

# Edge-based prosodic mapping and the prefix-stem boundary in Huave<sup>\*</sup>

Yuni Kim

University of Manchester

## 1. Introduction

It is common to find phonological processes that apply within a stem-plus-suffix constituent but treat prefixes as invisible, motivating a phonological domain boundary at the prefix-stem juncture. This kind of morphologically defined phonological domain is found in Polish (Booij & Rubach 1984), Hungarian (Nespor & Vogel 1986), Indonesian (Cohn 1989), Itelmen (Bobaljik & Wurmbrand 2001), and Bantu languages (Hyman 2008), to name but a few examples. The formal basis of this phenomenon, or whether a unified one exists at all, is unclear: potentially it could follow straightforwardly from morphophonological cyclicity (see Bermúdez-Otero 2011:§4 and Scheer 2011:§749), or even arise epiphenomenally from independent phonological principles (van Oostendorp 2004 on Dutch).

In some cases, the stem-plus-suffix domain is demonstrably not a morphological constituent, giving rise to a mismatch between morphological and phonological structure (see e.g. Hall & Kleinhenz 1999). Here, the Prosodic Hierarchy (Nespor & Vogel 1986) permits a representational analysis in which the stem and suffixes form a Prosodic Word (PrWord) to the exclusion of prefixes. The PrWord can then provide a domain for phonological processes. Many analyses simply state that prefixes are independent PrWords or otherwise excluded from a following PrWord (see Hall 1999:16). However, if we assume that “prefix” is a surface-descriptive label rather than a true primitive of morphological representation (e.g. “[±prefix]”), this means that the formal procedure for mapping morphosyntax to prosody is left as an open question.

Where the mapping algorithm is explicitly problematized, one approach prespecifies PrWord status in the lexical entries of prefixes (Wennerstrom 1993 on English) or within the relevant Vocabulary Insertion rules (Gribanova & Blumenfeld 2013 on Russian). Alternatively, Cohn (1989) argues for the application of Selkirk’s (1986) asymmetrical

---

<sup>\*</sup> Thanks to all the Huave people who have taught and helped me in San Francisco del Mar, and thanks to audiences at SOAS, Tromsø, Edinburgh, Cambridge, and NELS 45 for valuable feedback. Fieldwork was sponsored by the Salus Mundi Foundation and an LLC Research Support Fund grant from the University of Manchester. I am solely responsible for any errors.

edge-based mapping theory to the prefix-stem boundary in Indonesian. In this analysis, a left-edge PrWord boundary is inserted at the left edge of a stem. Because the right edge is determined separately, the eventual PrWord will not necessarily be isomorphic with a morphological constituent. Peperkamp (1995) develops a similar analysis for Italian using Generalized Alignment (McCarthy & Prince 1994) within OT.

This paper examines the formal structure of morphology-prosody mapping in light of recent syntax-prosody interface research that contrasts edge-based Alignment (Downing 2010, Cheng & Downing 2012) with the more restrictive Match Theory (Selkirk 2011). In principle, these theories are applicable not only to sentence-level phrasing, but to any level of the Prosodic Hierarchy that is sensitive to morphosyntax, including the lowest such level – the PrWord – where the comparison has received less attention.<sup>1</sup> I therefore test their predictions against novel data from Huave, a language isolate of Oaxaca State, Mexico, where prefixes are invisible to a phonological process that operates within the stem-plus-suffixes domain (and where the latter is not a morphological constituent).

Huave presents a unique opportunity to disambiguate hierarchical morphological structure from linear position due to its “mobile affixes,” whose surface position as prefixes or suffixes is conditioned phonologically (Noyer 1994, Kim 2010). Since there is no morphological or lexical difference between prefixal and suffixal realizations, their asymmetrical behavior in PrWord formation must follow from linear considerations alone. This state of affairs presents challenges for recent proposals for morphology-prosody mapping that derive apparent non-isomorphism from underlying properties of the affixes (Newell 2008, Shwayder 2015). Turning to prosodic analyses, I argue that the Huave data are inconsistent with Match Theory, which predicts that non-isomorphism arises only to avoid phonological markedness (Selkirk 2011:§3). Rather, Huave provides evidence in favor of edge-based Alignment as a mechanism of PrWord formation.

