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Journal
Himalayan Linguistics, 11(2)

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Publication Date
2012

DOI
10.5070/H911223713

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A description of allophonic and morphophonological alterations in Chhatthare Limbu

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ABSTRACT

In Chhatthare Limbu, many phonemes undergo allophonic alterations when occurring in different phonetic environments. Similarly, phonological changes of the stem or affix result from the interaction between phonemes in different morphological contexts. A monosyllabic stem final consonant syllabifies with a vocalic suffix, causing a verb stem alternate between consonantal and vocalic suffixes. Various types of affixal strings show different phonological processes such as deletion, epenthesis and assimilation which contribute to allophonic and morphophonological changes.

KEYWORDS

allophonic, morphophonological, deletion, epenthesis, assimilation

A description of allophonic and morphophonological alterations in Chhatthare Limbu

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1 Introduction

Chhatthare Limbu is spoken by 17,782 people in the Chhatthar area of eastern Nepal, which includes Marekkatahare, Leguwa, Arkhaule Jitpur, Ghorlikharka, Sanne, Hattikharka, Murtidhungga, Tangkhuwa, Teliya and Parewadin village development committees of the Dhankuta district, and Panchakanya Pokhari, Phakchamara, Hamarjung, Okhre, Sudap, Angdim, Dangappa, Phulek and Basantapur village development committees in the Terhathum district (CBS 2002). It is a polysynthetic, agglutinative-to-fusional type of language. In this article I present the consonant and vowel phonemes, their distribution and allophonic alterations as well as the scenarios of morphophonological changes on the basis of data collected from Bharat Kumar Subba, Khagendra Bahadur Limbu and Dharmal Lal Limbu, and mostly using my own insight as a native speaker.

Morphophonology is the study of changes in the appearances of phonemes and morphemes resulting from the phonological processes they undergo in morphologically complex words. Crystal (2003) defines morphophonology as a branch of linguistics referring to the analysis and classification of phonological factors that affect the appearance of morphemes, or grammatical factors affecting the appearance of phonemes. Likewise, Hannahs (2001: 10053-10058) states that morphology and phonology interact in phonological alternation of a stem or affix, vowel harmony involving both stems and affixes, the spread of a phonological feature as a grammatical marker, combinations of patterns of consonants and vowels in non-concatinative morphology, and phonologically definable reduplication.

This article is divided into five sections. The first section is an introduction, the second section deals with phonemes in Chhatthare Limbu, the third section with syllable structure, the fourth section deals with morphophonological changes and the last section presents the concluding remarks.

2 Phonemes

2.1 Consonants

There are twenty consonants in Chhatthare Limbu on the basis of minimal pair contrast.

(1)

a.	pɛn	'slips off'	pʰɛn	'comes'
b.	tak	'friend'	tʰak	'loom'
c.	koma	'to attend'	kʰoma	'to find'
d.	ca	'paddy'	cʰa	'child'
e.	pa	'father'	ba	'this'
f.	ɔku	'He called him.'	ɔgu	'He dug it.'
g	miŋ	'name'	niŋ	'thatch'
h.	sim	'sari'	siŋ	'firewood'
i.	yan	'weed.'	yaŋ	'money.'
j.	wɛpma	'to spill'	yɛpma	'to stand'
k.	si	'louse'	ɦi	'excreta'
l.	sa	'meat'	ɦa	'tooth'
m.	sɛmma	'to pluck out'	ɦɛmma	'to estimate'
n.	hɛp	'He embraces.'	ɦɛʔ	'It breaks.'
o.	lat	'He enters'	laʔ	'He buys.'
p.	hɛk	'He cuts.'	ɦɛʔ	'It breaks.'
q.	bo	'here'	mo	'down there'
r	hagu	'He husked it.'	haŋu	'He sent it.'
s.	cʰima	'to meet'	sima	'to die'
t.	rɔk	'only'	lɔk	'share'

The phonemic chart is given in Table 1.

	Labial	dental	alveolar	palatal	velar	glottal
Stop	p b pʰ	t tʰ			k g kʰ	ʔ
Fricative			s			ɦ
Affricate			c cʰ			
Nasal	m	n			ŋ	
Lateral			l			
Trill				r		
Semi-vowel	w			y		

Table 1. Consonant phonemes

2.1.1   *Distribution of consonant phonemes*

The phonemes of Limbu occur in initial, medial and final positions. In the following section, each phoneme is discussed.

2.1.1.1   Distribution of /p/

/p/ is an unaspirated, voiceless, bilabial stop. It occurs in initial, medial and final positions.

(2)

	Initial	Medial		Final	
a.	papma 'to say'	sapu	'He wrote it.'	sap˺	'He writes.'
b.	paŋ 'house'	kubaŋ	'his house'	kulap˺	'its wing'
c.	pima 'to give'	kambiyun	'You did not give him.'	hap˺	'He weeps.'

The phoneme /p/ has three variants, [p], [p˺] and [b]. It is pronounced as [b] if it occurs intervocalically or after a nasal consonant as in (2b-c). However, in initial position in a limited number of words, it contrasts with its voiced counterpart. If the preceding vowel is phonetically long, it is pronounced as [p] as in (2a). It is unreleased in final position, indicated by a diacritic [˺] in 2.

2.1.1.2   Distribution of /b/

/b/ is an unaspirated, voiced, bilabial stop. It does not occur in final position, and it contrasts with /p/ only in initial position. As the second and third columns in (3) show, in medial position /b/ stays unchanged but in final position it becomes [p˺].

(3)

	Initial	Medial		Final	
a.	bo 'here'	labu	'He burned it.'	lap˺	'He burns.'
b.	ba 'this'	tʰubu	'He pierced it.'	tʰup˺	'He pierces.'

2.1.1.3   Distribution of /pʰ/

/pʰ/ is an aspirated, voiceless, bilabial stop. It occurs in initial and medial positions. It does not occur in final position.

(4)

	Initial		Medial		Final
a.	pʰendi	'axe'	kubʰendi	'his axe'	
b.	pʰɛn	'He comes.'	kambʰɛnnɛn	'You do not come.'	

It has two allophones: [pʰ] and [bʰ]. [pʰ] is realized in initial position and [bʰ] after the prefix as in (4a) and after a nasal consonant as in (4b).

