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Re-placing PStem in the prosodic hierarchy

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Abstract: A persistent issue for the Prosodic Hierarchy is what repertory of prosodic constituents is needed to define the commonly recurring domains for phonological processes. Even though there is a long tradition of work arguing in favor of up to three subphrasal constituents (Composite Group (CG), PWord and PStem), a body of recent work has argued in favor of a more parsimonious view of the repertory, making the strong claim that, at the subphrasal level, the Prosodic Hierarchy contains only one constituent, Phonological Word (PWord). Any additional subphrasal domains required by the phonology must be defined as recursions of PWord. This paper argues that PStem must find a place even in a parsimonious Prosodic Hierarchy. It cannot easily be replaced by recursive PWord or by a CG-PWord distinction. The cross-linguistic validity of a PStem-PWord distinction is supported by showing that it accounts for a robust cross-linguistic generalization concerning subphrasal phonological domains. Alternatives to PStem not only miss this generalization but also prove to be formally inadequate.

Keywords: Prosodic Hierarchy, stem-word asymmetry, prefix-suffix asymmetry, recursion, prosodic domains, Shona, Limbu, vowel hiatus, tone, stress

1 Introduction

Prosodic structure theory, as developed in Nespor and Vogel (1986), and Selkirk (1986) and much subsequent work, proposes that the domains for phonological processes are defined by parsing phonological strings into a set of hierarchically-arranged prosodic constituents – the Prosodic Hierarchy.¹ Generally agreed upon

¹ There has been a wealth of work on subphrasal phonological domains, in prosodic structure theory and other frameworks. Important foundational and overview works include: Bermudez-Otéro (2011, 2012, 2016, 2017); Downing (1999, 2006); Frota et al. (2012); Frota and Vigário (2013); Guzzo (2018); Hayes (1989); Inkelas (1989, 1993, 2011, 2014); Ito and Mester (2009a, 2009b, 2012, 2013); Kaisse and Hargus (1993); Kaisse and McMahon (2011); Kiparsky (1982, 1985); Nespor and Vogel (1986); Selkirk (1986, 1995, 2009, 2011); and Vogel (2009a, 2009b, 2010, 2019).

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is the requirement that constituents in the Prosodic Hierarchy must be defined with respect to cross-linguistically valid, morphosyntactically-based constituents, and they must be motivated by prosodic or phonological processes which are sensitive to the domain defined by the prosodic constituent. A more controversial issue for the Prosodic Hierarchy is: What is the repertory of prosodic constituents? In addressing this issue, two conflicting considerations must be balanced:

1. The repertory of constituents should be as parsimonious as possible, as this is the best way to ensure that the posited constituents are of broad cross-linguistic relevance.
2. The repertory of constituents must be sufficient to account for cross-linguistically recurring, morphosyntactically-conditioned phonological domains.

At the lexical – i.e., subphrasal (i.e., sub-Phonological Phrase) – level, a body of evidence has been put forward supporting three constituents: Composite Group or equivalent (CG), PWord and PStem:

However, recent work by Selkirk (2009, 2011) and Ito and Mester (2009a, 2019b, 2012, 2013) has argued in favor of a more parsimonious view. They make the strong claim that the Prosodic Hierarchy contains only one subphrasal morphosyntactically-defined constituent, PWord, which by default matches a syntactic word (Selkirk 2011: 439). Additional subphrasal domains, equivalent to PStem or CG, must be defined as PWord or recursions of PWord.

It is controversial, however, whether recursive PWord successfully accounts for cross-linguistically recurring subphrasal phonological domains in a constrained and coherent way. Bickel et al. (2009), Frota and Vigário (2013), Guzzo (2018), Schiering et al. (2010), Vigário (2010), and Vogel (2009a, 2009b; 2010, 2012, 2018, 2019), in particular, have argued against PWord recursion in favor of expanding the set of subphrasal domains. At the same time, some of this work argues, rather surprisingly, against PStem as a subphrasal domain. The goal of this paper is to present arguments in favor of including PStem in the Prosodic Hierarchy, as shown in (1). Analyses that aim to replace PStem with some other prosodic constituent will be shown to be

unsatisfactory, as they fail to capture a robust cross-linguistic generalization regarding a stem-word asymmetry in prosodic domains in a formally coherent way.

The argument is structured as follows. Section 2 reviews cross-linguistic evidence supporting a stem-word asymmetry in the domains for subphrasal phonological processes. Section 3 takes up how to best model this asymmetry, providing arguments in favor of PStem and against (minimal) PWord as a potential alternative parse. Section 4 presents case studies of two unrelated languages, Shona and Limbu, to illustrate in more detail the arguments in favor of PStem. Section 5 concludes.

2 Motivating the stem-word asymmetry

Phonological studies in a variety of frameworks demonstrate that it is cross-linguistically common for one set of affixes within a grammatical word to form a distinct phonological domain from their base of affixation, while another set of affixes is phonologically integrated with the base. (See e.g., Bermudez-Otéro 2011, 2012, 2013, 2016, 2017; Bybee et al. 1990; Dixon 1977; Hyman 2008; Inkelas 1989, 1993, 2014; and Kiparsky 1985, 2000, 2015 for proposals and overviews.) This section surveys examples of this phenomenon, which is commonly characterized as a stem domain versus word domain asymmetry.

The stem-word asymmetry is, in fact, a key component of the architecture of Lexical Phonology (Booij and Rubach 1984, 1987; Borowsky 1993; Kaisse and Hargus 1993; Kiparsky 1982, 1985), and its successor, Stratal OT (Kiparsky 2000, 2014, 2015; Bermudez-Otéro 2011, 2012, 2013, 2016, 2017).² The stem-word asymmetry in these approaches aims to formalize the cross-linguistic generalization, mentioned above, that many languages have two lexical phonological domains, distinguished by the relative phonological independence of different sets of affixes from their base. The literature in Lexical Phonology and Stratal OT provides ample evidence of the robustness of stem and word as distinct lexical phonological domains, from languages as diverse as Albanian (Trommer 2011), Levantine Arabic (Kiparsky 2000), English (Bermudez-Otéro 2011, 2017), Hebrew (Meir 2006) and Western Nilotic (Trommer 2011), to name only a few.

