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Prosodic and Grammatical Domains in Limbu[1]

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1   Introduction

I begin this account with an apparent problem in Limbu phonology, discussed at some length by various contributors. In his 1987 grammar and again in a 1990 paper, George van Driem examines, from an areal and diachronic perspective, the allophonic variants of the lateral approximant /l/ in the Phedappe dialect of Limbu and in some other languages of the Eastern Kiranti branch of Tibeto-Burman. These are summarized with (Phedappe) Limbu data in (1a.& b.) (van Driem 1990: 3-84):

(1) Conditions for [l] and [r][2]

a. /l/ → [l] / ꜱ(_ …) or ꜱ(C._ …) if C ≠ /l/

lap   'wing'
lup.**l**i   'earthquake'

phak-**l**ɛ[3]
pig-ɢᴇɴ
'of a pig'

b. /l/ →   [r] / ꜱ(V_V) or ꜱ(ʔ._ …)

nɛ.**r**ɛt   'liver'

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[2] van Driem (1987 4f.) describes /l/ as an apico-alveolar approximant, and [r] as a lamino-alveolar trill.

[3] ABBREVIATIONS: Σ = stem piece, 1 = first person, 2 = second person, 3 = third person, A = subject of transitive clause, ADH = adhortative, ADV = adverb, AP = adjective participle, ASS = assertive, ᴄᴀᴜs = causative, ᴄᴏɴᴅ = conditional, d = dual, ᴇʀɢ = ergative, ɢᴇɴ = genitive, IMP = imperative, ɪɴꜰ = infinitive, ɪɴᴄʟ = inclusive, ɪɴsᴛʀ = instrumental, ɪᴘꜰ = imperfective, ʟᴏᴄ = locative, ɴᴇɢ = negative, ɴᴏᴍ = nominalizer, ɴᴘ = negative participle, ɴᴘᴛ = non-preterite, ns = non-singular, ᴏᴘᴛ = optative, ᴘ = patient, ᴘꜰ = perfective, pfɢ = perfect gerund, ᴘʟ = plural, ᴘᴏss = possessive, ᴘᴘ = passive participle, prɢ = present gerund, ᴘsᴛ = past, ᴘᴛ = preterite, Q = interrogative, ʀᴇꜰʟ = reflexive, s =singular, s = subject, sᴜʙ = subjunctive, ᴠᴏᴄ = vocative

ku-sa-**r**ɛ
3POSS-son-GEN
'of his son'

lɔʔ-**r**ik[4]
manner-ADV
'fashion, manner of acting'

The occurrence of [r] in these contexts is predictable, and /r/ as a contrastive phoneme in Limbu occurs only in two contexts: In Nepali loans in word-initial (and in final) position, and in word-medial C2 onset position in some native words like *cɔkkrɔkma* 'uvula' (6).[5]

    The allophonic variation shown in (1) is described by van Driem as the result of an older merger of */r/ and */y/, leaving */l/ and */r/ in complementary distribution, where their appearances were predictable (1990: 83). More recently, word-initial, phonemic /r/ has been reintroduced into Limbu via Nepali loanwords (e.g. *r**a**ŋ* 'color' and *r**uma**ʔl* 'handkerchief', *pir* 'pain, anguish' (1990: 84). This has "enabled a redistribution and re-analysis of native liquid allophones in Eastern Kiranti" (1990: 84), and the beginning of a break-down in the alternation between the two allophones in some words, particularly certain compounds. This is exemplified in (2):

(2) Exceptions to [l] ~ [r] in Some Compounds

haʔ + **l**uŋ (*haʔ+**r**uŋ, following /ʔ/)[6]
fire-tooth
'ceremonial fireplace stone' (van Driem 1987: 419)

makhi + **l**am (*makhi+**r**am, intervocalically)
blood-road
'artery' (464)

sam + **r**ippa (***l**ippa, syllable-initial, post-consonantal)
spirit-darkened
'shadow' (van Driem 1990: 85)

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[4] This and other data suggest that /ʔ/ is transparent to the boundaries of certain phonological rules.

[5] Apparently [l] may occur in final position in certain native verb forms under certain aspectual or valency circumstances. Other, rhotic-like consonants, like alveolar approximants and trills show a similar restriction in distribution in other Tibeto-Burman languages, including Meithei and Dolakha Newar (Chelliah 1997; Genetti 1994). Interestingly in Garo, the mirror-image process applies, where the phoneme /r/ surfaces as [r] in syllable-initial position, both word initial and medial, and surfaces as [l] in word-medial, intervocalic position (Burling 1961, 2003).

[6] van Driem (1987) transcribes compounds as a single unit, with no morpheme boundaries. I use the + symbol in this account to show juncture between the elements.

mi+rak-maʔ
fire + burn-NOM
'to burn something' (Michailovsky 1997: 142)

In a later synchronic and diachronic discussion of patterns of [l] ~ [r] alternation in Limbu, Boyd Michailovsky (1997) notes additional exceptions that make the conditions for the allophonic alternations seem even less clear-cut. Two of these cases are listed in (3).[7]

(3) Additional Exceptions to [l] ~ [r]

ku-**l**aŋ (*ku-**r**aŋ, intervocalic after possessive prefix)
3POSS-leg
'his leg' (140)

iŋ-gɛ-**l**ɛktu (*iŋ-gɛ-**r**ɛktu, intervocalic after 2nd person prefix)
speech-2-barter-CAUS-3P
'You coaxed him.' (143)

The possessive and 2nd person in (3) are glossed as prefixes by both Michailovsky and van Driem, suggesting they are part of one (polymorphemic) grammatical word. However, the [r] allophone does not surface intervocalically, as would be expected.

These examples would suggest that the alternation between [l] and [r] is broken down, and there is no simple rule to cleanly predict the environments in which either variant would surface. In fact, Michailovsky suggests that syllable-initial [r] was never a conditioned variant of [l]. For him, the alternation between [l] and [r] is tied more to a combination of a phonological weakening process and morpheme class membership, where [r] is realized in certain verb compound types, or with certain bound or free morphemes (1997: 146).

The aim of this paper is to show that the [l] ~[r] alternation as shown in examples (2) and (3) applies with regularity at the word-initial boundary, and is also conditioned by syllable structure in word-medial position (in line with van Driem 1987). Those cases that appear to defy the predicted alternations in fact occur at the edges of a domain in Limbu called the "Phonological Word," a domain of prosodic organization that also includes reference to morphological material. Phonological Words have been identified and described for several languages (e.g. Nespor & Vogel 1986; Hall & Kleinhenz 1999, eds.; Dixon & Aikhenvald 2002, eds.). In Limbu, the interest in the Phonological Word comes not so much in its existence, but in the interesting ways that different prosodic domains, including the Phonological Word, align (and mis-align) with morphological ones. For a number of processes and patterns (described in section 3.3), the alignment includes stem and suffix/enclitic morphemes only, to the exclusion of prefixes. For still other processes, the alignment includes the prefix and stem, to the exclusion of suffixes (section 3.4).

Interestingly, there is only a single process, namely anticipatory labialization, that includes exhaustively the prefix + stem+ suffix as a domain (section 3.5). Still another interesting observation is that there is a phonological difference between nominal compounds and verbal

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[7] The morpheme glosses are adapted from van Driem's (1987) glossary.

bipartite stems in Limbu (section 4). Nominal compounds always result in two P-words, while verbal bipartite stems show variation in phonological cohesion at the level of P-word.

In addition to the Phonological Word, I illustrate how various phonotactic patterns and phonological processes/constraints illuminate still other prosodic domains either containing, or contained by, the Phonological Word. These include the Syllable (section 2), the Foot (section 3.2), and the Phonological Phrase (section 5).

One more general benefit of this analysis is that it demonstrates the relevance of multiple, mis-aligned phonological domains beyond that of syllable in a Tibeto-Burman language. One popular (and generally not inaccurate) view of Sino-Tibetan (Sinitic in particular) phonology is that the syllable or foot is the primary or most salient unit of phonological organization. While this is perhaps true of the "omnisyllabic languages" of South-East Asia, and especially where historical reconstruction is concerned, other domains are also crucial to phonological organization in the Tibeto-Burman languages of South Asia (e.g. the word-tone systems in Bodish languages), and I suggest here that an appeal to different prosodic domains best captures a number of otherwise complex and contradictory phonological phenomena in Limbu.

2   The Syllable in Limbu

There is ample evidence for the relevance of the syllable in Limbu phonology, and Michailovsky describes the syllable as of "fundamental importance in Limbu phonology (1997: 140)." Most of this evidence comes from syllable structure and phonotactic patterns. For example, voiceless bilabial and velar plosives (/p, k/) are released when they are syllable onsets (single or the first member of a cluster), and are unreleased with a "simultaneous" glottalization in coda position ([p^ʔ, k^ʔ]) (van Driem 1987: 3).[8] Onset consonant clusters are permitted (with restrictions), but coda clusters are not. In addition, the vowels /i, o/ have more centralized variants when a syllable ends with a velar nasal coda consonant (but apparently not if the nasal is the onset of another syllable).