2.1.1.4   Distribution of /t/

/t/ is an unaspirated, voiceless, dental stop. It occurs in initial, medial and final positions.

(5)

	Initial	Medial	Final
a.	tak 'friend'	adak 'my friend'	nat˺ 'He chases.'
b.	tama 'to come'	patu 'He said it.'	pat˺ 'He speaks.'
		kambatun 'You did not say it.'	

/t/ has three variants. [t] occurs in the initial and [d] occurs in the medial position after the prefix or the nasal consonant. [t] occurs intervocalically before a vocalic suffix as in (5b) when the stem vowel is phonetically long. It is unreleased in final position.

2.1.1.5   Distribution of / tʰ/

/tʰ/ is an aspirated, voiceless dental stop. It occurs in initial and medial positions. It does not occur in syllable final position.

(6)

	Initial	Medial	Final
a.	tʰak 'loom'	adʰak 'my loom'	
b.	tʰuŋma 'to drink'	kandʰuŋun 'You do not drink it.'	

/tʰ/ has two phonetic variants: [tʰ] in initial position and [dʰ] in medial position after a prefix or a nasal consonant.

2.1.1.6   Distribution of / k/

/k/ is an unaspirated, voiceless, velar stop. It occurs in initial, medial and final positions.

(7)

	Initial	Medial	Final
a.	kuyu 'He carried it.'	naku 'He begged it.'	pʰak˺ 'pig'
b.	kuŋba 'brother-in-law'	aguŋba 'my brother-in-law	tɔk˺ 'boiled ice'
c.	koma 'to attend'	kaŋgoɦun 'You did not attend to him.'	kɔk˺ 'load'

/k/ has three allophonic variants. [g] occurs in the medial position after a prefix or a nasal consonant. [k] occurs in the initial position and also medial position if the stem vowel is phonetically long. In final position, it is unreleased. A limited minimal pairs show its contrast with /g/ in the medial position.

2.1.1.7   Distribution of /g/

/g/ is a voiced, velar stop. It occurs in the medial position.

(8)

	Initial	Medial	Final
a.		ɦagu 'He husked it.'	ɦak˺ 'He husks.'

b.		laɡu	'He licks it.'	lakˀ	'He licks.'
c.		maŋɡɛna	'goddess'	tʰɔkˀ	'body'

/ɡ/ contrasts with /k/ only in medial position in a limited number of minimal pairs. It does not occur in initial and final positions.

2.1.1.8   Distribution of / kʰ/

/kʰ/ is an aspirated, voiceless, velar stop. It occurs in initial and medial positions.

(9)

	Initial		Medial		Final
a.	kʰam	'soil'	kuɡʰam	'his land'	
b.	kʰoma	'to find'	kaɡʰowu	'You found it'	
c.	kʰɛmma	'to hear'	kaŋɡʰɛpsun	'You do not hear it'	

/kʰ/ has two phonetic variants: [kʰ] occurs in the initial position and [ɡʰ] occurs in medial position after a prefix or a nasal consonant. It does not occur in final position.

2.1.1.9   Distribution of /ʔ/

/ʔ/ is a glottal stop. It occurs in medial and final positions.

(10)

	Initial		Medial		Final	
a.	ʔikma	'to twist'	saʔ wama	'famine'	piʔ	'cow'
b.			sɔʔwa	'bee.'	kɛʔ	'He comes up'.
c.			kaʔwa	'crow'	hɛʔ	'He breaks'

In a vowel initial word such as ʔikma 'to twist', it optionally occurs in initial position.

2.1.1.10 Distribution of /c/

/c/ is an unaspirated voiceless, alveolar affricate. It occurs in initial and medial positions.

(11)

	Initial		Medial		Final
a.	ca	'paddy'	aja	'my paddy'	
b.	cuk	'He does.'	kajuk	'You do.'	
c.	cit	'He is greedy.'	kanjitnɛn	'You are not greedy.'	

/c/ has two phonetic variants: [c] and [j]. The first one occurs in initial position and the second one in medial position after a prefix or a nasal consonant. It does not occur in final position.

2.1.1.11 Distribution of / cʰ /

/cʰ/ is an aspirated, voiceless, alveolar affricate. It occurs only in initial and medial positions.

(12)

	Initial	Medial	Final
a.	cʰuma 'to touch'	kancʰuwun 'You don't touch.'	
b.	cʰima 'to meet'	kacʰiru 'You meet him.'	
c.	cʰa 'child'	kanjʰa 'your sibling'	

/cʰ/ has two phonetic variants: [cʰ] and [jʰ]. However, [jʰ] occurs only after the augmented nasal consonant of a prefixal kinship term as in the second column of (12c). Elsewhere [cʰ] occurs consistently.

2.1.1.12 Distribution of /s/

/s/ is a voiceless, alveolar fricative. It occurs in initial and medial positions.

(13)

	Initial	Medial	Final
a.	sɛpmaŋ 'dream'	asɛpmaŋ 'my dream'	
b.	sipma 'to distill'	kasipu 'You distilled it.'	
c.	sogʰa 'ghost'	kusogʰa 'his spirit'	

/s/ has no alternate phonetic variant and is realized as [s] in initial and medial positions.

2.1.1.13 Distribution of /ɦ/

/ɦ/ is a voiced glottal fricative. It occurs only in initial and medial positions.

(14)

	Initial	Medial	Final
a.	ɦaŋ 'king'	kaɦaŋ 'your king'	
b.	ɦorik 'skin'	kaɦorik 'your skin'	
c.	ɦapma 'to weep'	kaɦap 'You weep.'	

/ɦ/ has no alternate phonetic variant, and is realized as [ɦ] in initial and medial positions.

2.1.1.14 Distribution of /m/

/m/ is a bilabial nasal consonant. It occurs in initial, medial and final positions.

(15)

	Initial	Medial	Final
a.	maŋ 'goddess'	pʰɛmba 'blacksmith'	lam 'path'
b.	mɛttu 'He looked at it.'	kamɛttu 'You looked at it.'	im 'He sleeps.'
c.	mɔkma 'to boil'	kammɔkkun 'You did not boil it.'	sim 'sari'

/m/ has no alternate phonetic variant, and is realized as [m] in all positions.