Work in non-stratal approaches to phonology also provides considerable cross-linguistic evidence for the stem-word asymmetry, as defined above. For example, Hyman (2008) proposes that there is a correlation between the typologically well-attested stem-word asymmetry and the equally well-attested prefix-suffix asymmetry. Not only are prefixes less common, they tend to be less

² Bermudez-Otéro (2011, 2017), Kaisse and McMahon (2011), and Kiparsky (2015) provide thoughtful recent overviews of these theories, clarifying their similarities and crucial differences, and pointing out persistent issues.

phonologically “cohering,” in Dixon’s (1977) terms, than suffixes, as shown in work like Bybee et al. (1990) survey. Hyman (2008) suggests that it follows from these observations that the least marked structure for a word with both suffixes and prefixes is for the suffixes to form a stem constituent with the Root, while the prefixes are adjoined into a word constituent. That is, the prefix-suffix asymmetry can be modeled as a stem-word asymmetry:

- (2) [WORD Prefixes [STEM Root + Suffixes]]

Hyman (2008: 327) provides phonological motivation for the stem-word asymmetry schematized in (2) through a detailed discussion of the phonology of Bantu languages. As he shows, in many Bantu languages, the stem (Root plus mainly derivational suffixes) is the domain for processes like vowel harmony, nasal consonant harmony, tonal affiliation and verbal reduplication, as well as constraints on the distribution of vowels, consonants and tonal contrasts. While prefixes, typically inflectional, are excluded as target for these processes, they are included with the stem for other processes which are clearly word bound. Detailed additional discussion and exemplification of the stem-word asymmetry in Bantu languages can be found in work like: Downing (1998a, 1998b, 1999, 2006), Downing and Kadenge (2015), Hyman (1987, 1998, 1999, 2008, 2009), Hyman and Inkelas (1997), Inkelas and Zoll (2005), Jones (2011), Mudzingwa (2010), Mutaka (1994), Myers and Carleton (1996), Van de Velde (2008), to name a few. Shona (Bantu S.11–15, Zimbabwe), will be discussed in detail in Section 4.1, below, to illustrate the stem-word asymmetries typical of this language family.

Outside of Bantu, one finds numerous analyses from a diverse set of languages illustrating a stem-word asymmetry: one set of affixes is excluded from a phonological domain which includes the root and (some other) affixes. For example, Czaykowska-Higgins’s (1996, 1998) analysis of Moses-Columbia Salish (Nxaʔamxcín) shows that the language illustrates the prefix-suffix asymmetry: the Root and all suffixes form the domain for progressive vowel retraction and stress. Prefixes are never stressed, and do not trigger progressive retraction. Prefixes are, however, targets for regressive vowel retraction, a process that Czaykowska-Higgins (1998: 178–181) demonstrates is word bound. Booij and Rubach (1984) show that in Polish, too, a number of word-bound phonological processes (e.g., yer-Lowering, syllabification) either ignore prefixes or do not apply across the prefix-base boundary, whereas suffixes are integrated into the domain for these processes. We can add to this list of languages showing a prefix-suffix asymmetry: a number of Athapaskan languages (McDonough 1990; see Inkelas 2014 for a recent overview), Chumash (Downing 1998b; Inkelas 2011, 2014; Inkelas and Zoll 2005), some Germanic languages (Booij

1996; Hyman 2008), Georgian (Butskhrikidze 2002), Hungarian (Siptár and Törkenczy 2000: 64, 123), and Limbu and other Tibeto-Burman languages (Bickel et al. 2009, Hildebrandt 2007, Schiering et al. 2010).³ Limbu prosodic domains will be discussed in detail in Section 4.2, below. Axininca Campa (Downing 2006: Section 3.2.1.4.2) illustrates the mirror-image pattern: the prefixes plus root form a domain for phonological processes which excludes the “less cohering” suffixes.

In other languages, other morphosyntactically-defined parameters have been shown to define the distinction between stem affixes (“cohering”) and word (“less cohering”) affixes. For example, Dolatian (2018) demonstrates that in some dialects of Armenian, derivational suffixes trigger destressed vowel reduction while inflectional suffixes are outside the domain of this process. In Bengali (Fitzpatrick Cole 1994), certain root plus affix combinations form monomorphemic-like domains, termed stem domains, for a number of phonological processes, while other root plus affix combinations form heteromorphemic-like word domains.

To sum up, it appears to be uncontroversial that the phonologies of many languages illustrate a stem-word asymmetry: one set of affixes is included in the domain of word-bound phonological processes, yet excluded from a word-internal (stem) domain which parses the root and some other affixes. Indeed, Kiparsky (2000: 362) suggests that:

The categories “stem” and “word” are special in being anchored in the universal prosodic hierarchy[;] their status in UG is comparable to the status of such categories as “noun” and “verb.”

The issue is how best to model this distinction in prosodic structure theory: is a prosodic constituent PStem, distinct from PWord, necessary, or can the same generalizations be captured without expanding the repertory of prosodic constituents? This is the topic of the next section.

3 Modeling the stem-word asymmetry

In this section, we will argue that the stem-word asymmetry is best formalized in prosodic structure theory by proposing a corresponding PStem-PWord distinction in the Prosodic Hierarchy. Alternative analyses are shown to be formally inadequate and to fail to account for important cross-linguistic generalizations.

All of the proposals discussed in this section adopt standard assumptions of prosodic structure theory as developed in work like Frota et al. (2012); Guzzo (2018); Inkelas (1989, 1993); Ito and Mester (2007, 2009a, 2009b, 2012, 2013);

³ The stem versus word distinction has also been shown to play an important role in the prosodic morphology of a number of languages. See work like Downing (2006), Fitzpatrick Cole (1994), Inkelas and Zoll (2005), Ito (1990), Ito and Mester (1996), and Rodier (1998) for discussion.

Nespor and Vogel (1986); Selkirk (1986, 2009, 2011); Truckenbrodt (1995, 1999); Vigário (2010); Vogel (2009a, 2009b; 2010, 2012, 2018, 2019). Phonological processes apply within prosodic domains which are constituents of the Prosodic Hierarchy.⁴ Prosodic constituents are defined with respect to specific morphosyntactically-defined constituents. This ensures their cross-linguistic validity. In the default case, a prosodic constituent is perfectly aligned with the relevant morphosyntactically-defined constituent. However, the constituents can be misaligned if this is motivated by other factors defining well-formed prosodic constituents in the language. We begin by defining PStem and PWord and briefly summarize arguments in favor of formalizing the stem-word asymmetry using these two constituents. Then we consider two alternative approaches.

3.1 PStem distinct from PWord

In prosodic structure theory, a considerable body of work has argued, following Inkelas (1989, 1993), for a PStem-PWord distinction in the Prosodic Hierarchy, based on a cross-linguistically diverse set of languages, including many of those referenced in Section 2, above. The default definition of PStem that we adopt is based on Bermudez-Otéro's (2017: 105) definition of stem; recall that prosodic constituents by default match a morphosyntactically-defined constituent:

- (3) **Phonological Stem (PStem)** matches a **Stem** (Bermudez-Otéro 2017: 105; see, too, Bauer 2003: 202; Matthews 1991: 64):

A **stem** is a lexical item specified for syntactic category (N, V, A, etc.).

