flap variation is more plausible.

Rest of the examples in this group (21b-c) further extend the scope and include liquid consonants /r, l/ together with the stop. If we follow Pokharel (1989), all the consonants in the examples above which vary with tap/flap are coronal and are at the syllable final position.

Variation in Liquid Consonants (r or l)

Some verb roots of Nepali vary in liquid consonants /r/ and /l/ as in example (22).

22)	r ~ l		
	a.	/ko.ʦʌr/ ~ /ko.ʦʌl/	'stir'
	b.	/kʰo.tʌr/ ~ /kʰo.tʌl/	'dig'
	c.	/ni.ɦɑr/ ~ /ni.ɦɑl/	'observe'

The consonants /r/ and /l/ are contrastive in Nepali thus they occur at the same environments. So it is difficult to explain why they vary in some roots.

Variation in Simple-Geminate

Example (23) presents the Nepali verb roots that contain simple and geminate variants of the consonants /t/, /l/, /t̪ʰ/, /r/, /m/, /s/ and /p/.

23)	a.	t ~ tt	/rʌ.ti/ ~ /rʌt.ti/	'be tamed'
	b.	l ~ ll	/ʌ.lʌ.li/ ~ /ʌ.lʌl.li/	'sob'
	c.	t̪ʰ ~ t̪t̪ʰ	/kɑ.t̪ʰi/ ~ /kɑt̪.t̪ʰi/	'chill'
	d.	r ~ rr	/kʰu.ri/ ~ /kʰur.ri/	'dry (extreme)'
	e.	m ~ mm	/t̪i.mu.ri/ ~ /t̪im.mu.ri/	'behave insanely'
	f.	s ~ ss	/ni.sɑ.si/ ~ /nis.sɑ.si/	'soffocate'
	g.	p ~ pp	/pʌ.lɑ.pi/ ~ /pʌ.lɑp.pi/	'become faineant'

Variation in example (23) involves the roots which can be related to some other classes of words and taken as derived roots. These are intransitive process verbs that involve different degrees of intensity. Variants with simple consonants express lower intensity and the variants with geminate

consonants express higher intensity. So, this type of variation is not phonological and cannot be explained from structural perspectives.

Example (24) with simple ~ geminate consonant is different from the examples presented in (23) since it is not intransitive process verb so there is no involvement of degrees of intensity. Thus it needs different explanation.

24)	tsʰ ~ tstsʰ	/pʌts.tsʰjɑu/ ~ /pʌ.tsʰjɑu/	'follow'

Nepali has an optional phonological rule that geminates the consonant followed by glide. Gemination in this example can be explained as gemination before glide. This phonological process is reflected in the dictionary entry as variation.

Example (25) shows the variation in voicing. The verb roots on the left have voiceless consonant as onset of the second syllable but those on the right have voiced consonant instead. This is the result of intervoiced voicing (25a) and intervocalic voicing (25b-c).

Variation in Voicing

25)	a.	/ʌr.tsɑp/ ~ /ʌr.dzɑp/	'sharpen'
	b.	/o.kʌt̪/ ~ /o.gʌt̪/	'capture'
	c.	/kʰo.tʌl/ ~ /kʰo.dʌl/	'dig'

There is another example of voicing variation presented in (26) in which consonant at coda position of the monosyllabic root is voiceless on the left but voiced on the right.

26)	d.	/tsop/ ~ /tsob/	'dip'

This seems as a result of syllable final devoicing but should be examined with more data.

Variation in Aspiration

A group of Nepali verb roots show unaspirated ~ aspirated phoneme variation which also include the voiced phonemes that can be termed more specifically clear ~ breathy variation.

27)	a.	g ~ gʰ	/ũg/ ~ /ũgʰ/	'nap'
	b.	t ~ tʰ	/gut/ ~ /gutʰ/	'wrap around head'
	c.	dz ~ dzʰ	/bidz/ ~ /bidzʰ/	'pierce'
	d.	ɖ ~ ɖʰ	/pʌɖ/ ~ /pʌɖʰ/	'read'

Pokharel (1989) has identified that no aspirated phoneme can occur syllable finally. The roots in example (27) reflect the result of this phonological process in the dictionary entry.