2.1.1.15 Distribution of /n/

/n/ is a dental nasal consonant. It occurs in initial, medial and final positions.

(16)

	Initial		Medial		Final	
a.	nɔma	'to fry'	kanɔyu	'You fried it.'	ɔn	'horse'
b.	nɛnnɛ	'elder sister'	ani	'we'	wadʰin	'egg'
c.	nɛndɔre	'sister-in law'	kʰunɛ	'he'	pʰɔn	'hail'

/n/ has no alternate phonetic variant, and is realized as [n] in all positions.

2.1.1.16 Distribution of /ŋ/

/ŋ/ is a velar nasal consonant. It occurs only in medial and final positions.

(17)

	Initial	Medial		Final	
a.		ɦaŋu	'He sent it'	luŋ	'stone'
b.		ɦuŋu	'He paid it.'	siŋ	'wood'
c.		sɔŋa	'brother'	tiŋ	'thorn'

/ŋ/ has no alternate phonetic variant, and is realized as [ŋ] in medial and final positions. In Panthare (Weidert and Subba 1985, Kainla (2003), Phedappe (van Driem 1987) and Taplejungge (Michailovsky 2002) dialects, it occurs even in initial position such as in *ŋa* 'fish', which is pronounced with a dental nasal /na/ in Chhatthare Limbu.

2.1.1.17 Distribution of /l/

/l/ is an alveolar lateral. It occurs in initial and medial positions.

(18)

	Initial		Medial		Final	
a.	lam	'path'	kulam	'his path'		
b.	laŋ	'leg'	pʰaklaŋ	'pig- leg'		
c.	luŋ	'stone'	haʔluŋ	'fireplace'		

/l/ is realized as [l] in all of its occurrences. In native words, it does not occur in word final position. It, however, occurs in Nepali loan words with syllable- final [l], such as *sural* 'trouser', *thal* 'dish' etc..

van Driem (1987:4) describes /l/ in Phedappe Limbu as a phoneme with two allophones [l] and [r] and analyzes their distributional constraints from segmental phonological contexts. Hildebrandt (2007), on the other hand, studies their distributions in the same dialect from prosodic and grammatical points of view. In Chhatthare Limbu, /l/ and /r/ are treated as different phonemes.

2.1.1.18 Distribution of /r/

/r/ is a palatal trill. It occurs in initial and medial positions.

(19)

		Initial		Medial	Final
a.	rɔk	'only'		arɔk 'only me'	
b.	ri	assertive particle		pʰaru 'He helps him.'	
c.	ro	assertive particle		ɦaru 'He bit him.'	

/r/ occurs rarely in initial position, and does not occur syllable finally or word-finally in the native tongue. It is pronounced as [r] in all occurrences. But when it occurs in the assertive particle *ro* after a preceding consonant, it may change to [l] as an idiolectical variant as in *tegaŋlo* ' I went', which is, normally, pronounced as *tegaŋro*. In Nepali loan words, /r/ occurs in the final position such as in *khir* 'pudding', *pir* 'worry', *tir* 'arrow' etc. Similarly, it occurs word-initially in numerous loan words such as in *rumal* 'handkerchief' *rɔksi* 'local wine', *rɔŋ* 'colour' etc..

One anonymous reviewer questions whether /l/ and /r/ are distinct phonemes on the basis of the data provided in this analysis. In fact, there are only a few minimal pairs to show this contrast. Historically, it is more so because these two sounds show mutually exclusive distribution even now. It is more likely that they were allophones of the same phoneme in the past. However, now, minimal pairs like *makla* 'maize cob after removal of corn', *makra* 'a kind of tree', *a-lɔk* 'my share', and *arɔk* 'only me' are available . They are contrastive in identical environments, and on this basis, these two sounds are distinct phonemes.

2.1.1.19 Distribution of /w/

/w/ is a semi-vowel. It occurs in the initial and medial positions.

(20)

		Initial		Medial		Final
a.	wa	'hen'		kakwa	'crow'	
b.	wan	'It shakes.'		sakwama	'starvation'	
c.	wet	'It spills.'		sãweʔ	'buffalo'	

/w/ has no alternative phonetic variation. It is pronounced as [w] in both positions. It does not occur in the final position.

2.1.1.20 Distribution of /y/

/y/ is a palatal semi-vowel. It occurs in the initial and medial positions.

(21)

		Initial		Medial		Final
a.	yan	'weed'		poya	'It increased.'	
b.	yaŋ	'money'		kayaŋ	'your money'	
c.	yɔk	'origin'		kayɔk	'your origin'	

/y/ does not occur in the final position, and is pronounced always as [y].

2.1.2   *Complementary distributions or allophones*

The distribution of phonemes indicate that when /pʰ/, /tʰ/, /kʰ/, /p/, /t, /k/ and /c/ occur after a prefix or a nasal consonant, they change to [bʰ], [dʰ], [gʰ], [b], [d], [g] and [j]. However, they are phonetically similar and mutually exclusive or they are complementary to each other. They are allophones. In some cases such as ba 'this' /b/ occurs as a phoneme. Similarly, in the verb *hegu* 'He cut it', /g/ occurs as a phoneme as mentioned earlier. [jʰ] has only limited occurences such as with *anjʰa* 'my younger sibling, *kunjʰa* 'his younger sibling', *kanjʰa* 'your younger sibling' and *nunjʰa* 'our younger sibling'. It might have developed due to the contact with Athpahariya language.

There are no retroflex phonemes such as /ʈ/, /ʈʰ/, /ɖ/ and /ɖʰ/ in the native language. However, they have been borrowed from the Nepali language.

2.1.3   *Constraints of consonants*

The Chhatthare Limbu phonological system does not allow all consonants to occur in all positions. They have positional constraints as described below.

a. The aspirated plosives /pʰ/, /tʰ/ and /kʰ/ are not found in final position.
b. Semi vowels such as /w/ and /y/ do not occur in final position.
c. Fricatives like /s/ and /ɦ/ do not occur in final position.
d. Affricates do not occur in final position.
e. Velar nasal /ŋ/ does not occur in word initial position.
f. Alveolar lateral /l/ and palatal trill /r/ do not occur in final position.
g. Voiced, velar stop /g/ does not occur in initial and final positions.
h. Voiced, bilabial stop /b/ does not occur in final position.