We follow Bermudez-Otéro (2017) in proposing that the stem, unlike the word, need not be fully inflected, as it need not parse all of the affixes to the lexical root. That is, the PStem canonically parses derivational affixes but not inflectional ones. As a result, PStem is not necessarily either prosodically or syntactically autonomous. Because PStem does not necessarily parse a free form, it follows that it is also not necessarily subject to minimality. While PStem by default matches the morphosyntactic constituent defined by the Root plus derivational affixes, Section 2 shows that mismatches are common. For example, the prefix-suffix asymmetry schematized in (2), above, defines the PStem as the Root plus all following suffixes, whether they are derivational or inflectional.

PWord by default matches a lexical word as defined by Bermudez-Otéro (2017: 105):

⁴ We are agnostic about whether the domain distinctions defined using subphrasal prosodic constituents are best implemented in a non-derivational approach, like co-phonologies, or as phonological levels in a derivational approach, like Stratal OT. Finally, we assume that prosodic constituents can be recursive, but only if recursion satisfies the well-formedness criteria discussed in Section 3.2, below.

(4) **Phonological Word (PWord)** matches lexical **word**:

A **word** is a syntactically autonomous lexical item bearing the full set of inflectional features required by its category.

Since PWord, unlike PStem, by default matches an autonomous, fully inflected lexical item, it is canonically, in the sense of Corbett (2007), subject to minimality. (See McCarthy and Prince (1986) and much subsequent work establishing that minimality is cross-linguistically a canonical property of the PWord domain.⁵) The schema below, chosen for the sake of concreteness, illustrates the prosodic parse that would be given to (2), above:⁶

(5) $(_{\text{PWord}} \text{Prefixes } (_{\text{PStem}} \text{Root} + \text{Suffixes}))$

While PWord by default matches the syntactic or lexical word, mismatches are well-attested in the prosodic structure theory literature. For example, many languages impose a disyllabic minimality condition on PWords, which is actively satisfied by augmenting a subminimal lexical word through, e.g., epenthesis (V) to provide an additional syllable: $(_{\text{PWord}} V [_{\text{word}} \text{CV}])$. We will see an example of augmentation via epenthesis to satisfy PWord minimality in the discussion of Shona in Section 4.1, below.

To conclude, since PStem, like PWord, is by default morphosyntactically-defined, it satisfies prosodic structure theory's "explanatory goal – minimally, a motivated identification of categories across languages, such that the [default] 'xyz-[prosodic constituent]' of one language can be confidently equated with the [default] 'XYZ-[prosodic constituent]' of another [...]" (Ito and Mester 2009a: 228). Just as importantly, the PStem-PWord distinction allows us to straightforwardly model the cross-linguistically robust generalization concerning a stem-word asymmetry defining domains of lexical phonological processes motivated in Section 2.

5 In saying that PWord is canonically subject to minimality, we mean that PWord, not PStem, is the domain where minimality would be expected to hold. The fact that there are many languages which do not have a minimality requirement even for PWords (see Downing (2006) for detailed discussion) does not change the status of minimality as a *canonical* property of PWord (rather than PStem) in Corbett's (2007) sense.

6 In a language (or form) where the prefixes excluded from PStem are not obligatory in a fully-inflected PWord, PStem, and PWord would potentially overlap in the sense that they would parse the identical string. See Vogel (2019: 14ff) for discussion of the necessity for this kind of overlap in prosodic structure theory.

3.2 Recursive PWord replaces PStem-PWord distinction?

Even though parsing the stem domain as PStem has clear advantages, it does add a constituent to the Prosodic Hierarchy. To keep the repertory of prosodic constituents as parsimonious as possible, PWord recursion has been proposed in work like Bennett (2018), Booij (1996), Booij and Rubach (1984, 1987), and van der Hulst (2010) as a way to model a distinction between stem level ('cohering'; low level) and word level ('non-cohering'; high level) affixes.⁷ This is schematized in (6), which shows how non-cohering prefixes are parsed into a recursive PWord with their base in these analyses:

- (6) Recursive PWord to model stem-word asymmetry; cf. (2), above
 (PWORD Prefixes (PWORD Stem))

Although PWord recursion has come to be widely accepted, there are reasons to be dissatisfied with this approach as a general alternative way to formalize a stem-word asymmetry.⁸ As noted above, a principal advantage of proposing a PStem constituent distinct from PWord is that this provides the most straightforward way, within prosodic structure theory, of formalizing the stem-word asymmetry which Kiparsky (2000) proposes is universal. Collapsing this distinction in favor of PWord alone fails to capture the generalization that it is cross-linguistically very common for languages to have two lexical (subphrasal) domains, with distinct phonological properties. Further, if prosodic constituents by default match their morphosyntactic correlates, then excluding classes of affixes from the PWord domain, as in (6) above, obviously has the potential to create a considerable mismatch between PWord and the corresponding grammatical word, making it difficult to identify unifying cross-linguistic morphosyntactic properties of PWord. Finally, since PStems are bound, they need not be subject to minimality constraints, whereas PWord canonically is subject to minimality. If PStem is replaced by PWord, it is unclear how a cross-linguistic generalization concerning domains subject to minimality could be formalized, further diminishing the unifying cross-linguistic properties of PWord. (See

⁷ While the focus of this paper is on subphrasal prosodic constituents, it should be pointed out that there is a parallel discussion concerning motivations for recursion at the Phonological Phrase and Intonation Phrase level. See e.g., Elfner (2015), Ito and Mester (2012, 2013), Ladd (1986, 2008), Kisseberth (2010), Selkirk (2009, 2011), Truckenbrodt (1995, 1999), and Wagner (2010).

⁸ It is beyond the scope of this paper to take up all of the recent arguments for and against uses of recursive structures. Our focus is on whether recursive PWord can meaningfully replace a PStem-PWord distinction. See van der Hulst (2010) and Vogel (2019) for thoughtful recent discussion of recursion, from different perspectives.

Inkelas 1989 and Downing 1999 for detailed development of arguments like these.)