In Limbu there is a general dispreference of the surfacing of vowel-initial syllables, even though the underlying template may be V-initial or V-only, (van Driem 1987: 16). There are different strategies of onset maximization, depending upon where the syllable is located in a word and on syllable phonotactics (Hildebrandt 2004; Bickel et al 2007: 29). If a suffix is underlyingly V-initial, then the coda consonant of the preceding morpheme resyllabifies into the suffix onset (e.g. /VC-V/ → [V.**C**V]).[9] If the stem is underlyingly V-initial, then glottal insertion occurs, even if a prefix is available (e.g. /CV$_{prefix}$-V/ > [CV$_{prefix}$.ʔV]). These resolutions are illustrated in (4) and (5).

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[8] The dental plosive /t/ is not included here because its allophonic variants in coda position are sensitive to word boundaries. For more detail, refer to section 3.5.

[9] Such a process violates the *Tautomorphemicity Principle*, whereby morpheme boundaries are dispreferred within certain phonological domains (Bickel 2003b), but it is a weak violation in that the strong version of this principle refers to the foot and not the syllable. More is said about Tautomorphemicity in sections 3.2. through 3.4

(4) Resyllabification: Stem + Suffix

tak(**t**)-**u**   [takˀ.**t**ʊ]   ("Untimely Death": 21)[10]
bring.up.s2-3P
'I bring it up.'

mɛ-pu**r**-**u**   [mɛ.bu.**r**ʊ]   ("Untimely Death": 16)
3PL-give.S2-3P
'They give (to) them.'

(5) Glottal Insertion: Stem-Initial & Prefix-Stem

iŋghɔŋ   [ʔiŋ.ghɔŋ]   ("Untimely Death": 2)
'news, message'

ku-iŋghɔŋ   [ku.ʔiŋ.ghɔŋ]   (van Driem 1987: 15)
3.POSS-message
'his news'

Even the [l] ~ [r] alternation in Limbu, an alternation which in some contexts highlights the initial edge of a P-word, also makes some reference to syllable boundaries. In word-medial position, [l] surfaces if the preceding syllable is closed, and [r] surfaces if the preceding syllable is open or ends with glottal stop (in both cases, [l]~[r] are the only onset in the syllable, as neither variant of /l/ in word-medial position is the first member of an onset cluster).

There are a number of assimilation processes in Limbu, but these, like the [l] ~ [r] alternation, cross syllable boundaries, or else they refer to a domain of application that is greater than a single syllable (or morpheme). For example, an anticipatory assimilation of dental/alveolar consonants to bilabial place applies exclusively across morpheme boundaries, as in examples (6a. stem + suffix) and (6b, prefix + stem):

(6) Anticipatory Labial Assimilation (van Driem 1987: 17)

a. Stem + Suffix Application

/mɛ-n-kɔ**t**-**m**ʔna-haʔ/   [mɛŋgɔ**p**mʔnahaʔ]
NEG-NEG-have-PP-NOM
'(The haves) and the have-nots'

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[10] The parentheses around a final coda segment indicate that the stem has two underlying representations, in this case, /tak, takt/. The second coda consonant is a historically eroded second coda consonant that resurfaces, for example, before vowel-initial suffixes. Limbu texts from the LACITO Archive: (http://lacito.vjf.cnrs.fr/archivage/index.html). The story titles correspond to the titles of the sound files. The page numbers correspond to the location of the words in the transcribed texts.

b. Prefix + Stem Application

/mɛ-**n**-**m**ɛt-baŋ/   [mɛ**m**mɛppaŋ]
NEG-NEG-tell-1S→3/PT-PF
'I did not tell him.'

Example (6a.) also shows that another assimilation process, anticipatory velarization (i.e. /n/ →
[ŋ] of the negative prefix), also applies across morpheme boundaries.
Another set of related, but bi-directional assimilation processes, where glottal stop assimilates
with an adjacent nasal consonant (i.e., both anticipatory and perseverative), potentially apply
across specific morpheme boundaries only (e.g. locative and absolutive suffixes), and other times
only applies across syllables within a morpheme, as (7) shows:

(7) Glottal-Nasal Assimilation (van Driem 1987: 18)

/hi**m**-ʔo:/   [hi**m**mo:] (across stem-suffix boundary)
house-LOC

/-aʔ.**m**ɛʔ/   [a**m**mɛʔ] (in a morpheme, across syllable boundaries)
'PL.INF'

These examples show that while the triggers for various assimilation processes are adjacent
segments, the domain of the processes can cross-cut syllable and morpheme boundaries in
somewhat idiosyncratic ways. I would suggest that these varying domains of assimilation (and
also of the [r]~[l] alternation, discussed in section 3.2) can be captured in a more unified way by
appeal to the prosodic hierarchy and to the phonological word in particular.

3   The Prosodic Hierarchy and Phonological Words in Limbu
3.1   The Prosodic Hierarchy & Phonological Word
     A crucial aspect of phonological rules is their domains of application, embodied in
literature on Prosodic Phonology and the Prosodic Hierarchy (Selkirk 1980, 1984; Nespor &
Vogel 1986). The hierarchy, with the domains and their structural mappings, is illustrated in the
schematic in (8).

(8) The Prosodic Hierarchy[11]

Domain	Mapping
Phonological Utterance	
Intonation Unit	Syntactic Structure
Phonological Phrase	
Phonological Word	Morpho-Syntactic Structure
Foot	Phonological Information
Syllable	

The relevance of the syllable in Tibeto-Burman languages has already been well established in other literature (Matisoff 1991a, b), and here. Many studies of other languages have also demonstrated the relevance of a phonological constituent larger than the syllable or foot, but smaller than the phrase, in accounting for the domain of phonological rules and phonotactic generalizations (Dixon 1977; Selkirk 1980; Booij 1983; Nespor & Vogel 1986; Hall & Kleinhenz, eds. 1999; Dixon & Aikhenvald, eds. 2002). This constituent has been variably referred to as the phonological or prosodic word (P-word). In many languages, there are phonological processes that cross morpheme boundaries, but which themselves cannot clearly be specified in terms of a single morphological generalization. For example, the domain of vowel harmony in Hungarian crosses stem-suffix boundaries. This is illustrated in (9) (Hall 1999: 4):

(9) Vowel Harmony Across Stem + Suffix

ölelés-n**e**k   'embracement' (with dative singular suffix)

hajo-n**a**k   'ship' (with dative singular suffix)

The domain of vowel Harmony in Hungarian excludes stem + stem boundaries of compounds and also prefix-stem boundaries (Booij 1984; Nespor and Vogel 1986).

As with Hungarian, there are processes in other Tibeto-Burman languages that cannot be accounted for in a unified manner either by strict appeal to syllable structure or by categorical appeal to morphological domains. For example, the domain of tone in many Bodish languages is the phonological word, including stems and various bound morphemes but not prefixes (Mazaudon 1973; Denwood 1999; Huber 2002; Noonan 2003; Hildebrandt 2003, 2005a). Stop consonant-voicing in Belhare is a word-medial phenomenon (Bickel 2003a). Tone upstep/downstep in Meithei also may be best defined by the phonological word (stem + suffixes),

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[11] The Clitic Group has been variably, and with some controversy, included in the Prosodic Hierarchy as a domain between that of Phonological Word and Phonological Phrase, in order to account for the prosodic idiosyncrasies of clitics and function words (cf. Vogel 1990; Peperkamp 1997, 1999).

as these processes exclude, or show idiosyncrasies with, prefixes, clitics and lexicalized (disyllabic) suffixes (Chelliah 1997). Examples of word-level phenomena in other Tibeto-Burman languages are also attested, e.g. Burmese shows a voicing of obstruent consonants in juncture domains within compounds (Sprigg 1957).

I now turn to a discussion of foot structure in Limbu first, with a description of stress and rhythm properties in sections 3.3 through 3.5. I then show the relevance of the P-word as a domain for specifying allophonic variation and assimilation processes in Limbu, noting that different processes and constraint provide evidence for multiple, non-isomorphic (non-overlapping) words.

3.2   The Phonological Foot in Limbu

Foot structure in Limbu is evidenced by two mutually-dependent patterns: (trochaic) rhythm and nasal consonant gemination.[12] Feet are bimoraic in Limbu, and a secondary stress is found on all *non-initial* feet. There are two types of evidence for this: (small-scale) acoustic evidence from secondary stress, and a pattern of gemination at morpheme boundaries of non-initial feet. However, as with other Kiranti languages like Belhare, footing and rhythm in Limbu are sensitive to syllable weight and onset constraints. A more detailed discussion of these interactions reveals the particularities of foot-structure and rhythm in Limbu.