2.2   *Vowels*

There are seven vowels in Chhatthare Limbu on the basis of quality contrast. For example *ik* 's/he twists', *ek* 'backbone', *ɛk* 'it breaks', *ak* 'it gets uprooted', *ɔk*, 'some sticky thing comes off' and *uk* 's/he brings'. They can be divided into close, half-close, half-open and open vowels on the basis of tongue-height and front, centre and back on the basis of tongue-frontness.

	Front	Centre	Back
Close	i		u
Half-close	e		o
Half-open	ɛ		ɔ
Open		a	

Table 2. Vowel phonemes

2.2.1   *Distriibution of vowels*

2.2.1.1   */i/*

/i/ is a front, unrounded close vowel. It occurs in initial, medial and final positions.

(22)

	Initial		Medial		Final	
/i/	ikma	'to twist'	sima	'to die'	si	'He dies.'

2.2.1.2 /e/

/e/ is a front, unrounded, close vowel. It occurs in initial, medial and final positions.

(23)

	Initial		Medial		Final	
/e/	ekma	'to be broken'	sema	'to urinate'	se	'He urinates.'

2.2.1.3 /ɛ/

/ɛ/ is a front, unrounded, half open vowel. It occurs in initial, medial and final positions.

(24)

	Initial		Medial		Final	
/ɛ/	ɛkma	'to winnow'	sɛma	'to scatter'	sɛ	'He scatters.'

2.2.1.4 /a /

/a/ is a central, unrounded open vowel. It occurs in initial, medial and final positions.

(25)

	Initial		Medial		Final	
/a/	akma	'to be uprooted'	sama	'to escort'	sa	'He escorts.'

2.2.1.5 /ɔ/

/ɔ/ is a half-open, rounded, back vowel. It occurs in initial, medial and final positions.

(26)

	Initial		Medial		Final	
/ɔ/	ɔkma	'to cry'	sɔma	'to kneed'	sɔ	'He kneads.'

2.2.1.6 /o/

/o/ is a half-close, rounded, back vowel. It occurs in initial, medial and final positions.

(27)

	Initial		Medial		Final	
/i/	okma	'to scratch'	soma	'to itch'	so	'It itches.'

2.2.1.7 /u/

/u/ is a close, rounded back vowel. It occurs in initial, medial and final positions.

(28)

	Initial		Medial		Final
/u/	ukma	'to bring down'	suma	'to be inactive'	su 'He is inactive.'

2.2.2 Diphthongs

Diphthongs are almost non-existent. When the verb stem final vowel occurs with interrogative suffix <-i>or nominal stem final vowel occurs with vocative case marker <-e, -o>, diphthongs are formed.

(29)

 a. kʰɛnɛ ka-de-i
  you   2S-go-Q
  'Do you go?'

 b. kʰunɛ   ta-i
  he   come-Q
  'Does he come?'

 c. ku-laŋ   so-i
  3SGPOSS-leg itch-Q
  'Does his leg itch?'

 d. ap-pa-e
  1SGPOSS-father-VOC
  'Oh my father!'

 e. am-ma-o
  1SGPOSS-mother-VOC
  'Oh my mother!'

The word ailamba 'this year' is the only word in Chhatthare Limbu containing the diphthong [ai].

3   Syllable structure

A word may have from one syllable to five syllables. A five-syllable word may consist of fifteen phoneme sequences. Glides such as /y/ and /w/ can occur following another phoneme in the onset position. But in the coda position, they cannot occur.

3.1 Monosyllabic pattern

A single vowel, sequences of consonant and vowel, consonant, vowel and consonant and consonant, consonant and vowel form a mono-syllabic pattern. Here C stands for consonant and V for vowel.

(30)

a.	V	i	'He wanders.'
b.	CV	mi	'fire'
c.	CVC	pan	'speech'
d.	CCVC	cwaʔ	'water'

3.2 *Disyllabic pattern*

The sequences of CVCV, CVCCV,CVCVC and CVCCVC constitutes disyllabic patterns. Thus, disyllabic patterns contain sequences of four, five and six phonemes.

(31)

a.	CVCV	nɛ.ɦu	'He laid it.'
b.	CVCCV	pʰak.su	'He untied it.'
c.	CVCVC	ca.suŋ	'gift'
d.	CVCCVC	hak.suŋ	'I waited for him.'

3.3 *Trisyllabic pattern*

The trisyllabic pattern includes CVCVCV, CVCCVCV, CVCVCCVC and CVCCVCCVC.

(32)

a.	CVCVCV	nɔ.yu.si	'He fried them.'
b.	CVCVCCVC	ha.ruŋ.siŋ	'I bit them.'
c.	CVCCVCV	tɛp.su.si	'He caught them.'
d.	CVCCVCCV	lɔm.bʰɛk.kʰa	'bamboo carpet'
e.	CVCCVCCVC	tɛp.suŋ.siŋ	'I caught them.'

3.4 *Four-syllabic pattern*

A four-syllable word may contain CVCVCVCV, CVCVCCVCV, CVCVCCVCCVC, CVCVCVCCVC, CVCCVCVCCVC and CVCCVCCVCCVC sequences. It may contain from eight to twelve phonemes.

(33)

a.	CVCVCVCV	ka.ɦɛ.ru.si	'You broke them.'
b.	CVCVCCVCV	ka.jan.du.si	'You beat them.'
c	CVCVCCVCCVC	ma.jan.dun.sin	'He didn't beat them.'
d.	CVCVCVCCVC	ma.hu.run.cʰin	'He doesn't teach them.'
e.	CVCCVCVCCVC	kan.ɦu.run.cʰin	'You didn't teach them.'
f.	CVCCVCCVCCVC	kan.dɛp.sun.sin	'You didn't catch them.'

3.5   Five-syllable pattern

A Five-syllable word is comprised of CVCVCVCCVCCVC, CVCVCCVCCVCCVC and CVCCVCCVCCVCCVC sequences. The sequence contains from thirteen to fifteen phonemes.