All data are from the Huave variety of San Francisco del Mar (Kim 2008) and were collected by the author during fieldwork trips between 2004 and 2013. The structure of the paper is as follows. In §2, I show how the exclusion of prefixes from a process of vowel copy leads to a morphological bracketing paradox that requires recourse to the Prosodic Hierarchy. In §3 I develop an edge-based analysis and contrast it with a Match Theory approach. Word-minimality effects provide evidence in favor of implementing Edge-based Alignment with violable constraints; I also show how the current PrWord proposal solves a residual mystery in the analysis of mobile affix placement. To conclude, I consider some facts that may point to native-speaker intuitions about prosodic constituency, and suggest general connections between PrWord formation and other edge-based analyses of phonological and grammatical phenomena.

## 2. A Huave bracketing paradox

The basic Huave phenomenon to be accounted for is the invisibility of prefixes to vowel-copy epenthesis. The example in (1) demonstrates normal application of vowel copy between a stem and a suffix: the epenthetic suffix vowel is a copy of the vowel in the preceding syllable. (Our focus is on intermediate forms, abstracting away from surface

---

<sup>1</sup> The parallel between phrase and word levels is probably not perfect. As pointed out to me by Francis Nolan, speech rate often induces variability in prosodic phrasing, but perhaps not in PrWord formation.

*Edge-based prosodic mapping in Huave*

diphthongization of front vowels before non-palatalized consonants. However, actual surface forms are provided for completeness.)

- (1) /tʰehk<sup>j</sup>-t/ → tʰehk<sup>j</sup>-et [ʌehkʲat]  
 open-CPL<sup>2</sup>  
 ‘(it) opened’

In the phonotactically similar environment in (2), where the initial syllable consists of prefixes rather than a stem, vowel copy fails. A default vowel [i] is inserted instead. The vowel is front due to a requirement for onsets and nuclei to match in palatality, but it does not take features from the preceding [e].

- (2) /t-e-htʃ-n/ → t<sup>j</sup>-e-htʃ-in [cehtʃjən]  
 CPL-2-give-PL  
 ‘you (pl.) gave (it)’

The example in (3) demonstrates the default status of [i], in that it also appears in other contexts where vowel copy fails. The requirement for onsets to match nuclei for frontness or backness takes precedence over vowel copy, so back vowel cannot copy across a palatalized consonant, and [i] is inserted instead (Kim 2008: ch.4).

- (3) /t-e-kotʃ-n/ → t<sup>j</sup>-e-kotʃ-in [cekotʃjən]  
 CPL-2-scratch-PL  
 ‘you (pl.) scratched (it)’

The invisibility of prefixes to vowel copy becomes relevant only on very short stems, as in (2), where a prefix vowel and epenthetic suffix vowel end up in adjacent syllables. Furthermore, the failure of vowel copy is evident only with the second-person prefix *e-*; other prefixes would either yield no difference between copied and default vowels (subject/agent theme vowel *a-*, second-person *i-*<sup>3</sup>), or be incompatible with the few attested monosegmental roots of the same [±back] value (valence reducer *u-*). Although the number of key examples like (2) is therefore limited, a couple more are given in (4).

- (4) a. /t-e-w<sup>j</sup>-n/ → t<sup>j</sup>-e-w<sup>j</sup>-in [cewʲən]  
 CPL-2-borrow-PL  
 ‘you (pl.) borrowed (it)’  
 b. /m-e-t<sup>j</sup>-n/ → m-e-t<sup>j</sup>-in [mecʲən]  
 SUB-2-eat-PL  
 ‘(that) you (pl.) eat (it)’

---

2 Abbreviations: CAUS=causative, CPL=completive, FUT=future, ITR=intransitive, 2ITR=second-person intransitive, PERF=perfect, PL=plural, POSS=possessive, PROG=progressive, STAT=stative, SUB=subordinate, 1SUB=first-person subordinate, TV=theme vowel.

3 The second-person allomorph *i-* appears in the absence of other Layer 1 prefixes; where these occur, the allomorph *e-* is found (Kim 2008:250).