Like many other Sino-Tibetan languages, Limbu avoids, whenever possible, morpheme boundaries within syllables and also within feet. This reflects a principle dubbed *Prosodic Tautomorphemicit*y in Bickel 2003b.[13] Vocalic suffixes and clitics are a potential threat to this principle because resyllabification to avoid V-initial syllables (onset maximization) could lead to (CV-V) or (CV.C-V) feet, which include a concatenative morpheme break. This situation is generally avoided by leaving the relevant strings unfooted and thus unstressed.

A tautomorphemic foot emerges in Limbu (and in Belhare), however, in situations that meet two conditions: (i) the suffix is bimoraic, i.e. the suffix or clitic supports the construction of a foot of its own; (ii) the suffix or clitic follows a consonant. In other words, the relevant situations have the structure $(CVC)_\Sigma$-VV or $(CVC)_\Sigma$-VC. In these (and only these) cases, the preceding consonant is geminated, and this leads to the construction of two feet: $(CVC)_\Sigma(CVV)$ or $(CVC)_\Sigma(CVC)$. The data in (10) illustrate this:

(10) Gemination in Limbu (gemination data from van Driem 1987: 47, 144)

/a-nju**m**-e:/   [a'nju**m,m**e:]
1POSS-friend-VOC
'Oh my friend!'

/kɛ-sira-tha**ŋ**=i:/   [kɛ'sira,dha**ŋ,ŋ**i:]
2-pleasure-come.up=Q
'Do you like it?'

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[12] This analysis follows from that proposed in (Bickel 1998 and 2003b).
[13] For an Optimality Theoretical Analysis see (Bickel 1998)

These words surface with onsetted syllables and a trochaic rhythm. If the suffix is not amenable to construction of a bimoraic foot, the stem-suffix string is unfooted and therefore, unstressed, as in (11):

(11) Unfooted suffixes in Limbu

/kɛ-ni-siŋ-i/　　　　　[kɛ'nisiŋi]
2-see-REFL-2p
'You saw each other.'

In (11) the surfacing structure contains onsetted syllables, but the (light) non-initial syllables are unfooted, and as such, there is no secondary stress in the word. If the final two syllables were footed (i.e. (siŋi)φ), this would violate tautomorphemicity in Limbu, as a footed string of heavy-plus-light syllables would contain a morpheme boundary.

　　　　One alternative analysis to the gemination process shown in example (10) is to posit that geminates are derived from an epenthetic glottal stop in a vowel initial syllable and then a process of assimilation in place and manner to the nasal segment of the preceding morpheme. This would be represented as a three-step derivation as in (12):

(12) Alternative Analysis: Glottal Insertion and Assimilation

/a-nju**m**-e:/

a-nju**m**ʔe:　　　　　Glottal Stop Insertion
a-nju**m**me:　　　　　Glottal-Nasal Assimilation
a-'nju**m**ˌme:　　　　Footing for Stress and Rhythm

[a'nju**m**ˌ**m**e:]

However, in Limbu insertion of any type is disallowed in word-medial domains (i.e. stem ± suffixes or enclitics). Hildebrandt (2004) demonstrates that the only domain where insertion of any kind occurs in Limbu is at the starting edge of a prefix and at the starting edge of a root morpheme. Despite a strong preference in Limbu for onsetted syllables (as noted in section 2), the resolutions in word-medial domain always involve gemination stem allomorphy (with resyllabification), or simple resyllabification, depending on tautomorphemicity. In the latter cases, historically *CVCC stems will be realized as CVCC before a vowel-initial suffix (and as CVC elsewhere), or else an underlyingly /CVCC/ stem will resyllabify to a vowel initial suffix, as shown in (13) and (14):

(13) Stem Allomorphy and Resyllabification

/tak(**t**)-**u**/　　　　　['takˀ.**t**ʊ]　　　("Untimely Death": 21)
bring.up.s2-3O
'You bring (it) up.'

(14) Simple Resyllabification

/mɛ-pu**r-u**/   [mɛ.ˈbu.**r**ʊ]   ("Untimely Death": 16)
3PL-give.S2-3O
'They give (to) them.'

The resyllabification strategies may apply regardless of whether the following affix is bimoraic or not, and if the affix is monomoraic, a secondary stress still does not apply. Overall then, tautomorphemicity is avoided in Limbu.

While a trochaic rhythm pattern and its reflexes in gemination are evidence for foot structure in Limbu, there is also a single main stress found in Limbu words. The main stress is described in more detail in sections 3.3 and 3.4, as there is both a default and an alternative pattern, thereby revealing non-overlapping word domains.

3.3   Phonological Word 1: Stem ± suffix(es) ± Enclitic(s)

One piece of evidence for a Phonological Word of a certain morphological structure in Limbu comes from the seemingly idiosyncratic environments in which the phoneme /l/ is realized as the allophone [r], illustrated in examples (1) through (3) in section 2. Van Driem (1987: 4f.) describes /l/ as a phoneme with two allophones: [l] and [r]. The allophone [l] surfaces word-initially, and also in word-medial onset position when preceded by a consonant (except glottal stop /ʔ/). It also occurs in word-final position in Nepali loans like *be:l* 'bel tree'.

The other allophone of /l/, [r], surfaces intervocalically in word-medial syllable-onset position, and also following /ʔ/ (see example 1b above). Van Driem notes that "the two allophones occur in complementary distribution in all affixes and parts of speech, with the exception of nouns taking possessive prefixes and the second members of a few composita." (1987: 4). These exceptions include Nepali loans with initial and final /r/, as shown in section 2, and the tendency for bilingual Limbus to confuse Nepalese /r/ and /l/ when they speak Nepali (his example *ama re* and *ama le* 'mother ERG') (1987: 5). Through diachronic change, phonemic /r/ remains only as the second member of a word-medial consonant cluster (e.g. *saŋ.ga.**t**ra* 'citrus fruit').

At first glance, the domain of the [l] ~ [r] alternation appears to be the syllable (onset). The allophone [l] surfaces syllable initially in word-initial position, or in onset position following any consonant, and the allophone [r] surfaces as the onset in (word-medial) intervocalic position. However a closer look at different morpho-phonological environments for this alternation shows multiple exceptions to this pattern. I will now detail these exceptions.

One prominent exception to the application of the [l] ~ [r] alternation in Limbu is prefixes. Van Driem notes that the addition of the "productive prefix" possessive *ku-* to an l-initial noun does *not* trigger the alternation, so that the following examples may be found in (15). (van Driem 1987: 5)

(15) No [l] ~ [r] Alternation Following Prefix *ku-* (van Driem 1987: 5, 359, 363, 29)

ku-**l**a:p (*ku-**r**a:p)
3POSS-wing
'its wing'

ku-**l**um-ʔo (*ku-**r**um-ʔo)
3POSS-between-LOC
'situated between'

ku-**l**e:dhi:mba (*ku-**r**e:dhi:mba)
3POSS-testicles
'his testicles'

ku-**l**aŋyo:p (*ku-**r**aŋyo:p)
3POSS-footprint
'his footprint'

In these cases, there is the intervocalic environment where [r] is expected to surface, but instead [l] is realized. Examples with verbal pronominal prefixes show there is also no [l] ~ [r] alternation in verb-initial position, shown in (16).

(16) No Alternation Following Person Marking Prefixes[14]

a-**l**ɛʔl a-nɛʔl (*a-**r**ɛʔl)
1-take.leave 1-impend
'He's about to leave us/die.' (van Driem 1987: 124)

kudzaʔ-haʔ mɛ-**l**u:g-ɛ mɛ-dhɛ: (*mɛ-**r**u:g-ɛ)
fruit-PL NsAS-fall.from.tree-PT nsAS-fall.PT
'The fruits have fallen from the tree.' (121)

kɛ-**l**ept-u (*kɛ-**r**ept-u)
2-throw-3P
'You threw it.' (Michailovsky 1997, 140)

In addition, there is also no alternation with the negative prefix or with the active participle prefix, as shown in (17).[15]

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[14] I have no data for other agreement prefixes including: *a-*'1', and *ke-*'2', but I assume that the lack of an alternation between prefixes and other morphemes holds in a general sense.

[15] An anonymous reviewer points out that the presence of [l] in these environments also suggests that the possessive noun prefixes and the verb agreement prefixes were formerly independent words. Refer to section 6 for more discussion on the status of prefixes in this analysis.