(34)
a.	CVCVCVCCVCCVC	ma.ɦu.rum.sim.nɛn	'Let's not teach them.'
b.	CVCVCCVCCVCCVC	ma.lɔp.sum.sim.man	'We do not beat them.'
c.	CVCCVCCVCCVCCVC	kan.lɔp.sum.sim.nɛn	'You did not beat them.'

4   Morphophonological changes

In Chhatthare Limbu, the interaction between morphology and phonology triggers morphological and phonological changes simultaneously. These phenomena can be observed in stem+ (a single) suffix, stem+suffixal strings, prefix + stem, (single) prefix+stem+suffixal string and prefixal string+stem+ suffixal strings.

4.1   Stem+suffix

When a CVC syllable stem is followed by V-initial suffix, the coda consonant of the preceding morpheme re-syllabifies onto the suffix onset, thus forming syllables such as CV.CV, and violating a 'tautomorphemicity' principle as coined by Bickel (2003b). When a CVC stem is followed by a C-initial suffix, the coda consonant of the preceding morpheme is deleted. These are detailed in the sections below.

4.1.1   Deletion

The stem-final consonants /w/, /r/, /y/ and /ɦ/ appear before a vocalic suffix, whereas they are elided before a consonantal suffix.

(35)
  a.   <ɦaw+u>
       divide+3SGO
       'He divided it.'

  b.   <ɦa+ma>
       divide+INF
       'To divide'

  c.   <pʰar+u>
       help+3SGO
       'He helped him.'

  d.   <pʰa+ma>
       bite+INF
       'To help'

e.   <pey+a>
fly+PT
'It flew.'

f.   <pe+ma >
fly+INF
'To fly'

g.   <nɛɦ+u>
keep+3SGO
'He kept it.'

h.   <nɛ+ma>
keep+INF
'To keep'

These alternations can be captured by the rule as given in (36).

(36)   {wryɦ} → Ø / __C

According to Bickel (2003b), "lexical morphemes in Belahare all minimally contain one syllable and the same is true for over 90% of the grammatical morphemes." This observation holds for Chhatthare Limbu, too. Lexemes have minimally a CVC syllable structure. When CVC + V is formed, it is resyllabified as CV.C+V. As a result, *haw-u*, *phar-u*, *pey-a* and *neh-u* are resyllabified as *ha.wu*, *pha.ru*, *pe.ya* and *nɛ.hu*.

In Chhatthare Limbu consonant phonemes like /w/, /r/, /y/ and /ɦ/ cannot occur in the syllable- final position. Therefore, when verb stems with these phonemes in syllable final position are followed by a consonantal suffix, they are deleted, but when followed by a vocalic suffix, they remain, constituting another syllable with the following vocalic suffix as given in (35a), (35c), (35e) and (35g).

Verb stems have post-syllabic consonants. They appear before a vocalic suffix, but are deleted before a consonantal suffix, as a consonant cluster is not licensed in syllable-final position. So, the last consonant in the cluster is deleted. The post-syllabic consonants such as /p/, /t/, /k/ and /s/ are deleted before the consonantal suffix.

(37)
   a.   <cɛpp+u>
cut+3SGO
'He cut it.'

   b.   <cɛp+ma>
cut+INF
'To cut'

   c.   <kʰamd+u>
          chew +3SGO
          'He chewed it.'

   d.   <kʰam+ma>
          chew+INF
          'To chew'

   e.   <lɛkk+u>
          change+3SGO
          'He changed it.'

   f.   <lɛk+ma>
          change+INF
          'To change'

Segment strings such as CVCCV are syllabified as CVC.VC As a result, *cɛpp-u*, *khamd-u* and *lɛkk-u* are syllabified as *cɛp.pu*, *kham.du* and *lɛk.ku*. For Phedappe Limbu, Hildebrandt (2007) argues that historically *CVCC is realized as CVCC before a vowel initial suffix and the stem re-syllabifies as CVC.CV.

      Demonstrative adjective ba is a full grammatical word and it is prosodically independent. It is evidenced by the examples given in (38). When locative suffix follows it, the vowel is deleted and a prosodically independent full grammatical word is formed, as illustrated in (38b).

(38)
   a.   <ba+o>
          this+LOC
          'In this'

   b.   <bo>
          'Here'

   c.   ba napmi
          'This man'

   d.   ba paŋ yɔmba cuk
          this house big be
          'This house is big.'

Casali (1997) says that in many languages hiatus arises through morphological or syntactic concatenation, and is frequently resolved by eliding one of the adjacent vowels. In Chhatthare Limbu, as the example (38) shows, the first vowel is elided to resolve the hiatus.

      If a verb stem has a sequence of a voiceless velar stop /k/ and dental fricative /s/, or bilabial stop /p/ and alveolar fricative /s/, they both appear before a vocalic suffix as in (39a) and (39c), but

when they appear before a consonantal suffix, the post-syllabic consonant is deleted to respect syllable structure requirements and the syllable final /k/ changes to /ŋ/, as shown in (39b). The syllable final /p/ changes to /m / as in (39d).

(39)

    a.   <pʰaks+u>
           untie+3SGO
           'He untied it.'

    b.   <pʰaŋ+ma>
           untie+INF
           'To untie'

    c.   <aps+u>
           winnow+3SGO
           'He winnowed it.'

    d.   <am+ma>
           winnow+INF
           'To winnow'

These alternations can be captured by the rule given in (40).

(40)

    s → Ø / __Nasal
    {k,p} →Nasal /__Nasal

4.1.2 *Assimilation*

    If a verb stem has a voiceless dental stop /t/ in a stem-final position, it surfaces as such before the vocalic suffix <-u> as in (41a) and (41c), but it undergoes homorganic assimilation before a consonantal suffix as in (41b) and (41d) and is realized as /p/.

(41)

    a.   <set+u>
           urinate+3SGO
           'He urinated on it.'

    b.   <sep+ma>
           urinate+INF
           'To urinate on it.'

    c.   <pʰet+u>
           fart+3SGO
           'He farted at him.'

d. <pʰep-ma>
Fart+INF
'To fart at something or somebody'

This alternation can be captured by the rule in (42).

(42)   t > p/ - m

The syllable final consonant /t/ of a verb stem undergoes affrication if it is followed by a voiceless, aspirated, alveolar affricate /cʰ/. However, in a slow speech it remains unchanged before /cʰ/.