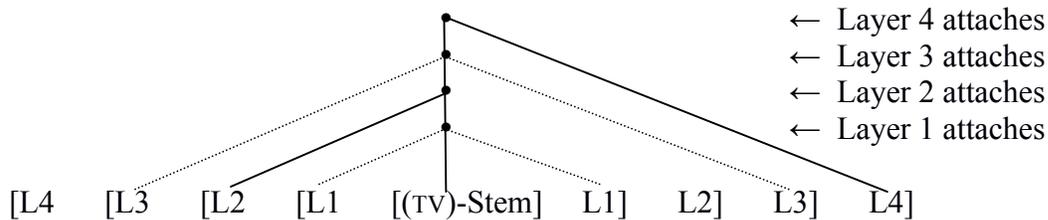
Crucially, we have evidence that the prefixes in (2)-(4) attach earlier than the plural (PL) suffix *-n*. Because hierarchical morphological structure groups the prefixes and stem together in these examples, to the exclusion of the suffix, we have a bracketing paradox. This is illustrated in (5), using the example from (4a).

- (5) *Morphological bracketing*  
 a.  $[[t^j\text{-}e\text{-}[w^j]]\text{-in}]$   
 CPL-2-borrow-PL

- Phonological bracketing*  
 b.  $[t^j\text{-}e\text{-}[[w^j]\text{-in}]]$   
 CPL-2-borrow-PL

In Huave, the reason we have direct morphological evidence for the relative order of attachment between prefixes and suffixes is that some affixes are mobile, switching their linear position in the word based on phonological factors (Noyer 1994, Kim 2010). This can be seen with the completive *-t-*, which is a suffix in (1) but a prefix in (2). Nevertheless, mobile affixes surface at a consistent distance from the stem, so that it is possible to diagnose early-attaching inner affixes that are close to the stem (no matter on which side), and late-attaching outer affixes that are always farther away. This structure can be captured in a “layer model” with flexible direction of branching, shown in (6).

- (6) *Layer model of Huave word structure (Kim 2010)*



- a. **s-** **i-** **n-** a-raŋ(g)  
 1 FUT 1SUB TV-do  
 ‘I will do (it)’
- b. pahk -at-u -s -un  
 face.up CPL-ITR 1 PL  
 ‘we (excl.) lay down face up’
- c. **i-** **m-** a-raŋ(g)  
 FUT SUB TV-do  
 ‘s/he will do (it)’
- d. **t-e-** w<sup>j</sup> -in  
 CPL-2 borrow PL  
 ‘you (pl.) borrowed (it)’

### *Edge-based prosodic mapping in Huave*

The dashed lines represent the mobility of affixes in Layers 1 and 3 (mobile affixes boldfaced), while Layers 2 and 4 contain only fixed prefixes and suffixes that surface in the relevant order with respect to mobile affixes. The basic generalization in Kim (2010) is that consonantal mobile affixes attach as prefixes to a vowel-initial base (except where this is a stem vowel; see §3.2) but as suffixes to a consonant-initial base.<sup>4</sup> The Layer 1 subordinate affixes (1SUB and SUB) thus attach as prefixes in (6ac), but the Layer 1 completive attaches as a prefix in (6b), where the base is consonant-initial. Similarly, the Layer 3 first-person affix is able to attach to the vocalic prefix in (6a), but is relegated to suffixal status in (6b). Epenthetic suffix vowels are italicized.

The affix ordering exemplified in (6b) provides key evidence that the completive *t* is an early-attaching affix, while the plural suffix *n* is in Layer 4, attaching even outside the mobile first-person *s* in Layer 3. As a consequence, we can see in (6d) that the invisibility of Layer 1 prefixes to vowel-copy epenthesis in the Layer 4 suffix cannot be for reasons of morphological structure.

Suffix vowels trigger vowel copy on following suffixes, as shown in (7), so we cannot appeal to root-control mechanisms to explain the prefixal inertness. Example (7b) shows that only the immediately preceding VC sequence matters for vowel copy, supporting the idea that the final epenthetic vowel in (7a) is copied from the preceding epenthetic vowel rather than from the stem.

- (7) a. t-a-ndok-**os-on**  
CPL-TV-fish-1-PL  
'we (excl.) fished (it)'
- b. t-a-un<sup>1</sup>-**is-an**  
CPL-TV-buy-1-PL  
'we (excl.) bought (it)'

I conclude that it is desirable to define a Prosodic Word that encompasses the stem plus suffixes, to the exclusion of prefixes. Huave morphology conspires to prevent us from demonstrating perfect asymmetry between prefixal and suffixal realizations of the same mobile affix – i.e. the scenario where the same second-person vowel *e-* is invisible to vowel copy as a prefix, but a valid trigger as a suffix – because in suffixal position this affix is always followed by the intransitive *-u-*, as in (8), so there is no context for epenthesis. In any case, though, we lack positive evidence that prefix invisibility could be due to anything other than linear position in the word.