(17) No Alternation With Negative or Active Participle Prefixes

mɛ-**lɛ**ː-ʔɛ-Ø-n   (*mɛ-**rɛ**ː-ʔɛ-Ø-n)
NEG-know-1s→3.NPT-sP-NEG
'I don't know it'. (van Driem 1987: 95)

kɛ-**lɔ**ːm-ba   (*kɛ-**rɔ**ːm-ba, intervocalic after active participle)
AP-come.out-AP
'that which comes out' (203)

In contrast to patterns seen with prefixes, all (monosyllabic) /l/-initial suffixes show the predictable allophonic variation based on the syllable structure of the preceding morpheme, as in (18) and (19).[16]

(18) Nominal /l/-Initial suffixes

a. -le ~ -re GEN/ERG/INSTR

siŋboːŋ-**le**   ku-boːŋ-ʔoː
tree-GEN   3POSS-base-LOC
'under the tree' (van Driem 1987: 44)

anige-**rɛ**-n   yaŋ
we-GEN-ABS   money
'our money' (1987: 38)

saʔ-**re**   suŋ   me-daʔr-u-ba
child-ERG   gift   nsAS-bring-3P-IPF
'The children brought him a gift.' (40)

---

[16] van Driem describes an assertive particle: *lo ~ ro* (1987: 242). I speculate that it is a phonologically cohering clitic, as it appears to be restricted to immediately following the verb, even if its scope is the verbal complex (event):

peːg-aŋ   **loː**
go-1sPS/PT   ASS
'I'm on my way!' (242)

peːg-i   **roː**
go-pADH   ASS
'Come on, let's go!' (242)

In this case, clitics would also be included in the P-word domain.

a-mik-**l**e
1POSS-eye-INST
'with my eyes' (41)
b. TIMES -lεŋ ~ -rεŋ

thik-**l**εŋ
one-TIME
'once' (Michailovsky 1997: 141)

ŋi-**r**εŋ
2-TIME
'twice' (142)

(19)   Verbal /l/-Initial suffixes[17]

khεneʔ   yəmba   məna   kε-bo:ŋ-**l**ɔ
you   big   man   2-become-OPT
'May you become a great man.' (van Driem 1987: 133)

kusiŋ   kε-ni:tt-u-**r**ɔ!   kusiŋ   kε-nis-u-**r**ɔ!
understand   2-understand-3P-OPT   like.that   2-see-3P-OPT
'May you understand it! May you see it as it is!' (134)

sɔbya-ʔaŋ   sɔbyaʔ   hεn   kε-dzo:k-**l**ɔ   kε-ya:k
furtively-and furtively   what   2-do-prG   2-be
'What are you carrying out so furtively?' (152)

---

[17] I have found one case where the suffix (on a color word) surfaces with initial [l], even though preceding stem syllable has a final glottal stop (van Driem 1987: 24):

mik   + **phuʔ-la**   me:n laʔba ku-mik   phɔ-daŋma
eye   + **white**-**color** NEG   maybe 3POSS-eye   white-like
'Maybe she's not a European, but she sure is white-eyed!'
(compound = 'Englishman')

One possible analysis is that the older form of 'white' was *phut* or *phuk*, and that final plosive has eroded, leaving a final glottal. Other languages of the Yakka-Limbu group appear to have retained a coda consonant. (Balthasar Bickel personal communication). This form therefore might be analyzed an old Tibeto-Burman compound, formed and lexicalized before the alternation became productive. Thus, [l] surfaces because the form is not a productive combination, unlike with other suffixes. An alternative analysis offered by an anonymous reviewer is that this compound has as its ultimate origin a combination of a Sino-Tibetan/Tibeto-Burman etymon *bok* 'skin' plus an old (now phonologically eroded) loan (Indic/Persian/Arabic) *rang(i)* 'color'. The current phonotactics of this form might therefore be due to a fossilization of an [r] ~ [l] alternation at a time before the final -k became a glottal stop.

pi?l-ha?	thɔk-si-**rɔ**	ya:k-si
bull-PL	clash-dPS-prG	be-dPS

'The bulls have locked horns in combat.' (152)

The pattern of the [l] ~ [r] alternation illuminates, in particular, the starting edge of a P-word.[18] However, it is not the only piece of evidence for P-word in Limbu. Other evidence comes from the stress patterns. Van Driem notes that stress in Limbu is "not very pronounced and is non-distinctive," but that verbal stems carry the (main) stress in stem-affix combinations (1987: 15). This is shown in examples (20) and ((21), reproduced from (17)):

(20) Single Main Stress: Stem + Suffixes

/thaŋ-aŋ-aŋ/	['tʰaŋˌŋaŋˌŋã:]	("Untimely Death": 23)
come.up.s2-1SGNAPA-ALSO		

'I come up also...'

(21) Single Main Stress: Prefix + Stem + Suffixes

/kɛ-sira-thaŋ=i:/	[kɛˈsiraˌdhaŋˌŋi:]
2-pleasure-come.up=Q	

'Do you like it?'

Note that in example (21) the stem still bears the single main stress, to the exclusion of the prefix. This non-initial main stress is different from (20), where the main stress does fall on the initial syllable of the word. This indicates that prefixes never bear main stress, and as such, are non-cohering to the P-word, but as section 3.4 shows, there are specific instances where such an alternative does occur in Limbu.

Additional evidence for the relevance of a P-word referencing a stem and post-posed grammatical material in Limbu comes from additional constraints on syllable structure and phonotactic patterns at word edges vs. word-medially. For example, a word may not begin with the velar nasal /ŋ/, but it is present (and contrastive) in word-medial syllable onset position (e.g. *pho.ŋa?* 'uncle' and *pho:.ma?* 'stir about grain drying in the sun'). The same constraints and patterns are true for the glottal stop (van Driem 1987: 16). In addition, a few consonant onset clusters are permitted in both word-initial and word-medial position (e.g. **sya?l** 'sting' and *sam.**my**ang* 'gold'), but consonant-plus-/l/ clusters are not attested in word-initial position (only in medial onset position) (17).

---

[18] As suggested by an anonymous reviewer, the current distribution of [l] at the start of P-words might have arisen by analogical extension, motivated by a trend towards uniform signaling of stem boundaries. While this is a plausible diachronic scenario, it is difficult to reconcile this with the fact that the sound [l] *per se* does not always signal stem-initial boundaries, as it also occurs word-medially at stem-suffix boundaries. The functional scenario proposed by the reviewer also makes heavy psycholinguistic assumptions about phonological processing in Limbu that would need further research.

In addition, there are two assimilation processes that (optionally) include stems and specific suffixes, and do not include prefixes. These include nasal-lateral assimilation (in allegro speech) and glottal-nasal assimilation between noun stems and the locative or absolutive endings (e.g. [him-ʔo:] ~ [him-mo:] 'house-LOC') (1987: 18).

Yet another piece of evidence for the coherence of the stem and any post-posed grammatical material comes from particular resolutions to a general ban on onsetless syllables (i.e. onset maximization), first discussed in sections 2 and 3.2. As stated, the only resolutions available in word-medial domains (i.e. excluding prefixes) are the resyllabification strategies. As described in 2.4, the variety of onset maximization attested exclusively in the domains of prefix-initial and prefix-stem is glottal stop insertion.

Note that to this point, all P-word diagnostics in Limbu systematically excluded pre-posed grammatical markers (i.e. prefixes). However, there are other processes that reference exclusively the prefix + stem domain (2.4) and also a larger (more traditionally conceived) domain of word, including the stem and all pre-posed and post-posed markers (2.5).

3.4 Phonological Word 2: Prefix + Stem Only

As just noted, the morphological domain referenced by the alternations and restrictions described above systematically excludes prefixes. Cross-linguistically it is not uncommon that prefixes (or even disyllabic suffixes, cf. Dixon 1977) are non-cohering at the level of the P-word. Other languages are similar to Limbu in excluding prefixes from the domain of application of various phonological processes. For example, the domain of vowel harmony in Hungarian includes the stem and suffixes, but excludes prefixes (Hall 1999: 3-4). In English, the prefixes *im-* and *un-* are not sensitive to prosodic rules in the ways that stems and suffixes are (Raffelsiefen 1999: 139). In Kyirong Tibetan prefixes do not carry tone, nor do they influence the tone patterns of stems (Huber 2002; Hall & Hildebrandt Forthcoming). In puma and Chintang, there is also robust evidence for prosodic boundaries between prefixes and stems (Bickel et al. 2007). Interestingly, in a reverse situation, prefixes are the *only* affixes in Dolakha Newar that participate in vowel harmony with a stem (and not suffixes); however, as with Limbu, prefixes in Dolakha Newar are not included in the domain for other types of allophonic variation (e.g. [r] ~ [ɖ] alternations) (Genetti 1994).