(43)
a. <kɛt>
bring+3SGS
'He brings.'

b. <kɛc+cʰ+u>
bring+ DA+3SGO
'They bring him.'

c. <mɛt>
look+3SGS
'He looks.'

d. <mɛc-cʰ-u>
look+DA+3SGO
'They look at him.'

The application of these rules is shown in (44).

(44)   Underlying representation   /ɛt-cʰ-u/
        Lexical representation   /ɛt-cʰ-u/
        Assimilation   [ɛc-cʰ-u]
        Phonetic representation   [ɛc-cʰ-u]

This alternation is captured by the rule in (45).

(45)   t > c/ - cʰ

A syllable final glottal stop /ʔ/ undergoes voicing assimilation when it is followed by a vocalic suffix, and specifically changes to a trill /r/, as exemplified in (46b), (46d) and (46f).

(46)

    a.   <sɛʔ>
           kill+3SGS
           'He kills.'

    b.   <sɛr+u>
           kill-3SGO
           'He kills it.'

    c.   <lɛʔ>
           leave+3SGS
           'He leaves.'

    d.   <lɛr+u>
           leave-3SGO
           'He leaves it.'

    e.   <pʰɛn>
           come+3SGS
           'He comes.'

    f.   <pʰɛr-a>
           come+PT
           'He came.'

    This derivation is shown in (47).

(47)   Underlying representation of verb stem   /sɛʔ/
                Underlying representation of verb stem + suffix   /seʔu/
                Voicing assimilation   seru
                Phonetic representation   [seru]

    This situation can be presented in the rule in (48).

(48)   /ʔ/ > /r/ ‐ V‐V

Exceptionally, /n/ occurs in the coda position in *pʰen* where /ʔ/ otherwise is expected. However, the /n/ becomes [r] before a vocalic suffix as shown in (46e-f).

    The first person singular subject marker <-ŋa> undergoes progressive assimilation, retaining or changing its phonetic shape according to the consonant preceding it, as shown in (49).

(49)

    a.   <yɔŋ+ŋa>
           shiver+1SGS
           'I shiver.'

b. <lok+ŋa>
run+1SGS
'I run.'

c. <pʰen+na>
come+1SGS
'I come.'

d. <et+na>
laugh+1SGS
'I laugh.'

e. <im+ma>
sleep+1SGS
'I sleep'

f. <ɦap+ma>
weep+1SGS
'I weep.'

In (49a) and (49b) the nasal phoneme /ŋ/ retains its phonetic shape because it is preceded by the velar consonants /ŋ/ and /k. In (49c) and (49d) the velar nasal consonant /ŋ/ becomes dental in place of articulation ([n]) because it is influenced by the preceding dental nasal or stop consonant /n, t/ and in (49e) and (49f) the nasal /ŋ/ becomes bilabial in place under the influence of the preceding bilabial nasal /m/ and bilabial stop /p/. The nasal does not undergo place assimilation when following a vowel.

This situation can be presented by the rule given in (50).

(50)   /ŋ/ --> C[α place] / C[α place] __

4.1.3   Epenthesis

Homorganic nasals are inserted between the stem final consonant and the interrogative suffix, <-i>, locative suffix <-o> and vocative suffixes <-e, –o>. The nasal consonants assume their phonetic shapes according to the phonological environments as shown in (51).

(51)

a.   <sim+m+i>
saree+EPN+Q
'Is this a saree?'

b.   ɦap+m+i>
weep-EPN+Q
'Does he weep?'

c. <pin+n+i>
Jump+EPN+Q
'Does he jump?'

d. <ket+n+i>
 come up+EPN+Q
'Does he come up?'

e. <paŋ+ŋ+i>
house+EPN+Q
'Is this a house?'

f. <ɛk-ŋ+i>
 break+EPN+Q
'Does this break?'

g. <nam+mo>
sun +LOC
'In the sun'

h. <ɦap+mo>
nest+LOC
'In the nest'

i. <ɔn+no>
horse+LOC
'On the horse'

j. <cwat+no>
water+LOC
'In the water'

k. <paŋ+ŋo>
 house+LOC
'In the house'

l. <ɦuk+ŋo>
hand+LOC
'In a hand'

m. <nam+me>
sun+VOC
'Oh, sun!'

n. <pit+ne>
    cow+VOC
    'Oh, cow!'

o. <maŋ+ŋe>
    goddess+VOC
    'Oh, goddess!'

p. <lam+miŋ>
    path+ABS
    'The path'

q. < lap+miŋ >
    wing+ABS
    'The wing'

r. < pʰen+niŋ >
    underwear+ABS
    'The underwear'

s. < meʔ+niŋ >
    wife+ABS
    'The wife'

t. < laŋ+ŋiŋ >
    leg+ABS
    'The leg'

u. < ɦuk+ŋiŋ >
    hand+ABS
    'The hand'

Homorganic stops are inserted between demonstrative adjectives and locational adverbs when they are compounded.

(52)
  a. <ba+p+mo>
      this+EPN+down
      'Down here'

  b. <ba+t+to>
      this+EPN+up
      'Up here'

  c. <ba+ʔ+yo>
      this+EPN+ over there
      'Over this side'

/p/ is inserted between the demonstrative adjective ba 'this' and locational adverb *mo* 'down' as in (52a), and /t/ is inserted between the demonstrative adjective *ba* and locational adverb *to*, as in (52b) when they are compounded. The glottal stop /ʔ/ is inserted between *ba* and *yo* as in (52c).

4.2   Stem+suffix strings

4.2.1   Deletion

The vowel /a/ in the initial position of the sequential suffix is deleted when it occurs after the first person singular suffix <-ma, na, ŋa> as shown in (53b), (53d) and (53f).

(53)
    a.   <teps+u+m+ma+aŋ wa>
        hold+3SGO+PA+1SGO+SEQ+be
        'We have held him.'

    b.   <teps+u+m+ma+ŋ +wa>
        hold+3SGO+PA+1SGO+SEQ+ be
        'We have held him.'

    c.   <ka+jan+na+aŋ   ka+lok >
        2SGA+beat+1SGO+SEQ 2SGS+run
        'You beat me and run.'

    d. ka+jan+na+ŋ   ka-lok>
        2SGA+beat+1SGO+SEQ_ 2SGS+run
        'You beat me and run.'

    e.   <tek+ŋa+aŋ   tum+u+ŋ>
        go+1SGS+SEQ_ meet+3SGO+1SGA
        'I will go and meet him.'

    f.   <tek+ŋa+ŋ tum+u+ŋ>
        go+1SGS+SEQ meet+3SGO+1SGA
        'I will go and meet him.'