- (8) pahk-am-e-r-u-n  
face.up-SUB-2-2ITR-ITR-PL  
'(that) you (pl.) lie face up'

There have been recent attempts to derive phonological domains from an essentially cyclic or phase-based approach to Spell-Out, even where these domains are apparently non-isomorphic with morphosyntactic constituents. Newell (2008:ch. 4) proposes an

---

<sup>4</sup> The vocalic mobile affixes have some more complex behavior that is tied to the rest of Layer 1; see Kim (2008:ch. 6) and Kim (2010) for further discussion.

operation of Late Adjunction to resolve morphology-phonology bracketing paradoxes in several languages. In Late Adjunction, a morphological adjunct (defined as any  $X^0$  that is both non-projecting and not selected for) can be interpreted prior to acyclically merging with the rest of the word. The prediction is that bracketing paradoxes can only arise if the phonologically non-participating morpheme fulfills the adjunct criteria. For Huave, this option does not seem possible, not only due to the arguably projecting nature of the morphemes involved, but also because it predicts that mobile affixes should have the same prosodic structure regardless of prefixal or suffixal status. Shwayder (2015:ch. 3) also makes use of additional operations to argue for a direct relationship between morphosyntactic and phonological domains; however, I have not found evidence for a deeper structural difference between prefixal and suffixal realizations of mobile affixes in Huave. In the following section, I therefore focus on comparing theories that assume an ontological distinction between morphosyntactic and prosodic structures.

### 3. Analysis

#### 3.1 Match Theory versus Alignment

At the heart of the debate between Match Theory (Selkirk 2011) and Alignment (Selkirk 1986, Peperkamp 1995, Cheng & Downing 2012) is whether the morphosyntax-phonology interface has access to constituents as such, or merely their edges. A constituent-based analysis such as Match Theory is more restrictive, since the visibility of a constituent more or less boils down to the simultaneous visibility of both its left and right edges, whereas Alignment analyses can treat each edge differently.

Selkirk (2011) posits a set of violable constraints that demand syntax-phonology isomorphism on three different levels, shown in (9) – the intonational phrase, the phonological phrase, and the phonological word – that are hypothesized to be universal.

- (9)
- a. Syntactic clause  $\leftrightarrow$  Intonational phrase ( $\iota$ )
  - b. Syntactic phrase  $\leftrightarrow$  Phonological phrase ( $\varphi$ )
  - c. Syntactic word  $\leftrightarrow$  Phonological word ( $\omega$ )

In a number of languages, non-isomorphism between morphosyntactic and prosodic constituents can be successfully analyzed by ranking prosodic well-formedness constraints above the Match constraints. An example is shown in (10), taken from Selkirk’s (2011) analysis of Xitsonga phrasing.

(10) *Prosodic well-formedness outranks Match (Selkirk 2011:§2.1.2)*

clause[ [ verb [ noun ] <sub>NP</sub> ] <sub>VP</sub> ] <sub>clause</sub>	BinMin ( $\varphi, \omega$ )	Match (Phrase, $\varphi$ )
a. $\iota(\varphi(\text{verb } \varphi(\text{noun})_{\varphi})_{\varphi})_{\iota}$	*!	
→ b. $\iota(\varphi(\text{verb noun})_{\varphi})_{\iota}$		*

In the tableau in (10), the (9b) preference for syntactic and phonological phrases to be coextensive, formalized as a constraint Match (Phrase,  $\varphi$ ), is violated in order to satisfy a higher-ranked Binary Minimality constraint. The prosodic constraint types identified by

*Edge-based prosodic mapping in Huave*

Selkirk (2011) as interacting with Match constraints include, aside from minimality, left-edge strengthening (StrongStart), stress assignment, and tonal prominence.

The problem in Huave is that there is no prosodic difference among the words in (11), aside from the fact that their morphological structure causes them to be parsed differently in terms of the Prosodic Hierarchy. In examples (11ab), vowel copy between a stem and epenthetic suffix vowel is successful, while (11c) repeats an example where vowel copy between a prefix and epenthetic suffix vowel is blocked.