Returning to Limbu, while the processes detailed in the previous section apply to the exclusion of prefixes, there is evidence from main stress assignment to suggest a level of cohesion between the prefix and the stem, to the exclusion of suffixes and enclitics. As described in section 3.3, in almost all cases, main stress falls on the stem, with optional secondary stress occurring on non-initial syllables, depending on foot structure and violations of Tautomorphemicity (cf. examples (10-11)). However, one case in which this does *not* happen is when the grammatical word consists of only a prefix + stem combination, as in (22):

(22) Main Stress in Prefix + Stem Combinations

/ku-la:p/   ['**ku**ˌla:p]
3POSS-wing
'its wing'

In such cases where the word consists exclusively of a prefix and stem, the main stress will fall on the prefix, thus avoiding an iambic rhythm of weak-strong, which is unattested in Kiranti

languages in general (Bickel 2003b). This alternative stress placement is available exclusively to prefix + stem combinations, and as such, signifies a level of coherence for this morphological structure.

There is one optional consonant assimilation process, namely anticipatory velarization (i.e. /n/ → [ŋ] /__k, kh) that also appears to reference exclusively the prefix and stem, illustrated in (23):

(23) Anticipatory Velarization, Prefix + Stem

/mɛ-**n-k**ɔt-mʔna-haʔ/ [mɛ**ŋ**gɔpmʔnahaʔ]
NEG-NEG-have-PP-NOM
'(The haves) and the have-nots' (van Driem 1987: 17)

/kɛ-**n-kh**o:s-u-n/   [kɛ**n**gho:sun] ~ [kɛ**ŋ**gho:sun]
2-NEG-find-3P-NEG
'You didn't find it.' (18)

However, it is not certain if such a process actually applies to the exclusion of post-posed grammatical markers, as the environment in which such a test could be applied is not available in Limbu. As such, this process is not a robust diagnostic for a second, non-aligning P-word.

A final process worth noting here is one that iteratively (or recursively) applies between the prefix + stem domain and is evidence that the prefix and stem (± postposed markers) are prosodized as *separate* P-words. van Driem (1987: 15) notes a process of "glottal hiatus", which for him defines the phonological word and also prevents diphthongization when two vowels occur in adjacent positions. [19] As is stands, glottal hiatus is the only process of onset maximization that is available at the edge of a Phonological word, while all other resolutions occur word-medially in combinations of stem + suffixes (cf. sections 2, 3.2, and 3.3). However, glottal hiatus does not reveal a level of cohesion between the prefix and stem in the same way that alternative stress assignment or anticipatory velarization do, but rather it applies iteratively before the prefix and before the stem, assuming that they are both underlyingly vowel-initial, as in (24):

(24) Glottal Hiatus (van Driem 1987: 15)

a. /iŋghɔŋ/   [ʔiŋghɔŋ]
'message'

b. /ku-iŋghɔŋ/ [kuʔiŋghɔŋ]
3POSS-message
'his news'

---

[19] According to van Driem, the glottal stop is also a phoneme in word-medial position. Loanwords do not participate in glottal hiatus. In addition, glottal hiatus does not occur with the interrogative particle *i* and the vocative suffix *-e* (1987: 15). However, if the preceding syllable ends with a nasal segment, that nasal is doubled and presumably syllabified into the onset position of the particle or suffix.

c. /a-i:r-ε/   [ʔaʔi:rε]
1-wander-PST
'We (plural, inclusive) wandered.'

Example (24) shows glottal hiatus in three different environments: a bare vowel-initial stem (a), before a vowel-initial stem with a vowel-final prefix (b), and iteratively before both a vowel-initial prefix and between the prefix and stem (c). One analysis of this recursive application of glottal insertion is that the prefix and the stem + suffix string may be prosodized as separate P-words (i.e. (ʔa)ω-(ʔi:r-ε)ω). As such, there is evidence (albeit marginal) of yet another domain of phonology referencing morphological material. The application of glottal hiatus at the left edge of stem + suffix combinations falls in line with other processes revealing P-word 1, but the iterative application of this process also illuminates prefixes in Limbu as their own potential P-word domains.

        The previous two sections have focused on processes that reference either the stem and suffixed/enclitic material, or else the prefix-stem, exclusively. Despite the multiple phonological processes and restrictions available in the language, there is only one process in Limbu that does reference the Phonological Word in a traditional way as it is assumed to exist in most Generative literature: anticipatory labial assimilation, described in detail in the following section.

3.5   **Phonological Word 3: Prefix + Stem + Suffix + Enclitic**

        The evidence for a Phonological Word in an exhaustive (traditional) sense comes from one consonant assimilation: anticipatory labial assimilation applying to stops and nasals (i.e. C[cor] → C[lab] / __ C[lab]). This is illustrated in (25).[20]

(25) Anticipatory Labial Assimilation (van Driem 1987: 412, 433, 136, 230)

a.   *prefix-stem*

/mε-**n**-**m**εt-baŋ/   [mε**m**mεppaŋ]
NEG-NEG-tell-1S→3/PT-PF
'I did not tell him.'

b.   *stem-suffix*

/ke:**t**-**m**aʔ/   [ke:**p**maʔ]
insert-NOM
'to insert'

---

[20] An anonymous reviewer logically suggests that the smallest of the P-words might be best referred to as the "minor word", and the most cohesive of the P-words referred to as "the major word"; however, the numeric system is retained here to emphasize the multiple non-overlapping domains.

c. *suffix-suffix*

/si-aŋ-mɛ**n-p**a/   [sjaŋmɛ**m**ba]
die-1sS.PST-COND-IPF
'I might die'

d. *stem=enclitic*

/myaŋluŋ=phɛlle hɛ**n=ph**ɛlle/   [mjaŋluŋbhɛlle hɛ**m**bhɛlle]
Myaŋluŋ=SUB what=SUB
'What does *Myaŋluŋ* mean?'

The domain of application includes the prefix and stem (25a), stem and suffix (25b), suffix strings (25c), and also stem-enclitic combinations (25d).

This process does not cross grammatical word boundaries, as evidenced by a separate but related allophonic alternation applying to the coronal plosive /t/ only. Of relevance here are two variants of /t/: an unreleased, glottalized variant [t^{ʔ}], which occurs in word-medial coda position, and a variant comprised of a glottal-plus-plosive cluster with simultaneous lateralization [ʔt^{l}], which occurs in word-final position (van Driem 1987: 3). Only the glottalized variant is subject to this coronal-labial assimilation, while the lateralized glottal-plosive variant does not undergo this assimilation. As such, the following examples may be contrasted in (26):

(26) /ɔ:mɔt-/ 'look at, watch' (van Driem 1987: 377, 485, 485, 279)

a. *word-medial*

[ɔ:mɔ**t^{ʔ}**-n-i-ŋ]
look.at-1/2-pPS-1SA
'I look at you (plural).'

b. *word-final*

[ɔ:mɔ**ʔt^{l}**]
look.at
'look at'

c. *word-medial, with coronal-labial assimilation*

[ɔ:mɔ**p-m**aʔ]
'look.at-NOM'
'to look at'

> d.　　*across words, within a clause*

> nirɛŋ-sumlɛŋ　[cwaʔtˡmaːʔtˡ]　　lɔk　　piːt-mʔ　　　poːŋ
> twice-thrice　water　　be.finished　only　suck-INF　　EXIG
> 'If it [beer mixture] has sat for many days, it will ripen...'

Example (26a) shows the word-medial allophone of /t/, while (26b) shows the word-final allophone. Example (26c) shows the result of coronal-labial assimilation in a word-medial environment. Crucially, example (26d) shows that across word boundaries (within a clause), the lateralized glottal-plosive variant occurs, and assimilation does *not* occur.

It should be noted here that the different types of alternations, patterns and assimilations described in sections 3.3 through 3.5 reference morpho-syntactic structure in variable and mis-aligned fashion. In other words, these processes and patterns provide evidence for multiple and non-overlapping P-words in Limbu. In section 6 I return to this issue with commentary on the challenges that these multiple P-words present for certain predictions about the P-word in relation to other prosodic domains contained within the Prosodic Hierarchy Hypothesis.

4　The Prosodic Organization of Compounds in Limbu
4.1　The Relevance and Types of Compounds in Limbu

The topic of compounds in prosodic theory is of some interest because compounds are single lexical items (inflecting stem words) with a degree of internal (complex stem) structure. As such, the question then arises whether or not they display properties of single P-words. From a Sino-Tibetan perspective, compounds are also interesting because they have been a productive word-formation strategy for most languages in the family (cf. Matisoff 1991b). In Limbu, both verbal and nominal stems can combine to form compounds, which are single grammatical words in both semantic and syntactic senses, but they differ in both their morphological and phonological structure. In the following sections, I provide a more detailed discussion of the morphological and phonological properties of nominal and verbal (bipartite) compounds in Limbu, showing that while nominal compounds are always separate Phonological Words, verbal bipartite stems are variably phonologically cohering or non-cohering.