28)	a.	dz ~ dzʰ	/o.dzɑu/ ~ /o.dzʰɑu/	'remove burning firewoods from fireplace'
	b.	b ~ bʰ	/o.bɑu/ ~ /o.bʰɑu/	'become dry'
	c.	g ~ gʰ	/u.gɑu/ ~ /u.gʰɑu/	'scoop'
	d.	d ~ dʰ	/u.djɑu/ ~ /u.dʰjɑu/	'sharpen'
	e.	ts ~ tsʰ	/kʌ.tseṭ/ ~ /kʌ.tsʰeṭ/	'to bargain hard'

This class of roots show variation at onset position. There is no restriction for any phoneme at onset position in Nepali. This situation provides no clue for explaining this type of variation. Suffix *-au~-a* derives causative verbs from verb roots and derives verbs from other classes of words in Nepali. Another suffix -eṭ also derives verbs from other classes of words with very limited scope. The roots presented in (28), however, are not the derived verbs at least in the contemporary Nepali.

This type of variation can be explained either as historical traces if the basic forms of these roots are established without suffix or as false analysis as bimorphemic root.

There are two more examples of this type of variation.

29)	t̪i ~ t̪ʰi	/bɑũ.t̪i/ ~ /bɑũ.t̪ʰi/	'disalign'
30)	l ~ lʰ	/pʌ.lɑu/ ~ /pʌ.lɦɑu/	'leaf'

Example (29) can be explained as the root containing enunciating vowel at the end to break the super heavy syllable. Without the enunciating vowel, the root is monosyllabic with aspirated phoneme at coda position. The variation reflects the coda deaspiration rule in the Nepali verb roots.

Example (30) is different. Breathy liquids and nasals are attested in medieval Nepali contrasting with their modal or clear counterparts but there is no such contrast in modern Nepali. In this situation this example can be explained as historical trace of breathy liquid in writing. Clements and Khatiwada (2015) mention that some of the phonemes can be aspirated (for voiced phonemes too) in the environment of ɦ or any other aspirated phonemes. This is not applicable with this example since there is no such environment.

Example (31) is different from other examples in this group.

31)	p ~ bʰ	/gop/ ~ /gobʰ/	'pierce'

This example shows two step changes – once from breathy voice to modal or clear voice and then voiced to voiceless phoneme.

Summary and Conclusion

This study is based on the 1892 verb roots as data from a monolingual dictionary of Nepali *Prajñā Nepālī Bṛhat Śabdakośa* (2079BS). Among those 1892 verb roots 959 are forms without variation whereas the remaining 933 verb roots have variations. Most of the 933 verb roots have two variants and a few of them have three variants.

Nepali verbs have six types of syllable structures V, CV, CCV, VC, CVC and CCVC which can be further extended to ten types when monophthong (V) and diphthong (VV) at nucleus position are specified with addition of VV, CVV, CCVV and CVVC. The specification of the vowel at nucleus position helps in explaining many of the variations. Among the CC cluster, the second member can be only among the three consonants including the glides j and w, and a liquid r which is found single example in the data. CV including both monophthong and diphthong as nucleus is the most frequent syllable structure followed by CVC including both monophthong and diphthong as nucleus. Nepali falls within the group of languages with moderately complex syllable structure.

There are fourteen groups of verb roots with variations among which four are based on syllable structure and the remaining ten are based on segments involving vowels, consonants and suprasegmentals. Variations of the verb roots containing front or back high vowel, containing ʌ or i, presence or absence of ʌ, and metathesis include syllable based variations. These variations can be explained in terms of syllable weight. These variations also present in writing, indicate to the phonological process of simplification of syllable structure, i.e., from super heavy to heavy syllables.

The variations containing non-high back or non-high front vowel, presence or absence of nasalization, oral or nasal segments, presence or absence of intervocalic ɦ, glide maintaining or avoiding, stop/liquid or tap, variation among the liquid consonants (r or l), simple or geminate consonants, variation in voicing and variation

on aspiration include segment based variations. Some of these variations can be taken as single feature based variations too. Some of the segment based variations can be explained phonologically whereas some remain unexplained in this study and need further data as well as other perspectives.