- (11) a. wehk<sup>j</sup>-et [wehkjat]  
born-CPL  
's/he was born'
- b. ʰehk<sup>j</sup>-en [ʰehkjan]  
open-STAT  
'(it) is open'
- c. m-e-htʃ-in [mehtʃən]  
SUB-2-give-PL  
'(that) you (pl.) give (it)'

Huave has fixed final-syllable stress, and all the words in (11) are disyllabic with a CVhCVC structure. There does not seem to be any phonological factor that would favor distinct prosodifications of (11ab) from (11c), or that would motivate any mapping other than an isomorphic one where the morphological word is contained in a single PrWord.

What is needed is an asymmetrical targeting of the left edge of the stem. Following Peperkamp (1995: 227), an ALIGN constraint is defined in (12).

- (12) ALIGN (Stem, L; PrWd, L)  
Align the left edge of the stem with the left edge of the PrWord.

The constraint in (12) favors candidates with a PrWord-initiating boundary inserted at the beginning of the stem. A sufficiently high ranking of ALIGN (Stem, L; PrWd, L) will therefore yield outputs of the type in (13).

- (13) a. <sub>ω</sub>[wehk<sup>j</sup>-et]  
born-CPL
- b. <sub>ω</sub>[ʰehk<sup>j</sup>-en]  
open-STAT
- c. m-e-<sub>ω</sub>[w<sup>j</sup>-in]  
SUB-2-borrow-PL

Right-edge PrWord boundaries are assumed to be inserted at the ends of the words by default, and the prosodification of the prefixes in (13c) is left unspecified; but the key difference is in the placement of the left edge of the PrWord.

Another analysis based on single-edge marking, but in a derivational framework, is offered by D'Alessandro & Scheer (2013). They propose that phonological boundaries

can be inserted at Spell-Out as marks on phase heads or their complements. These marks are inserted at one edge only. In the Huave case, spellout of the stem could insert a phonological boundary at the root's left edge. A partial derivation with the key stages is shown in (14). As in (13), I assume that the Layer 4 output is subject to further operations that would e.g. add the right-hand PrWord boundary to complete the prosodification.

(14)	Stem	L1+Stem	L1+Stem+L4
	$\omega[w^j]$	t-e $\omega[w^j]$	t-e- $\omega[w^j]$ -in
	borrow	CPL-2-borrow	CPL-2-borrow-PL

D'Alessandro & Scheer (2013) argue against diacritic boundary symbols such as # and  $\omega[$  on the grounds that they are not independently motivated phonological objects, and that they overgenerate because there are no constraints on what kinds of effects they are able to trigger. They propose that empty skeletal slots are the carriers of boundary information, such that the  $\omega[$  boundaries in (14) should instead be replaced by a featurally empty skeletal slot, along the lines of  $Xw^j \rightarrow t-e-Xw^j \rightarrow t-e-Xw^j-in$ .

While the main point of this subsection has been to demonstrate the necessity of an asymmetrical edge-based approach to the Huave PrWord, we see that some analytical choices remain: a constraint-based or non-constraint-based approach, diacritic or non-diacritic representation of prosodic boundaries, and cyclic versus global evaluation. Next I will consider evidence that favors violable constraints, diacritic boundary representations, and cyclicity.

### 3.2 Violability of ALIGN

An apparent exception to the placement of PrWord boundary at the left edge of a stem, i.e. where ALIGN (Stem, L; PrWd, L) is violated, is in CVC monosyllables that consists of prefixal CV and a monosegmental stem that forms the coda C. Two examples of this configuration are shown in (15).

(15)	a.	/t-e-w <sup>j</sup> /	→	t <sup>j</sup> -e-w <sup>j</sup>	[cew]
		CPL-2-borrow			
		'you (sg.) borrowed (it)'			
	b.	/t-e-mb/	→	t <sup>j</sup> -e-mb	[cjam]
		CPL-2-go			
		'you (sg.) went'			

LAYEREDNESS states that no prosodic category can dominate a category that is higher in the Prosodic Hierarchy; it is thought to be an inviolable constraint (Selkirk 1996). However, in the prosodification in (16a), which would satisfy ALIGN (Stem, L; PrWd, L), the PrWord is smaller than the syllable. The winning candidate should be (16b), where the PrWord exceptionally includes prefixes.

There is Huave-internal evidence for the absence of a PrWord boundary between the prefixes and stem in (15) and (16). Looking at the actual surface form in (15b), we see diphthongization of /e/ → [ja] due to the non-palatalized status of the coda consonant.