4.2　Nominal Compounds As Two P-words in Limbu

Despite the grammatical cohesion, there is evidence that (nominal) compounds in Limbu are two units prosodically. One piece of evidence is found with a lack of the [l] ~ [r] alternation; [l] always surfaces in the second element of a compound that results in a lexical noun. These are shown in example (27).

(27) Compounds[21] (van Driem 1987: 499, 419, 464, 464)

pho:ktaŋ + **l**uŋ   (***r**uŋ)
shoulder + stone
'Mt. Kangchenjunga'

haʔ + **l**uŋ   (***r**uŋ)
fire + stone/tooth
'ceremonial fireplace'

ma:khi + **l**am   (***r**am)
blood + road
'artery'

ma:ki + **l**aŋ   (***r**aŋ)
corn(Nepali) + leg
'cornstalk'

In the first compound in (27) the surfacing of [l] is accurately predicted because it is preceded by a coda consonant [ŋ]. In all other examples, [r] would be predicted in intervocalic position, but instead [l] surfaces.[22]

    This lack of an [l] ~[r] alternation suggests that each element of a nominal compound is parsed as its own P-word domain. This analysis is further evidenced by a lack of anticipatory labial assimilation across the two stems, shown in (28), contra to what is seen across stems and affixes (or clitics).

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[21] The plus (+) symbol in these examples indicates element juncture. Also, van Driem (1987: 54) notes that there is an occasional (unpredictable) process of glottal hiatus between compounds. This is shown with the compound for 'fireplace'. This may only happen if the first element ends in a vowel, and it does not depend upon the initial segment of the second element.

[22] There is one Limbu compound that does have an initial [r] segment:

sam + **r**ippa
spirit + dark
'shadow'

van Driem (1990: 85) analyzes the second element as a remnant of an early Eastern Kiranti form with a **kr* initial, and that the compound is an older, lexicalized one. The initial velar plosive may have been lost due to phonotactic pressure, as most other medial *kC* clusters appear to be syllabified as *k.C* (e.g. *cak + siŋmaʔ* 'get dressed'), or they follow a geminated *kk* sequence (e.g. *cɔkkrɔkma* 'uvula' (6)). In addition, this second element does not appear to exist independently in the lexicon as a separate entry.

(28)   No Application of Assimilation in Compounds[23]

/a:kkhe**n** + **b**e:la/   [a:kkhe**n**.be:la]   (*[a:kkhe**m**.be:la])
'how.much' + 'time (Nepali)'
 'at which time' (van Driem 1987: 406)

The non-application of these other processes therefore indicates that Limbu compounds are comprised of two P-words.

4.3   Verbal Compounds (Bipartite Stems)

A prosodic-domains analysis for Limbu has an added benefit of highlighting the interesting structural properties of bipartite stems in the language. At first glance, bipartite stems resemble other (nominal) compounds in Limbu. They are comprised of two stem pieces that are often (although importantly, not always) semantically transparent as a combination of lexical items (cf. Jacobsen 1980 for a discussion of semantic properties of bipartite stems in Washo; cf. DeLancey 1996 for bipartites in Klamath; cf. Nichols 2003/Forthcoming for bipartites in Nakh-Daghestanian). Their combination results in a word with a new, slightly altered meaning. Example (29) lists some bipartite stems in Limbu:

(29) Bipartite Stems[24]

mi+rak-maʔ
Σ*fire* + Σ*burn*-NOM
'to burn something'   (Michailovsky 1997: 142)

wa+rum-maʔ
Σ*water* +Σ*cover.up*-NOM
'to bathe someone' (142)

yaʔ+ra:k-maʔ
Σ*rice/paddy*+Σ*trample*-NOM
 'to paddy-dance' (trample on paddy in dancing fashion while threshing it)
                                                            (Michailovsky 2002: 91)

cuŋ+dzi:k-maʔ
Σ*cold*+Σ*cool.off*-NOM
'to be cold' (van Driem 1987: 414)

In these examples the resulting forms are all verbs (no matter the lexical categories of the individual elements), and it is the case in Limbu that all (and only) disyllabic verb stems in

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[23] As expected, the word-final allophone of /t/ occurs at the edge of the first piece of a compound: [te:ʔt¹ phuŋ] clothes + jingle 'garments' (van Driem 1987: 27), which does not undergo coronal-labial assimilation.
[24] The stem-piece structure of bipartites in these examples is indicated by the sigma symbol Σ followed (in italics) by the retrievable semantics of the stem piece, when available.

Limbu are bipartites, while two-stem combinations in other parts of speech (e.g. nouns, adverbs, noun-like adjectives, etc.) are compounds.

Bipartite stems in Limbu differ structurally from compounds. First, (and crucially) they have different domains that are targeted for morphological operations than do compounds (Bickel 2003a; Bickel & Nichols 2005/Forthcoming; Hildebrandt 2005b). Specifically, person marking and negation prefixes on bipartite stems always (and only) target the second element of the separable stem, as in example (30):

(30) Domain of Prefixing for Bipartite Stems (van Driem 1987: 408, 414, 475, 421)

caha-**kɛ**-dzo:-gwi:
Σ*want*-2-Σ*do*-Q
'Do you want it?'

cuŋ-**gɛ**-dzi:kt-ʔi:
Σ*cold*-2-Σ*cool.off*-Q
'Are you cold?'

nam-**kɛ**-bhɛtt-u-aŋ   kɛ-he:s-w-i:
Σ*sun*-2-Σ*fetch*-3P-pfG 2-dry.in.sun-3P-Q
'Having put it in the sun, have you managed to get it dry yet?'

ha-**mɛn**-chuk-mʔnɛ-lle
Σ*bite*-NP-Σ*able*-NP-INST
'shave with a blunt blade'

These prefixes never target the initial element or syllable of the bipartite as a whole. Compounds, on the other hand, show prefixing on the initial stem or syllable, or conversely, they may optionally show prefixing on *both* stems or syllables, without a meaning change, as example (31) shows.

(31)   Domain of Prefixing on Compounds (van Driem 1987: 29, 119, 27)

ku-laŋ+yo: (laŋ+yo:p)
3POSS-leg+imprint
'his footprint'

ku-de:ʔl+**ku**-bhuŋ   (te:ʔl+phuŋ)
3POSS-clothes+3POSS-jingle?
'his clothing'

a-ndzum+**a**-nde:ŋ-haʔ (cum+de:ŋ)
1POSS-friend+1POSS-comrade-PL
'my buddies'

It is the different domain for morphological operations displayed by bipartite stems as

opposed to compounds that is the crucial feature distinguishing them structurally from other stem types or stem combinations. The reason for this is that aside from their morphological properties, bipartites cannot be homogeneously identified through either phonological or semantic grounds (Bickel 2003a; Hildebrandt 2005b).

Jacobsen (1980) describes the typical semantic properties of Washo bipartite stems as contributing an instrumental or theme reading to the larger word. A secondary function may be manner of motion. It is true that one of the pieces (typically the first piece) of *some* bipartite verb stems in Limbu do contribute instrumental or theme interpretations. The examples in (32) illustrate this.

(32) Instrument Semantics of Some Bipartites

wa + rum-maʔ
Σ*water*+Σ*cover.up*-NOM
'to bathe someone' (Michailovsky 1997: 142)

iŋ+lek-maʔ
Σ*language*+Σ*trade*-NOM
'to lie' (van Driem 1987: 429)

kye:+laŋ-maʔ
Σ*drum*+Σ*dance*-NOM
'to do the Limbu drum dance' (440)

In these examples, water is used to cover someone in bathing, language is used in a lie, and a drum is used in this particular type of dance. However, such a reading is not always available for other bipartite stems, even though they show the same morphological properties. Examples are shown in (33).

(33) Non-Instrument/Unknown Semantics of Some Bipartites (van Driem 1987: 408, 508, 412, 471)

caha+dzo:k-maʔ
Σ*want*+Σ*do*-NOM
'to be necessary'

se:n+do:-maʔ
Σ*inquiry*+Σ*??*-NOM
'to ask'

cɔt+chiŋ-maʔ
Σ*push*-Σ*??*-NOM
'to budge'

mu+lo:p-maʔ
Σ*??*+Σ*underlay*-NOM
'to lay down underneath'

It is not obviously the case that the first pieces (or any pieces) are contributing any instrument or theme meaning in words like 'ask' or 'be necessary'. And while 'push' may serve a manner or motion function, it is hard to know for sure because the semantics of the second piece of the stem are unknown. The same is true for the first piece of the stem in 'lay down underneath.'