Verb root variations containing stop/liquid or tap consonants is not available in the written form because tap is not phonemic in Nepali. It has no separate symbol for writing instead it is written either as ड /ɖ/ or ट /ʈ/. All other variations are also present in written form.

The study has four conclusions. First, the verb roots with variations in the dictionary entry in the form of phonemic transcription can be used to investigate the variation even though it is writing based phonemic transcription. The writing provides sufficient clues for explanation of the phonemic variations conditioned by phonetic environment as well as by the syllable structures. Second, super heavy syllables are present at the underlying abstract level in the Nepali verb roots though these are not allowed at the surface level. Most of the variations can be explained as result of the simplification of the super heavy syllables. Third, the verb roots with variations in their written form are either both surface forms or only one of them is surface form and the other is underlying form. These forms which are present in the dictionary reflect the phonological processes. Fourth, the written data taken from dictionary do not present any clue to analyze non-phonemic variations such as containing stop/liquid or tap consonants mentioned above.

Acknowledgment

I would like to acknowledge the Research Management Cell of the Central Department of Linguistics, Tribhuvan University, Nepal for providing the research grant for preparing this article. I would also like to extend my thanks to the editors and anonymous reviewers of the article for providing the valuable comments and suggestions to get it in this form.

References

Ayton, J. A. (1820). *A grammar of the Nepalese language*. Philip Pareira, Hindoostanee Press.

Bandhu, C., Dahal, B. M., Holzhausen, A. & Hale, A. (1971). *Nepali segmental phonology*. Tribhuvan University and Summer Institute of Linguistics.

Clements, G. N., & Khatiwada, R. (2015). Cooccurrence constraints on aspirates in Nepali. In A. Rialland, R. Ridouane, & H. D. van der Hulst (Eds.), *Features in phonology and phonetics: Posthumous writings by Nick Clements and Coauthors* (pp. 127–156). De Gruyter Mouton. https://doi.org/10.1515/9783110399981-007

Dahal, B. M. (1974). *A description of Nepali: literary and colloquial* [PhD. Dissertation, University of Poona].

Hardie, A., Lohani, R., & Yadava, Y. (2011). Extending corpus annotation of Nepali: Advances in tokenisation and lemmatisation. *Himalayan Linguistics*, *10*(1), 151–165. https://doi.org/10.5070/H910123572

Maddieson, I. (2013). Syllable structure. In S. Matthew, Dryer & Martin Haspelmath (eds.) *WALS online* (v2020.4) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.13950591

Pokharel, M. P. S. (1989). *Experimental analysis of Nepali sound system*. PhD. Dissertation, University of Poona, Pune.

Pokharel, M. P. S. (1989). *Experimental analysis of Nepali sound system* [Doctoral dissertation]. Tribhuvan University Central Library Catalog.

Pokharel, M. P. (2064 BS). *Nepālī dhvanivijñana ra Nepālakā bhāṣāko dhvani parichaya* [*Nepali phonetics and introduction to the sounds of Nepalese languages*]. Bhundipuran Prakashan.

Pokharel, M. P & Pokharel. A. (2079BS). *Nepālī varṇa vyākaraṇa* [*Nepali phonemic grammar*]. Nepal Academy.

Prajñā Nepālī Bṛhat Śabdakośa [Prajñā Nepālī comprehensive dictionary]. (2079BS). Nepal Academy.

Pun, C. (2019). *Phoneme sequences in spoken Nepali* [MA thesis,Tribhuvan University].

Regmi, B. N. (2006). Writing based syllabification in Nepali. In *Proceedings of O-COCOSDA 2006, Penang, Malaysia*.

Turnbull, A. 1887. *A Nepali grammar and English-Nepali & Nepali-English vocabulary (about 4000 words): designed for the use of missionaries, tea-planters and military officers*. N. L. Roy.

Turner, R. L. (1921). The infinitive in Nepālī. *Philologica: Journal of Comparative Philology*, 1. 101-116.

Turner, R. L., Sir. (1931). *A comparative and etymological dictionary of the Nepali language*. Kegan Paul.