An additional problem with PWord recursion is that it violates a markedness constraint holding of well-formed prosodic constituent structures, NORECURSIVITY (Selkirk 1995: 443). As recent work by Frota and Vigário (2013), Guzzo (2018), Vigário (2010), and Vogel (2009a, 2009b, 2010, 2012, 2019) forcefully argues, even though this constraint, like others in an Optimality Theoretical approach, can be optimally violated to satisfy higher-ranked prosodic well-formedness constraints, a recursive representation must still strictly satisfy well-formedness criteria holding for linguistic recursion in general. In particular, recursion should involve “embedding a constituent in a constituent of the same type” (Pinker and Jackendoff 2005: 211, cited by Vogel 2012). For this requirement to be met, prosodic recursion must satisfy the criteria in (7):

- (7) Well-formedness criteria holding of prosodic recursion
 - a. Phonological processes apply recursively throughout the recursive prosodic domain, treating each instance of the recursion identically, or
 - b. The recursive (outer) domain must have the same phonological properties as a non-recursive (inner) domain.

In the literature on PWord recursion, one finds analyses that meet at least one of these two criteria: see, e.g., Bennett (2018), Guzzo (2018), Vigário (2010), and Zec (2005). However, work like Bickel et al. (2009), Frota and Vigário (2013), Guzzo (2018), Schiering et al. (2010), Vigário (2010), and Vogel (2009a, 2009b; 2010, 2012, 2018, 2019) show that many analyses involving PWord recursion are not well formed according to (7), above. The same phonological processes or constraints do not apply to the outer recursion of PWord as to the inner recursion. Indeed, the motivation for a stem-word asymmetry in all of the cases summarized in Section 2 is precisely that stem and word domains do not have the same phonological properties. Processes or constraints that target the stem domain do not apply to the entire word. And conversely, there are processes that apply differently in the word domain than in the stem domain.

A final conceptual problem with recursion is that, as Schiering et al. (2010: 699) argue, if an unlimited number of intermediate recursions of, for example, PWord, is allowed by a theory, it makes prosodic recursion “too powerful and puts too [few] restrictions on prosodic systems,” since intermediate prosodic recursions can parse morphosyntactic groupings defined by language-particular morphosyntactic structures rather than constituents with cross-linguistic validity. As van der Hulst (2010: 326) observes, though, it does not appear that languages need to appeal to more than two recursions of PWord (or any other

prosodic constituent). Note that two recursions of PWord define exactly three subphrasal constituents, precisely as schematized in (1), except that the three constituents in (1) crucially are distinct in kind, not recursions of another constituent. A limitation to three subphrasal constituents is, though, a stipulation in most work appealing to PWord recursion.

3.3 Composite Group (CG)-PWord distinction replaces PWord-PStem distinction?

Another alternative to PStem has been argued for in work by Vogel (2009a, 2019b) and Vigário (2010: fn 21, fn 26), also invoking parsimony. They propose that the range of facts supporting a PStem versus PWord distinction can be re-analyzed as a PWord versus Composite Group (CG or equivalent) distinction. Vogel (2019: 34) provides the following informal definition of CG:⁹

(8) **Composite Group (CG):**

Consists of a PWord, or in the case of compounds, multiple PWords, and PWord-external functional elements, such as clitics, non-cohering affixes and function words.

This definition must be considered a proposal for the default parse of the CG, since it is well-established that in some languages, certain clitics are arguably parsed within their host PWord, not external to PWord (in CG, for example). (See, e.g., Inkelas (1993), Zec and Inkelas (1992), Kaisse (1983), Peperkamp (1996), Selkirk (1995), Vigário (2010), and Zec (2005) for discussion and exemplification.) That is, for CG, as for other prosodic constituents, one expects to find mismatches between the morphosyntactically-defined default domain and the phonologically-motivated domain in a particular language.

Vogel's (2009a, 2009b) and Vigário's (2010: fn 21, fn 26) reanalyses of PStem are not worked out in detail, but one assumes the proposal would be that the structure in (2) would have the prosodic parse given in (9):

(9) (CG Prefixes (PWORD Stem))

The representation in (9) faces a number of problems, though. First, stem-external affixes do not necessarily have properties that motivate parsing them outside the PWord. On the contrary, much of the literature motivating the stem-word

⁹ See Guzzo (2018), Vigário (2010), Vogel (2009a, 2009b; 2010, 2012, 2018, 2019) for detailed motivations for and definitions of the Composite Group (or equivalent). Note that these authors do not all use the same term for this constituent and also have somewhat varying definitions.

asymmetry cited in Section 2 demonstrates that affixes parsed into the (P)Word outside of (P)Stem are included with the (P)Stem for some word-bound processes. The representation in (9) thus misses the generalization that it is cross-linguistically common for a language to have two sets of bound affixes that define distinct domains for word-internal processes.

Further, this approach shares problems with the recursive PWord approach. If prosodic constituents by default match their morphosyntactically-defined correlates, then excluding classes of affixes from the PWord domain, as in (9), obviously has the potential to create a considerable mismatch between PWord and the corresponding grammatical word, making it difficult to identify unifying cross-linguistic properties of PWord. Finally, since PStems are bound, they need not be subject to minimality constraints, whereas PWord canonically is subject to minimality. If PStem is replaced by PWord, it is unclear how this cross-linguistic generalization could be formalized, further diminishing the unifying cross-linguistic properties of PWord.

Finally, because this approach parses PWord-external (less cohering) affixes together with clitics or function words outside the PWord domain, it predicts that PWord-external affixes and clitics/function words should have the same phonology. One does find analyses supporting this prediction, and, as Vigário (2010: 494) notes, a common pattern is for proclitics to pattern with prefixes in being less cohering, whereas enclitics pattern with suffixes in being parsed into PWord.¹⁰ However, Bermudez-Otéro (2011) provides a counterexample to this prediction from English. It is well-established that English has a distinction between stem level affixes and word-level affixes. In a model which assumes the two subphrasal levels, CG and PWord, this distinction would most straightforwardly be formalized by parsing stem-level affixes into PWord and word-level affixes into the CG, external to PWord. English also has function word clitics, both proclitics and enclitics. These are plausibly parsed into CG together with word level affixes in the CG-PWord model. As Bermudez-Otéro (2011: 10) argues, parsing both word level affixes and enclitics into the same prosodic domain makes the prediction that phonological processes like the English process of /l/-darkening should apply the same way before a word level suffix like *-ing* as before an enclitic. Hayes (2000: 98) shows, however, that /l/-darkening applies with greater frequency before an enclitic (*heal it*) than before a word level suffix (*heal-ing*). As Bermudez-Otéro (2011) concludes, these two forms must have distinct prosodic representations in order to account for these facts. A CG-PWord model of subphrasal prosodic representations

10 The parallel between the proclitic-enclitic asymmetry noted by Vigário (2010) and the prefix-suffix asymmetry discussed in Section 2, above, is intriguing and deserves further study, which, unfortunately, falls outside the scope of this paper.

does not offer sufficient distinctions. The case studies of Limbu and Shona presented in Section 4 emphasize this point.