Bipartites also cannot adequately be identified purely through their phonological properties. That is, the domain of division or the location of morphological marking with bipartites cannot be defined through phonological means such as syllable structure. A look at the phonological structure of Limbu bipartites shows just this, in that they may (seemingly randomly) be comprised of either one P-word or two P-words. The main evidence for the differing P-word status of bipartite stems in Limbu comes from the occurrence of the [l] ~ [r] alternation. Some bipartite stems show the predicted alternation between the prefix and second stem piece, suggesting the unit is a single domain for phonological organization (beyond the syllable or foot). This is shown in (34):

(34) Bipartites as a Single P-word (Michailovsky 1997: 142)

yaʔ-gɛ-**r**a:kt-u
Σ*paddy*-2-Σ*trample*-sP
'You paddy-danced.'

mi-gɛ-**r**aks-u
Σ*fire*-2-Σ*burn*-sP
'You burned it.'

wa-gɛ-**r**ups-u
Σ*water*-2-Σ*pile.up*-sP
'You bathed him.'

Here the second piece of the stem takes the prefix, and the [l] ~ [r] alternation applies as if the second element was part of a P-word-medial domain. Still other bipartite stems do not show the allophonic alternation, suggesting that the unit is not a single P-word, as shown in (35):

(35) Bipartites as Greater Than One P-word (Michailovsky 1997: 143)

iŋ + gɛ + **l**apt-u
Σ*language* + 2 + Σ*never.reconcile?*-sP
'You coaxed him.'

iŋ + gɛ + **l**ɛkt-u
Σ*language* + 2 + Σ*trade?*-sP
'You lied.'

In (35) the prefix still targets the second part of the stem, but there is no [l] ~ [r] alternation to suggest phonological cohesion at the level of the P-word.

Some more, albeit marginal, evidence for this phonological variation comes from the application of nasal assimilation, another (marginal) cue for P-word status in Limbu (described in section 3.4). Sometimes a bipartite stem shows the nasal assimilation that applies at the level of the P-word (example (36)), and sometimes the stem shows no assimilation (example (37)), suggesting that these units are not a single P-word.

(36)   Application of Nasal Assimilation (van Driem 1987: 487, 464)

[pa:**m**.bi:.maʔ]
pa:n 'word' + *pi:maʔ* 'to give'
'to invite'

(37)   No Application of Nasal Assimilation

[ma**ŋ**.ma:k-maʔ] and *[ma**m**.ma:k-maʔ]
maŋ 'dream' + *ma:kmaʔ* 'to see'
'to dream'[25]

As such, the phonological properties (and prosodic alignment) of bipartites in Limbu is varied.

5   Phonological Phrase in Limbu

I have shown that many phonological processes and patterns and the seemingly idiosyncratic ways in which they apply in Limbu can be accounted for by appeal to domains including syllable, foot and multiple P-Words. In this section I show that another optional process of assimilation, stop consonant voicing assimilation, applies across syllable, foot, and P-word boundaries and is evidence for another level of prosodic organization in Limbu: the Phonological Phrase (P-Phrase). The P-Phrase in Limbu includes one or more phonological words, and is motivated as a way to account for the polymorphemic and cross-lexical domains of stop voicing assimilation.

The domain of stop voicing assimilation crosses both prefix and suffix boundaries, as shown in (38 a-b)

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[25] Another marginal piece of evidence for varying P-word status of bipartites comes from the reconciliation of vowel-initial syllables. The citation form of the Limbu word *hiʔe:t-maʔ* 'to shit' shows glottal insertion between the first element *hi* 'shit' and the second element *e:t* (gloss unknown). Its status as a bipartite stem is shown by the domain of prefixing in *hi-gɛ-e:tt-w-i:* shit-2-??-3P-Q 'Did you shit?' (van Driem 1987: 424). It is not clear however whether this glottal insertion is the result of a P-word boundary or because the previous syllable is open.

(38) Stop Voicing Assimilation (van Driem 1987: 81, 83, 66, 23, 98)

a.   *Prefix-Stem*

kɛ-ø-ø-**gh**ɛm-ø-ø-ø   /khɛmmaʔ/
2-3-sAS-hear-NPT-sPS-PF
'He'll hear you.'

kɔtna   ø-mɛ-**d**aʔr-ø-u-ø   /taʔmaʔ/
here   3-nsAS-bring-PT-3P-PF
'They brought it here.'

kɛ-**b**a:p-pa   /pa:pamaʔ/
AP-talk-AP
'a talker'

ku-**bh**ɔ-ra   /phɔ/
COLOR-white-COLOR
'white'

ku-de:ʔl+**ku**-bhuŋ   /te:ʔl/ and /phuŋ/
3POSS-clothes+3POSS-jingle?
'his clothing'

b.   *Stem-Suffix*

mɛ-n-ni-**b**aŋ-ø   /paŋ/
NEG-NEG-see-1s→3-PT-PF
'I didn't see him.'

This domain also crosses the boundaries between an inflected verb stem P-word and disyllabic grammatical particles, as shown in (39 a-c).

(39) Stop Voicing Assimilation, Particles (van Driem 1987: 22, 229, 225)

a.   *-taŋba*   *'like, of the kind'*

phɔ-**d**aŋba   'white, white-kind; a white one'

b.   *-phɛlle*   *'meaning'*

pe:niba:n   mɛm-ba:tt-amm-ɛʔ   **bh**ɛlle   pe:niba:n   lɔk
Nepali   NEG-speak-2p-IMP   meaning   Nepali   only

mɛ-ba:ʔl
nsAS-speak
'If I tell them 'Don't speak Nepali', then they talk only Nepali!'

c.   *phaʔaŋ*   QUOTATIVE

maŋdɔk   mɛ-bi:r-aŋ   **bh**aʔaŋkɛ-ha:b-ɛ-i:
maŋdɔk   nsAS-give-1sPS/PT   QUOTE   2-cry-PT-Q
'Are you crying because they gave you mangdok (to eat)?'

This voicing assimilation also includes both elements of compounds, as well as the elements of a bipartite verb stem, even if the elements are otherwise two separate P-words. This is shown in (40 a-b)

(40) Stop Voicing Assimilation Across Compounds & Bipartite Stems

a.   *Compounds* (van Driem 1987: 541, 406, 410, 419, 80, 142, 475)

wɛtchya+**d**ɔk   /tɔk/
rice+cooked
'cooked rice'

cɛmbi+**gh**ik   /khik/
soybean+bitter
'soy bitter food'

ha+**d**i:ŋ   /ti:ŋ/
tooth+thorn
'fussiness, stubbornness'

b.   *Bipartite Verbal Stems*

yaʔ+**g**ɛ-ra:kt-ø-ø-i-ø   /kɛ/
rice+2-dance-NPT-pPS-PF
'You.pl will take part in the rice harvest dance.'

iŋ+**g**ɛ-lekt-u   /kɛ/
language+2-trade?-sP
'You lied.' (Michailovsky 1997: 143)
nam+kɛ-**bh**ɛtt-u-aŋ   /phɛpmaʔ/

sun+2-fetch-3P-pfG
'(You) having put it in the sun...'

As these examples show, stop voicing assimilation rather idiosyncratically applies across both smaller and larger domains. Example (41) shows its application across a verb and its noun complement within a single clause:

(41) Stop Voicing Assimilation: Verb + Noun

hɛn   co:k-maʔ   allɔ?
what   do-NF   now
'What to do now'?

[(thi:)ω (**dh**uŋ-maʔ)ω]
beer   drink-NF
'Drink beer.' (van Driem 1987: 18)

Example (42) shows its application across verbs belonging to coordinated clauses:

(42) Stop Voicing Assimilation: Across Clauses

aŋga   [(co:**g**-u-ŋ)ω   (**b**i:-nɛ)ω]   thɛbae:,   khɛnɛʔ   gɔ:
1s   do-3-1sA   give-1→2   grandfather.VOC   2s   then
'I'll make it and give it to you, grandpa, for you!'[26] (van Driem 1987: 19)

This is the maximum syntactic domain observed for this voicing assimilation. There are unresolved questions as to why certain stops undergo assimilation and not others. For example, it is not clear why the first instance of the prefix in the final example in (40) does not voice. It is also not clear why the verb 'do' in example (41) does not voice, when the verb 'drink' in the next line does voice in a parallel structure. As such the precise syntactic parameters of stop voicing assimilation are open to future investigation.

6   Schematic Representation of Domains and Comparative Discussion
6.1   Representation of Limbu Prosodic Domains
Based on the patterns and domains of application described in sections 2 through 6, I propose the following hierarchical representation of phonological organization in Limbu in (43).