4.2.2   Epenthesis

In the first person singular agent and second person plural object configuration, there is an insertion of /n/ to avoid hiatus between the object marker <-na> and number marker <-i> as shown in (54a) and (54b).

(54)
    a.   <cʰu+na+n+i+ŋ>
        touch-1→2+EPN+PO+1SGA
        'I touch you (P).'

b. <set+na+n+i+ŋ>
    kill-1→2-EPN+PO+1SGA
    'I kill you (P).'

The dental nasal consonant /n/ is inserted between an imperative suffix <-a> and the third person object suffix <-u> as shown in (55a-c).

(55)
a. <hat+a+n+u+m+si+m>
    distribute+IMP-EPN+3O-PA+NSGO+PA
    'Distribute among them.'

b. <nat+a+n+u+m>
    Chase+IMP+EPN+3O-PA
    ' You, chase them.'

c. <kheks+a+n+u+m>
    bind-IMP-EPN+3O-PA
    'You, bind him.'

The velar nasal consonant /ŋ/ is inserted between the first person suffix <-ŋ> and the sequential suffix <-aŋ> as shown in (56a-c).

(56)
a. <niɦ+u+ŋ+ŋ+aŋ + wa>
    see+3SGO-1SGA-EPN+SEQ +be
    'I have seen it.'

b. <ɦer+u+ŋ+ŋ+aŋ +wa>
    break+3SGO+1SGA+EPN+SEQ+ be
    'I have broken it.'

c. <sub+u+ŋ+ŋ+aŋ +wa>
    close+3SGO+1SGA+EPN+SEQ+ be
    'I have closed it.'

4.3 Prefix+ Stem

4.3.1 Epenthesis

A homorganic consonant is inserted between a prefix and a kinship term, resulting in gemination as illustrated in (57).

(57)

    a.   <ku+n+ni>
         3SGPOSS+EPN+aunt
         'His aunt'

    b.   <ku+m+ma>
         3SGPOSS+EPN+mother
         'His mother'

    c.   <ku+p-+pa>
         3SGPOSS-EPN+father
         'His father'

    d.   <ku+t+tuba>
         3SGPOSS+EPN+grandfather
         'His grandfather'

    e.   <ku+k+ku>
         3SGPOSS+EPN+maternal uncle
         'His maternal uncle'

A similar phenomenon happens when the kinship term begins with an aspirated stop or affricate, as in (58).

(58)

    a.   <ku+c+cʰa>
         3SGPOSS+EPN+child
         'His child'

    b.   <a+p-pʰaŋ>
         1SGPOSS+EPN+uncle
         'My uncle'

    c.   <a+t+tʰe>
         1SGPOSS+EPN+grand mother
         'My grandmother'

In these cases, only the segment is geminated, not the aspiration feature.

4.3.2 *Voicing assimilation*

The stem-initial voiceless stops /p/, /t/ and /k/ and affricate /c/ are voiced after the prefix, which is vowel-only or CV.

(59)

    a.   <a+bi>
         1INCL-give
         'He gives us.'

    b.   <ka+gɔ>
         2- fall
         'You will fall.'

    c.   <mu+dɛ>
         3P-go
         'They will go.'

4.4   Prefix+Stem+Suffix

4.4.1   Negative allomorphs

After the negative prefix <man> and <ma-> the stem- initial voiceless stops /p/, /t/ and /k/ and affricate /c/ change to [b], [d], [g] and [j] and after the stem, negative suffix is <-nen>as shown in (60a) and (60d). However the negative prefix <man, maŋ> and the suffix <-ban, -pan>, as listed in (60b-c) are morphosyntactically restricted. They attach only to first person singular agent and third person singular object-marked verbs, or first person singular subject-marked verbs, all in past tense.

(60)

    a.   <ma+be+nen>
         NEG-fly-NEG
         'It does not fly.'

    b.   <man+de+ban>
         NEG-go-1SG/PT/NEG
         'I did not go.'

    c.   <maŋ+gɔ+ban>
         NEG+fall+1SG/PT/NEG
         'I did not fall.'

    d.   <ma+jɔ+nen>
         NEG+eat+NEG
         'He did not eat.'

4.5   Prefix- Stem+Suffix-string

The suffixal part of negative morpheme is <-nen> after the consonant as illustrated in (61).

(61)

   <ma+lɔps+u+m+nen>
   NEG-beat-3O+1/2 PA-NEG/ADH
   'Let's not beat him.'

4.6 *Prefix-string+ Stem+Suffix*

   The negative prefix undergoes regressive or anticipatory assimilation (shown in bold face) to the following consonant in (62).

(62)

  a. <ka+**ŋ**+got+nen>
    2SGO+3NSGA +search+NEG
    'They do not search you.'

  b. <ka+**n**+de+nen>
    2SGS+ NEG+go+NEG
    'you don't go.'

  c. <ma+**l**+lok+nen>
    3PS+NEG+run+NEG
    'They do not run.'

  d. <a-**m**-bo-nen>
    1INCL-NEG-grow-NEG
    'We do not grow.'

The process of morphophonological changes can be indicated by the rule in (63).

(63)   <n> --> C[α place] / ___ -C[α place]

Hildebrandt (2007:16) refers the assimilation process as shown in (62a) as "anticipatory velarization (/n/→ [ŋ] /_k, kʰ)" for Phedappe Limbu, and the assimilation process as shown in (62d) as "anticipatory labial assimilation" (2007:17). In addition, the data also exhibit that the suffixal part of negation is <-nen> after the stem.

4.7 *Prefix-string+ Stem Suffix-string*

   The suffixal part of the negative is <-nen>after the consonantal suffix.

(64)

  a. <ka+n+deps+u+m+nen>
    2+NEG-catch+3O+1/2 PA+NEG
    'You will not catch him.'

    b.   <a+l+lɔps+u+m+nen>
        1INCL+NEG-beat+3O+1/2 PA+NEG
        'We will not beat him.'