Before concluding this section, it is important to highlight that even though a CG-PWord distinction cannot systematically replace a PWord-PStem distinction, there is ample other evidence for a CG-PWord distinction, based mainly on the phonology of clitics and compounds. It is beyond the scope of this paper to present these arguments in detail, and the interested reader is urged to consult work like Guzzo (2018), Vigário (2010), and Vogel (2009a, 2009b; 2010, 2012, 2018, 2019) for detailed discussion. We simply note that many of the arguments given in these works for why PWord recursion cannot replace a CG-PWord distinction are analogous to those presented in Section 3.2 for why PWord recursion cannot replace a PWord-PStem distinction.

4 Case studies: Limbu and Shona

A considerable body of work on a broad range of languages, then, provides motivation for a distinction between stem and word domains in the phonology. In prosodic structure theory, this generalization has been formalized, since Inkelas (1989), by including a PStem constituent in the Prosodic Hierarchy, immediately dominated by PWord. As we have shown in Section 3, formalizing the distinction in terms of recursive PWord or in terms of a PWord-Composite Group (CG) distinction fails to define the stem-word distinction in a conceptually rigorous, cross-linguistically valid way. We conclude that the evidence supports including PStem as a constituent in the Prosodic Hierarchy, along with PWord and the Composite Group (or equivalent), as the three constituents relevant for sub-phrasal phonological processes:¹¹

¹¹ Following Bermudez-Otéro's (2017) approach to Stratal Phonology and most work within prosodic structure theory since Nespor and Vogel (1986) and Selkirk (1986), we do not assume a Lexical Phonology-style (Kiparsky 1982, 1985) lexical-postlexical distinction in the phonology. (Though see Vigário 2010 for a different point of view.) A postlexical level would be roughly equivalent to the Phonological Phrase level and above. All of the processes discussed in this section are lexical in the sense that they are word bound.

The best support for three distinct constituents is to show that all three are required to account for the phonology of a diverse set of languages. The two case studies discussed below have been chosen for this purpose, as other work on these languages has specifically argued against an appeal to PStem, replacing it with some other subphrasal domain. While the main purpose of the case studies is to argue for PStem, we shall see that they also present the kind of data that has been put forward to motivate CG as a distinct constituent in the Prosodic Hierarchy.

4.1 Shona

Shona (Guthrie number S.11–15) is a Bantu language spoken mainly in Zimbabwe and Botswana. Like most other Central Bantu languages, verb words exhibit the prefix-suffix asymmetry that Hyman (2008) argues often correlates with the stem-word asymmetry schematized in (2), above. The structure of the Shona verb word is given in (11), below, based on discussion in Myers (1987, 1998):

- (11) Shona verb word
 Proclitics/Pre-initials = Subj-TAM [_{MACROSTEM} Obj]-[_{STEM} Root-(Derivational suffixes)-FinalV] = Enclitics
 (See work like Hyman (2008, 2009) and Meeussen (1967) for further discussion of the structure of the Bantu verb word.)

A distinction between (P)Stem versus (P)Word domain for phonological processes in Shona is well-established from previous work on the language, as several phonological processes distinguish the two domains.¹² As is typical for Bantu languages (Hyman 2008), the PStem is the domain for vowel harmony (Beckman 1997) and forms the base for reduplication (Odden 1981). Three additional processes motivating a PStem-PWord asymmetry are discussed in turn in this section: minimality, Meeussen's Rule (an OCP-motivated constraint on High tone realization) and vowel hiatus resolution.

Minimality is a property of verb words in the Zezuru and Ikalanga dialects of Shona, as demonstrated in detail by Myers (1987, 1995) and Mudzingwa (2010). Subminimal words are augmented through the epenthesis of morphologically empty material. This is illustrated by the imperative forms in (12), below. The forms in (12e–g) show that in minimally disyllabic stems, the bare stem forms the imperative. The imperative forms in (12a–d) show that subminimal (monosyllabic) verb stems are augmented by epenthesis *i-*, creating a mismatch between the grammatical word and PWord:

¹² Shona is a particularly well-studied Bantu language. The analyses in this section draw on data and discussion found in work by: Beckman (1997), Downing and Kadenge (2015), Hyman (2008), Hyman and Mathangwane (1998), Myers (1987, 1995, 1997, 1998), Kadenge (2010), Mudzingwa (2010), Mudzingwa and Kadenge (2011), and Odden (1981). The interested reader is directed to this work for more detailed presentation of the Shona facts than space permits.

- (12) Zezuru Shona imperatives; epenthetic elements are bolded; ‘j’ is the palatal glide; *ku-* is the infinitive prefix

	<i>Imperative</i>	<i>Infinitive</i>	<i>Gloss</i>
(a)	ipá	ku-pá	‘give’
(b)	idyá	ku-dyá	‘eat’
(c)	inwá	ku-nwá	‘drink’
(d)	ibvá	ku-bvá	‘leave’
cf.			
(e)	imbá	ku-jimbá	‘sing’
(f)	túmírá	ku-túmírá	‘to send to’
(g)	verengerana	ku-verengerana	‘read to each other’

This data shows not only that PWords are subject to a minimality constraint, but also that prefixes like the infinitive prefix *ku-*, when present, can satisfy that constraint. Hence, prefixes must be parsed with the stems into PWord.¹³ However, stems themselves are obviously not subject to a minimality constraint, as they are only augmented when they occur as independent PWords, in the imperative.

Further evidence for a stem-word distinction comes from the OCP-motivated tonal process, Meeussen’s Rule, as Myers (1987, 1995, 1997, 1998) demonstrates in some detail. (Meeussen’s Rule deletes the second in a sequence of High tones.¹⁴) Myers shows that while Meeussen’s Rule is a word-bound process, its application is morphologically-conditioned within words: it systematically applies across a stem boundary, as shown in (13a–c). However, Meeussen’s Rule systematically fails to apply within the string of prefixes which precedes the stem, as shown in (13d–e):

- (13) Meeussen’s Rule (Myers 1987; 1998: 242–243); square brackets indicate stem edges; parentheses indicate PStem edges; the form of the verbs is: SUBJ-TAM [stem]

Applies across a prefix-PStem boundary

(a)	ndi-chá [ténga]	→	ndi-chá ([ténga])	‘I will buy’
(b)	ndi-aká [téngesa]	→	nda-ká ([téngesa])	‘I sold (yesterday or before)’
(c)	ndi-ngá [téngese]	→	ndi-ngá ([téngese])	‘I might sell’

¹³ See Bresnan & Mchombo (1995) and Myers (1987) for arguments that in most Bantu languages inflectional prefixes form a grammatical word with verb stems. They do not have the status of clitics.