[26] The gloss in this example is mine

(43)   Prosodic Domains in Limbu[27]

Domain	Evidence	Mapping
Phonological Phrase	Stop voicing assimilation	Phrase
Phonological Word 3	Anticipatory labialization	Prefix, stem, suffix, enclitic
Phonological Word 2	Alternative stress, (n-velarization)	Prefix + stem
Phonological Word 1	[l] ~ [r], single main stress, special /t/ allophony, other phonotactics	Stem + suffix
Foot	Trochaic rhythm	N/A
Syllable	Syllable structure, phonotactics	N/A

Of particular interest here is the exclusion of prefixes from P-word 1. One interpretation of this might be that prefixes are independent words (i.e. akin to pronouns and particles), and as such, are not fully prosodically integrated. However, this interpretation is not warranted here, as prefixes are grammatical affixes that exhibit stem-level dependencies. In addition, prefixes do show some level of word-level prosodic cohesion, as evidenced by coronal assimilation. As noted in sections 2 and 3.4, it is cross-linguistically common for prefixes to be excluded from prosodic word domains.
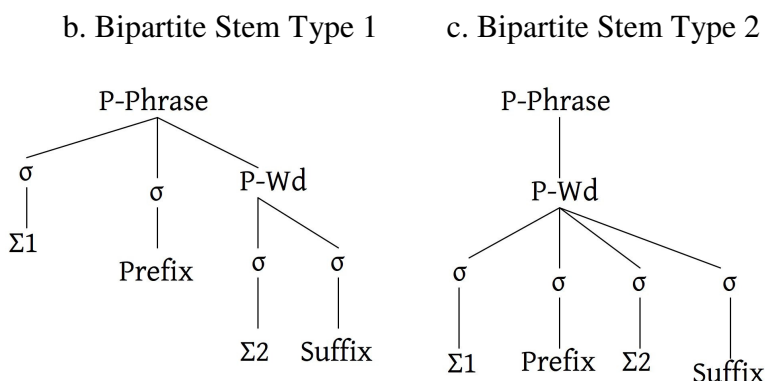
The domain types and alignment patterns for different complex stem types discussed in section 4 are shown in (44 a-c).

(44)   Alignment Patterns With Different Word Types

a. Compounds
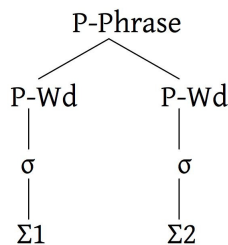
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b. Bipartite Stem Type 1   c. Bipartite Stem Type 2

For the Bipartite Stem type 1 (44b), the first stem piece and the interposed prefix are contained directly within the P-Phrase, while the second stem piece (with suffixes) is contained within its own P-word. It should be noted that even though the Bipartite Stem piece in Type 1 is represented as cohering directly with the P-Phrase (via being the domain for stop assimilation described in section 5), this is not a reflection of its grammatical status as a separate independent stem. This is in fact a potential analytical issue, as the Phonological Phrase is distinct from the Phonological Word via its referencing *multiple grammatical words*. An alternative analysis would be to posit yet another intervening prosodic domain between P-Wd and P-Phrase; however, there is otherwise no positive evidence for such a domain. Still another analysis would be a P-Phrase containing two P-words (one dominating the first stem piece, and another one dominating the second stem piece). While this second analysis is attractive in terms of predictions about the architecture of the Prosodic Hierarchy (i.e., the P-Phrase containing two P-words), a lack of stress data on the different bipartite stems makes this speculative at this point.

Another, more general, observation worth noting here has to do with the relationship between the domains posited here for Limbu and some predictions about the architecture of the Prosodic Hierarchy. First, one general prediction about the constituents of the Prosodic Hierarchy is that of the *Clustering Hypothesis* (part of the *Strict Layer Hypothesis* (cf. Selkirk 1984)), which predicts that phonological processes and constraints will cluster on a *maximal* number of prosodic constituents (mora, syllable, foot, word, phrase, unit, utterance) (Inkelas & Zec 1995: 547f). The multiple P-word types and the different morphological structures referenced by them challenge a prediction of strict clustering.

A final observation has to do with the overlapping nature of the mis-aligned P-word types in Limbu. These mis-aligned, yet overlapping domains stand as violations of another prediction contained within the Strict Layer Hypothesis, namely *Proper Bracketing* (i.e. an assumption that a unit of a given domain of the hierarchy is exhaustively contained in the super ordinate unit of which it is part) (Nespor and Vogel 1986). The two (smaller) word domains (prefix-stem)ω_2 and (stem-suffix)ω_1 suggest that languages can phonologize rules on overlapping and non-exhaustive domains (and thus show non-stacking domains).

7.   Comparison With Another Tibeto-Burman Language
An interesting comparison may be found with observations of prosodic domains (and their alignment with grammatical domains) in another Tibeto-Burman language, Kyirong

Tibetan (Bodish, Tibetan) (cf. Huber 2002 for a grammar and glossary of Kyirong, and Hall and Hildebrandt Forthcoming for an analysis of prosodic and morphological domains in Kyirong). While there is evidence motivating the domain of syllable in Kyirong (e.g. the distribution of long primary vowels is sensitive to syllable structure), there is no independent evidence as of yet for an intervening domain of Phonological Foot. As such, Kyirong evidences *skipping* of levels, contra to predictions contained within the Prosodic Hierarchy Hypothesis.

Even more interesting is the evidence for P-words in Kyirong, and the mis-aligned ways in which these domains map to morphological structure. Evidence for the Phonological Word in Kyirong is actually more abundant than is evidence for syllables, and includes different phonotactic constraints (e.g. restrictions of onset consonant clusters to word-initial position, restrictions of coda consonants in word-final position, de-aspiration in medial position), constraints on the distribution of what Huber terms "secondary vowels" (19), variation in intrusive nasal (prenasalization) distribution, and restrictions on occurrences of particular tone heights and contours in non-initial position.

In comparison to Limbu, *all* processes referencing the P-word in Kyirong do so to the exclusion of prefixes. For example, the negative *ma-* does not trigger de-aspiration, nor does it trigger contour tone adjustments. As such, there is no single phonological process referencing a prefix + stem (± any other grammatically bound material) structure in Kyirong. Prefixes are analyzed as licensed only at the level of syllable, and unlicensed at higher prosodic levels.

Also unlike Limbu, suffixes in Kyirong are hybrid in their prosodic organization, in the sense that the vast majority are either prosodized only at the level of the syllable (e.g. monosyllabic and disyllabic suffixes like *–de* non-finite and *-bamano* 'assertion'), or else stand as their own P-words (e.g. some monosyllabic and disyllabic suffixes like *-tʰò:* temporal 'until', and *-tsʰø:nu* 'possibility', are their own domains for aspiration and contour tone). In fact, of the dozen or so suffixes in Kyirong, only one (a nominalizer *-ba*) is shown to cohere with the stem phonologically, and only for certain processes (e.g. tone constraints).

As such, one assumption would then be that Kyirong fits a more prosodically isolating profile in comparison to Limbu, with most phonological processes centering on the stem alone, and the affixes either non-cohering or else licensed as their own P-words (in line with an 'omni-syllabic' view of Sino-Tibetan prosodic systems). However compounds in Kyirong, unlike in Limbu, are prosodically cohering as a whole, with both stems contained within the domain for contour tone restrictions and for de-aspiration, for example. In the end however, Limbu and Kyirong are united in the challenges that they present to traditional assumptions within the Prosodic Hierarchy Hypothesis, in that the first language evidences multiple, non-aligning Phonological Words, while the second language evidences skipped domains, a lack of a P-word containing all bound grammatical markers in an exhaustive sense, and the presence of multiple grammatical markers that are licensed as their own independent P-words. From a genealogical and typological perspective, these revelations of hybrid prosodic profiles, with languages existing somewhere between prosodically isolating and more prosodically cohering, make Sino-Tibetan languages of particular interest to studies of Prosodic Typology.

8   Concluding Remarks

In this paper I have described a number of phonological patterns and processes in Limbu that are difficult to reconcile when only the notion of syllable as a phonological category (or else only morpho-phonological environments) are invoked. I have shown that the varying applications of these processes are more cleanly accounted for when they are shown to

participate at (or apply to) different levels or domains of the prosodic hierarchy. Such an analysis indicates the important role of not only the syllable in a language like Limbu, but also of other phonological domains, including Foot, Phonological Word, and Phonological Phrase. This analysis also highlights the phonological misalignments between (non-verbal) compounds and (verbal) bipartite stems in Limbu, and also reinforces the characterization of bipartite stems primarily through morphological properties, and not semantic or phonological ones.

When compared to another Tibeto-Burman language, Kyirong Tibetan, certain cross-language similarities emerge (e.g. the non-cohering nature of prefixes), while other differences become evident (e.g. the heterogeneous prosodic nature of suffixes and of compounds in the two languages, and the prosodic primacy of the morphological stem to the exclusion of affixes in Kyirong).

This analysis raises the question as to the relevance of other phonological domains beyond the syllable or foot in accounting for otherwise complex processes in other Tibeto-Burman languages, both within single sub-groupings and beyond. Such investigations would perhaps reveal interesting domain mismatches displayed by different grammatical morphemes, including different types of affixes, and also those grammatical markers usually referred to as clitics, adpositions and particles. Such questions remain open for future research.

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