        In third person non-singular agent and speech act participant object configurations in the negative verb paradigm, the third person non-singular agent and negative prefix are contiguous. This results in a deletion of the negative marker, as the syllable structure does not permit gemination in the syllable final position.

(65)
    Underlying representation
            /a+m+m+baks+a+ŋ+nen/
            1O+3NSGA+NEG+send+PT+1SGO+NEG
            'They did not send me.'

    Surface representation
            [ambaksaŋnen]
            'They did not send me.'

(66)
    Underlying representation
            /ka+n+n+deps+a+n/
            2SGO+3NSGA+NEG+catch+PT+NEG
            'They did not catch you.'
    Surface representation
            [kandepsan]
            'They did not catch you.'

(67)
    Underlying representation
            /ka+ŋ+ŋ+got+nen/
            2SGO+3NSGA+NEG+search+NEG
            'They do not search you.'

    Surface representation
            [kaŋgotnen]
            'They do not search you.'

The negative suffix <-nen> reduces to [-n] when it occurs after the vocalic suffix.

(68)
    a.   < ka+n+naps+u+n>
        2SGA+NEG+smell+3SGO+NEG
        'You don't smell it.'

b. <ka+m+bat+u+n>
    2SGA-NEG-say-3SGO-NEG
    'You don't say it.'

c. <a+m+bac+cʰ+u+n>
    1INCL-NEG-say-DA-3SGO-NEG
    'We don't say it.'

It can be generalized as in the rule in (69).

(69)   <-nen>   >   <-n>/ VS-

The negative prefix allomorphs <n-~m-~ŋ-> are derived from <man->, which occurs only in first person singular subject or agent and first person plural exclusive subject or agent past verb forms. In first person singular subject or agent in non-past and third person singular or dual subject or agent in non-past or past form of the verbs, the negative prefix is <ma->.
The third person plural subject or agent prefix is <mu->.

(70)
a. <mu+ser+u>
    3PA+kill+3SGO
    'They kill him.'

b. <mu+deps+u>
    3PA+catch+3SGO
    'They catch him.'

c. <mu+iŋ+u>
    3PA-buy-3SGO
    'They buy it.'

When <mu-> occurs with the negative prefix <n-~m-~ŋ->, the high, round, back vowel /u/ is realized as a low, unrounded back vowel [a] and the negative prefix is realized as <ma->.

(71)
a. <ma+m+bʰɛtt+u+n>
    3PA+NEG+bring+3SGO+NEG
    'They did not bring it.'

b. <ma+n+nok+u+n>
    3PA+NEG+return+3SGO+NEG
    'They did not return it.'

c. <ma+ŋ+goɦ+u+n>
    3PA+NEG+attend+3SGO+NEG
    'They did not attend to it.'

This situation can be explained by the rule given in (72).

(72)   <mu-> > <ma-> /{-<m~n~ŋ>}

The phonetic form of third person plural prefix is morphologically determined; however, the prefix <mu-> loses its vowel when it occurs after the first person and second person object morphemes, < a-> and <ka-> respectively and retains only <m->. The morpheme <m-> also undergoes homorganic place assimilation based on the following stop.

(73)
    a.   <a+m+baks+a+ŋ>
        1+3NSGA+send+PT+1SGO
        'They sent me.'

    b.   <ka+m+baks+a>
        2SGO+3NSA+send+PT
        'Thy sent you.'

    c.   <a+n+sat+na>
        1+3NSA+tease+1SGO
        'They tease me.'

    d.   <ka+n+sat>
        2SO+3NSA+tease
        'They tease you.'

    e.   <a+ŋ+gʰeŋ+ŋa>
        1+3NSGA+bind+1SGO
        'They bind me.'

    f.   <ka+ŋ+gʰeŋ>
        2SGO+3NSGA+bind
        'They bind you.'

This situation can be presented by the rule in (74).

(74)   <mu-> > <m-~n-~ŋ>/ { <ka->}-
                                {<a->}-

In a kind of long-distance assimilation, the negative prefix <n-> assimilates to the final consonant of a vowel-initial verb stem for place of articulation.

(75)

   a.   <ka+n+ut+u+n>
        2SGA+NEG+call+3SGO-NEG
        'You do not call him.'

   b.   <ka-m-ep-u-n>
        2SGA+NEG+tread+3SGO+NEG
        'You do not tread on him.'

   c.   <ka+ŋ+og+u+n>
        2SGA-NEG-scratch-3SGO-NEG
        'You do not scratch it.'

In (75a) the negative marker surfaces as [n-] because the stem-final coda is /t/, which is a dental stop. Similarly, in (75b) and (75c) the negative marker is [-m] and [-ŋ] respectively because they are followed by bilabial stop [p] and velar stop [g] in contagious positions. This long-distance assimilation occurs only in rapid speech.

5   Concluding remarks

This article has shown the contexts of interaction between phonology and morphology, including processes such as deletion, epenthesis, assimilation, and voicing. This article has also presented information on phonemes, minimal pairs, distribution, positional constraints, syllable structures and words containing minimal through maximal syllables. There are other types of allomorphy that are grammatically motivated, for example in words like *po* 'it grows', *pʰo* 's/he grows something' but these are not elaborated on because they are not productive in Chhatthare Limbu.

ABBREVIATIONS

1INCL	First person inclusive	3SGS	Third person singular subject
1SGA	First person singular agent	ABS	Absolutive
1SGO	First person singular object	C	Consonant
1SGPOSS	First person singular possessive	DA	Dual agent
1SGS	First person singular subject	IMP	Imperative
2PO	Second person plural object	INF	Infinitive
2SGA	Second person singular agent	LOC	Locative case marker
2SGO	Second person singular object	NEG	Negative
2SGPOSS	Second person singular possessive	P	Plural
2SGS	Second person singular subject	PA	Plural agent
3 NSGA	Third person non-singular agent	PO	Plural object
3PA	Third person plural agent	POSS	Possessive
3SGO	Third person singular object	PT	Past tense
3SGPOSS	Third person singular possessive	Q	Question

| RV | Round vowel | V | Vowel |
| SEQ | Sequential | VS | Vowel stem |

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