¹⁴ As work like Meeussen (1967) and Kisseberth and Odden (2003) shows, most Bantu languages are tone languages, contrasting two tones. Some version of Meeussen’s Rule is found in many Bantu languages (Kisseberth and Odden 2003).

Does not apply within the prefix string

- (d) vá-chá [ténga] → vá-chá ([tenga]) ‘they will buy’
 (e) vá-ká [téngesa] → vá-ká ([tengesa]) ‘they sold
 (yesterday or
 before)’

Formalizing the stem-word asymmetry in terms of PStem and PWord allows Meeussen’s Rule to be defined as a domain juncture process (Selkirk 1986; Vogel 2009a, 2009b, 2010, 2019), which applies across prosodic constituent edges.

Finally, Myers (1987) and Mudzingwa (2010) demonstrate in careful detail that vowel hiatus is resolved differently across stem boundaries than within the prefix string.¹⁵ The data in (14d–g) show that in a hiatus context created by a subject prefix followed by a vowel-initial prefix, the vowel of the subject prefix undergoes resyllabification with a following prefix (deletes or glides). However, if the next vowel is stem-initial, a homorganic glide is inserted before the second vowel. The different resolution of the *i-o* sequences in (14c) versus (14d) highlights the importance of the stem juncture in conditioning the hiatus resolution strategy:

- (14) Vowel hiatus resolution in Shona (square brackets indicate stem edges; parentheses indicate PStem edges; inserted glides are bolded)
- (a) tí [ende] → tí (**j**[énde]) ‘we should go’
 we [should.go]
- (b) tí [úye] → tí (**w**[úyé]) ‘we should come’
 we [should.come]
- (c) ku [ndi [óna]] → ku ([ndi (**w**[óná]])) ‘to see me’
 INF [me [see]]
- (d) tí-ó [enda] → tó (**j**[énda]) ‘we should be going’
 we-TAM [go]
- (e) í-o [ténga] → jó ([tenga]) ‘it (cl. 9) should buy’
 it-TAM [buy]
- (f) tú-á [fám̩ba] → twá ([famba]) ‘they (cl. 13) have walked’
 they-TAM [walk]

¹⁵ Casali (1997, 2011) demonstrates that it is cross-linguistically common for vowel hiatus resolution to apply differently across the prefix-stem juncture than between affixes or between the stem and suffixes, as there is a strong cross-linguistic tendency to preserve the vowel in the initial position of lexical morphemes (like stems). Limbu also illustrates this generalization, as shown in the next section.

- (g) vá-á [tám̥ba] → vá ([tamba]) ‘they (cl. 2) have danced’
 they-TAM [dance]

It is important to note that, as Myers (1987: 232) and Mudzingwa (2010) show, vowel hiatus is not resolved – either by glide epenthesis or resyllabification – across word boundaries. That is, hiatus resolution is a word-bound process:

- (15) No vowel hiatus resolution across syntactic word boundaries or word initially; inserted glides are bolded
(a)	móta í [ri] = pí?	‘Where is the car?’	*móta jí -ri = pí?
	Car	SUBJ [is = where]	
(b)	mwaná uyu	‘this child’	*mwaná wuyu
	child	this	
(c)	tám̥bá óga	‘play/dance alone!’	*tám̥bá wóga
	dance	alone	
(d)	í -ténge	‘buy it!’	* jí -ténge
	OBJ-buy		

The generalization that emerges is that glide epenthesis, like Meeussen’s Rule, is a word-internal domain juncture phenomenon. When no word-internal prosodic constituent boundary – e.g., PStem – separates vowels in hiatus, other resolution processes apply.

There are several reasons why one cannot plausibly recast the PStem-PWord distinction motivated by these processes in terms of PWord recursion:

- (16) (_{PWord} Prefixes (_{PWord} Stem)).

PStems are not subject to minimality, even though, in a recursion analysis, the equivalent of PStem would be a (minimal) PWord, a constituent that canonically is expected to be subject to minimality. Further, as we have seen, Meeussen’s Rule and vowel hiatus processes apply differently within the prefix string than across the prefix-stem boundary. This contradicts the definition of recursion in (7): phonological processes should apply recursively and uniformly within recursive phonological domains.

Contra Vigário (2010: fn 21, fn 26) and Vogel (2009a, 2009b) the PStem-PWord distinction in Bantu languages like Shona also cannot easily be recast as a CG-PWord distinction:

- (17) (_{cg} Prefixes (_{PWord} Stem))

It is unclear why it would follow, in this approach that CG must, cross-linguistically, satisfy minimality while PWord does not. PWord is canonically expected to be a domain that is subject to minimality. Further, parsing prefixes as if

they were clitics, external to the PWord, incorrectly suggests that prefixes should be excluded from word-bound phonological processes. As Myers (1987, 1995, 1998) demonstrates, prefixes participate in prosodic processes which are PWord-bound, like tone spread and the calculation of minimal word.

An additional problem with parsing prefixes as if they were clitics in Shona (i.e., in CG, external to PWord; see (17)) comes from differences in the phonological behavior of prefixes and clitics for minimality, Meeussen's Rule and vowel hiatus resolution. Prefixes contribute to the satisfaction of word minimality, as shown in (12), above. However, clitics do not. As Myers (1987) demonstrates, the augmented form of the imperative of monosyllabic stems is maintained when certain enclitics are added to them (cf. (12)):

- (18) Enclitics subcategorize for PWord (Myers 1987); epenthesized vowel is bolded
- (a) **ipá** = wo 'give also!'
 - (b) **idyá** = wo 'eat also!'
 - (c) **inwá** = ji 'drink (plural/polite)!'
 - (d) **ibvá** = ji 'leave (plural/polite)!'
 - (e) **ipá** = zve 'give again!'

These forms provide further evidence for PWord, since one must specify a minimal PWord as the base for cliticization. And they demonstrate the distinction between a PWord and a CG domain, since only morphemes parsed in the PWord domain satisfy minimality.

The application of Meeussen's Rule provides additional evidence that prefixes and proclitics are parsed in distinct prosodic domains. (See Myers (1987, 1998) for detailed discussion.) A clitic triggers Meeussen's Rule on a following High-toned prefix, (19), or enclitic, (20). In contrast, recall from (13), above, that a High-toned prefix does not trigger Meeussen's Rule on a following High-toned prefix:

- (19) Proclitic há 'hortative' plus High-toned subject prefix (Myers 1987: 196, figs. 66e, f) [' indicates a stem edge; form of the verbs is Hort=subj [stem]
- (a) há = tí [tégese] → há = ti [tengese] 'let us sell'
cf. tí-téngésé 'that we might sell'
 - (b) há = tí [tarise] → há = ti [tarise] 'let us look'
 - (c) há = á [tarise] → há = a [tarise] 'let them look'
- (20) Sequence of two High-toned enclitics (Odden 1981: 48); epenthesized glides are bolded; form of the verbs is: subj-TAM [stem] =clitic1=clitic2
- (a) á-ká [bike] = **jí** = **wo** 'what did s/he cook? (polite)'
 - (b) nda-ká **j**[énda] = **wó** = zve 'I went again, too'

Finally, note in (19c) that a proclitic does not trigger elision of a following vowel-initial prefix, whereas prefixes do. (See (14), above.) And monosyllabic enclitics are subject to glide epenthesis, unlike affixes, as shown in (20). (See Mudzingwa 2010: 76–77 for discussion.) These distinctions in the phonological properties of affixes and clitics obviously are problematic for a CG-PWord analysis, as it would parse prefixes and all clitics together in CG outside of PWord.

We propose that the most straightforward way to account for these contrasts in the phonological behavior of clitics and inflectional prefixes is to appeal to a distinction between PWord, which parses prefixes into a constituent external to PStem, and CG, which parses clitics into a constituent external to PWord:

- (21) (CG clitics (PWORD Prefixes (PSTEM Root+Suffixes)) clitics)

Meeussen's Rule and glide epenthesis can then be analyzed as domain juncture processes that take CG as their domain.

4.2 Limbu

Limbu is a Sino-Tibetan language of Nepal. Bickel et al. (2009), Hildebrandt (2007), and Schiering et al. (2010) analyze the phonology of Limbu as their parade example in arguing that the traditional Prosodic Hierarchy does not provide sufficient subphrasal prosodic constituents to account for all the phonological domains that are cross-linguistically well-attested in what they define as a **prefix-stem-suffix=clitic** string. (See this work for detailed motivation of the suffix-clitic distinction in Limbu.) In this section, we show that the proposed expanded Prosodic Hierarchy in (10) neatly accounts for the domains motivated for Limbu by general phonological processes of the language.¹⁶

First, as they show, Limbu, like Shona, has the kind of prefix-suffix asymmetry that Hyman (2008) argues cross-linguistically correlates with a stem-word asymmetry: several phonological processes that apply within the stem domain, defined as **[stem-suffix=enclitic]**, fail to apply to prefixes. For example, Hildebrandt (2007) establishes that an *l*~*r* alternation (*l* is realized as *r* if it occurs intervocalically or after a glottal stop and preceding a vowel) applies systematically across stem-internal morpheme boundaries but fails to apply if the first vowel is in a prefix:

¹⁶ Bickel et al. (2009) and Hildebrandt (2007) show that four subphrasal domains are motivated by the **prefix-stem-suffix=clitic** string in Limbu. However, as they note, since two of the domains are morpheme-specific, they are not likely candidates for inclusion in a universal prosodic hierarchy. Therefore, they are not discussed here.

- (22) Limbu *l~r* alternation (Hildebrandt 2007: 11–13)
l~r alternation applies to stem-internal suffixes, *b* and *le*
- (a) $k\epsilon$ -ni:tt-u-**rɔ** ‘may you understand!’
 2-understand-3P-OPT
 Cf. $k\epsilon$ -bɔ:ŋ-**lb** ‘may you become...’
 2-become-OPT
- (b) anige-**rɛ**-n Yan ‘our money’
 ‘we-GEN-ABS’ Money
 Cf. a-mik-**le** ‘with my eyes’
 1poss-eye-inst
l~r alternation fails to apply across prefix-stem juncture (*l*)
- (c) ku-[la:p ‘its wing’ (*ku-ra:p)
- (d) $k\epsilon$ -[lept-u ‘you threw it’ (* $k\epsilon$ -rept-u)

Prefixes are also outside the domain of stress assignment. As shown in the examples below, the stem-initial syllable is assigned main stress (and secondary stress is assigned to non-initial, stem-internal bimoraic syllables). Prefixes are not stressed unless they must be recruited to satisfy a disyllabic minimality condition on footing (see Bickel et al. 2009, Hildebrandt 2007, and Schiering et al. 2010 for discussion):

- (23) Limbu stress patterns (Hildebrandt 2007: 14); ‘[’ indicates the left stem edge
- (a) [tʰaŋ -ŋaŋ -ŋã: ‘I come up also ...’
 come.up.s2-1SGNAPA-ALSO
- (b) $k\epsilon$ -[sira - dhaŋ = ŋi: ‘Do you like it?’
 2-pleasure-come.up=Q

Finally, different vowel hiatus resolution strategies apply at the prefix-stem juncture than stem-internally.¹⁷ Vowel sequences can occur stem-internally, and are analyzed as diphthongs in Schiering et al. (2010). However, at the prefix-stem juncture, such diphthongal vowel sequences are never found. All stems (and words) must begin with a consonant, and Schiering et al. (2010) posit that stem-initial and word-initial glottal stops occur to satisfy this constraint:

¹⁷ Recall from the preceding section that Casali (1999, 2011) demonstrates that it is cross-linguistically very common for stem-initial vowels not to be deleted in hiatus contexts.

- (24) Glottal stop insertion vs. diphthongal vowel sequences across different morpheme boundaries (Schiering et al. 2010: 691, fig. (30))

Prefix-[stem boundary Stem-internal boundary (diphthongization)

(a)	ku-ʔe:k
3POSS-back
'its/her/his back'	ʔa-[mphu-e:
1POSS-brother-VOC
'Brother!'
(b)	ʔa-ʔe:k
1POSS-back
'my back'	[yuma-e:
grandmother-VOC
'Grandma!'
(c)	ke-ʔim
2-sleep
'you sleep'	[naks-ɛ=i:
go.crazy-PST=Q
'Has he gone crazy?'
(d)	ʔa-ʔi:r-ɛ
1-wander-PST
'we wandered'	[nu-ba=i:
be.alright-NOM=Q
'Is this good?'

The prefix-suffix/enclitic asymmetry motivated by this data clearly illustrates Hyman's (2008) stem-word asymmetry in (2), and it can easily be modeled in prosodic structure theory as a PStem-PWord distinction. That is, the **[stem-suffix=enclitic]** string is parsed as PStem, while the prefixes are parsed outside of PStem, into PWord:

- (25) (_{PWord} Prefix (_{PStem} Stem-Suffix=Enclitic))

Because some phonological processes apply to PStem, excluding prefixes, recursive PWord is not a satisfactory alternative parse to the one in (25), for reasons taken up in detail in Section 3.2, above.

In fact, Schiering et al. (2010) acknowledge that the **[stem-suffix=enclitic]** domain could potentially be parsed as PStem. Their main argument against this analysis is that enclitics are syntactically phrasal elements and therefore not plausibly prosodified into a sub-phrasal prosodic constituent. However, phrasal clitics are actually quite commonly prosodified within a subphrasal prosodic constituent. For example, enclitics such as reduced auxiliaries in English (e.g., =s for *is* or *has*) are also clearly syntactic elements, yet they arguably prosodify into PWord, since they undergo the same word-bound phonological processes as phonologically identical suffixes do. (See, e.g., Kaisse 1983, Selkirk 1995 for discussion.)

Positive empirical motivation for parsing prefixes into a PWord domain with PStem in Limbu is provided by the process of labial assimilation (coronal stops and nasals assimilate in place to a following labial consonant). As shown by the

following data, this process can apply across any morpheme boundary, including the prefix-stem boundary:

- (26) Anticipatory labial assimilation across different morpheme boundaries (Hildebrandt 2007: fig. (25))
- (a) prefix-[stem
/mɛ-n-[mɛt-baŋ / → mɛ-**m**-[mɛp-paŋ
NEG-NEG-tell-1S→3/PT-PF
'I did not tell him'
- (b) [stem-suffix
/ke:t-ma?/ → ke:**p**-ma?
insert-NOM
'to insert'
- (c) suffix-suffix
/[si-aŋ-mɛn-pa/ → sjaŋ-m**em**-ba
die-1sS.PST-COND-IPF
'I might die'
- (d) [stem = enclitic
/myaŋluŋ=phelle hɛn = phelle/ → mjaŋluŋ = belle
h**em** = bhelle
myaŋluŋ=SUB what = SUB
'What does *Myaŋluŋ* mean?'

Because labial assimilation applies to both prefixes and stems, it is not plausible to parse prefixes into CG, external to PWord, as in (27):

- (27) (CG Prefix (PWORD Stem-Suffix=Enclitic))

This parse fails to formalize the generalization that prefixes are affected by word-bound phonological processes.

Hildebrandt's (2007) discussion of the phonology of nominal compounds provides additional empirical evidence that labial assimilation applies within the PWord domain, not the CG domain. As Hildebrandt shows, the members of nominal compounds must be parsed into distinct prosodic domains to account for the fact that labial assimilation – a process that we have just seen applies across all PWord internal morpheme boundaries – does not apply across the members of a compound. The *l~r* alternation illustrated in (22), above, also fails to apply across a nominal compound boundary, as we would expect since it applies only within PStem:

- (28) (a) Labial assimilation does not apply across members of a compound (Hildebrandt 2007: fig. (28))
 /a:kkhen + be:la/ → a:kkhen + be:la (*a:kkhem + bela)
 how.much + time (Nepali)
 ‘at which time’
- (b) *l~r* alternation does not apply across members of a compound (Hildebrandt 2007: fig. (27))
 haʔ + lunj (*runj)
 fire + stone/tooth
 ‘ceremonial fireplace’
 ma:khi + lam (*ram)
 blood + road
 ‘artery’

We conclude that Limbu nominal compounds are two-domain compounds: prosodically separate domains, even though they show the syntactic and semantic cohesion which define compounds as single lexical words.¹⁸ To formalize this generalization, we propose, following work like Vigário (2010) and Vogel (2010, 2012, 2018, 2019), that each member of the compound is parsed into PWord. This accounts for the fact that labial assimilation, a PWord-bound process, does not apply across members of the compound. The entire compound is parsed into CG (8):

- (29) (CG (PWord X) (PWord X))

If prefixes were parsed into CG, as in (27), it would be impossible to account for why labial assimilation applies across prefix-stem boundaries, but not across members of a compound. If labial assimilation applies across a PWord boundary following a prefix, all things being equal, it should also apply across a PWord boundary following the first member of a compound. Another alternative analysis is to parse the compound into recursive PWords, as schematized in (30), below:

- (30) (PWord (PWord X) (PWord X))

This parse would face the usual problems posed for PWord recursion by two-domain compounds, which are discussed at length in Vigário (2010) and Vogel (2010, 2012, 2018, 2019). Labial assimilation is blocked between members of a compound, even though each recursion should have the same phonological properties in order to satisfy the well-formedness criteria holding of recursion in (2).

¹⁸ See Inkelas (2014) for a recent detailed overview of the cross-linguistic distinction between one-domain and two-domain compounds.

To sum up, Bickel et al. (2009), Hildebrandt (2007), and Schiering et al. (2010) demonstrate that Limbu phonology provides evidence for three subphrasal prosodic constituents, as schematized in (31):

- (31) (PWORD Prefix (PSTEM Root-Suffix=Enclitic))
 (a) (CG (PWORD X) (PWORD X))

All three are needed to account for the distinct phonological behavior of prefixes vs. suffixes and enclitics, as well as the phonology of Limbu's two-domain nominal compounds.

5 Conclusion

To sum up, we have shown that there are good reasons why PStem must find a place even in a parsimonious Prosodic Hierarchy. PStem cannot easily be replaced by recursive PWord, as work like Ito and Mester (2009a, b, 2012, 2013) and Selkirk (2009, 2011) propose, or by a CG-PWord distinction, as Vigário (2010) and Vogel (2009a, 2009b) suggest. The cross-linguistic validity of a PStem-PWord distinction has been supported by showing that it accounts for a robust generalization concerning subphrasal phonological domains. It is cross-linguistically common for one set of affixes within a grammatical word to form a distinct phonological domain from their base of affixation, while another set of affixes is phonologically better integrated with the base. This phenomenon, which is often characterized as a stem domain vs. word domain asymmetry, is straightforwardly accounted for in prosodic structure theory by parsing the stem domain as PStem and the word domain as PWord. Alternatives to PStem were shown to not only miss this generalization but also were formally problematic. Replacing PStem with (minimal) PWord makes it extremely difficult to identify a cross-linguistically valid, coherent set of properties defining (minimal) PWord. As work like Vigário (2010), Vogel (2009a, 2009b, 2012, 2019) have strongly argued, replacing distinctions like PStem-PWord with recursive PWord often leads to a theoretically incoherent definition of recursion. In addition, as Schiering et al. (2010: 699) argue, recursion is far too powerful. It predicts an unlimited number of subphrasal domains, whereas far fewer are robustly attested. We have proposed that, in fact, only three are commonly attested (see, too, van der Hulst 2010), and that PStem is clearly one of them.

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