*Edge-based prosodic mapping in Huave*

This process applies only to tautosyllabic VC sequences, never across syllable or word boundaries. The direct interaction between the prefix V and stem C suggests that they are in the same domain. In contrast, no phonological process is known to apply between prefix vowels and stem-initial consonants in disyllabic and longer words. (A caveat is that this may be mainly because resyllabification of stem-initial consonants removes the environment for diphthongization.)

(16) *Monosyllabic prefixed forms*

t <sup>j</sup> -e-mb	LAYEREDNESS	ALIGN (Stem, L; PrWd, L)
a. t <sup>j</sup> -e- <sub>ω</sub> [mb]	*!	
→ b. <sub>ω</sub> [t <sup>j</sup> -e-mb]		*

The violability of ALIGN thus supports a constraint-based analysis. It is important to note that an ALIGN violation would not have been the only option for satisfying LAYEREDNESS. In fact, Huave has strategies for augmenting subminimal forms elsewhere in the morphophonology. Example (17) illustrates a requirement that the stem not be tautosyllabic with outer (Layer 4) affixes.

- (17) a. /d<sup>j</sup>-a-hints/ → d<sup>j</sup>-a-hints [ja.hjənts]  
 PROG-TV-cry  
 ‘s/he is crying’
- b. /d<sup>j</sup>-a-w/ → d<sup>j</sup>-a-aw [ja.aw]  
 PROG-TV-exit  
 ‘s/he or it is exiting’
- c. /l-i-mb/ → l<sup>j</sup>-i-imb [li.jəm]  
 PERF-2-go  
 ‘you (sg.) have gone’

In (17bc), existing prefix vowels are copied in order to augment the stem. The absence of this augmentation option in monosyllabic prefixed forms as in (15) and (16) points to the fact that ALIGN is outranked by anti-epenthesis DEP constraints. The low relative ranking of ALIGN must be accounted for as a language-specific fact of Huave, and not purely in terms of universal well-formedness conditions.

The facts about the violability of ALIGN would appear to support a diacritic representation of the PrWord boundary. D’Alessandro & Scheer (2013) posit empty X slots at the left edge of certain phase heads in Abruzzese, and argue that these skeletal slots both do all the work that a diacritic boundary would do and make further correct predictions. In Huave, the phonological domain boundary changes places depending on prosodic factors. Although the default is for it to be at the left edge of the stem, it may deviate from this position to satisfy LAYEREDNESS and high-ranked faithfulness constraints. If an empty X slot were inserted at the left edge upon spell-out of the stem, there would be no obvious way to motivate its deletion or migration on a subsequent cycle. We also assume that the X-slot insertion process would not be able to look ahead

to phonological conditioning from yet-to-be spelled-out affixes, i.e. could not show outward sensitivity in order to prevent application in forms like in (15). In contrast, diacritic boundaries can be reconfigured on subsequent cycles according to more global well-formedness considerations as in (16), similarly to Peperkamp's (1995) monostratal analysis of Italian. Newell (2008:131) and Newell & Piggott (2014:353) achieve similar results by proposing post-spellout mergers where minimality conditions on PrWords can trigger incorporation of additional material into a subminimal PrWord.

An advantage of inserting PrWord boundaries cyclically and recalculating them on subsequent cycles is that it may give an explanation for why mobile affixes attach as prefixes only to base-initial vowels that are not part of the stem. Kim (2015) discusses the contrast between VC bases that consist of a VC stem (18a) and those that consist of a theme vowel plus monosegmental stem (18b, where the stem is a prenasalized stop).

- (18) a. /uj/ + /m/ →  $_{\omega}$ [uj-um      \*m- $_{\omega}$ [uj  
           spin + SUB            spin-SUB            SUB-spin  
           'that (it) spins'
- b. /a-mb/ + /m/ → m-a- $_{\omega}$ [mb      \*a- $_{\omega}$ [mb-am  
           TV-go + SUB            SUB-TV-go            TV-go-SUB  
           'that (s/he, it) goes'

There is no prosodic difference between the bases in (18ab) that could trigger different mobile affix placement through purely phonological conditioning, other than the possibility of PrWord boundaries that are shown at the left edges of the stems and could indirectly carry morphosyntactic information into the phonology. The correct forms in (18) could be derived from a condition that licenses prefixal realizations of mobile affixes only if the resulting prefix sequences are well-formed (at the time of attachment) as an independent prosodic unit such as a syllable. The single consonant *m-* in (18a) would be subminimal, while the theme vowel in (18b) would form a syllabic nucleus and permit the affix to cohere. Although the form in (18b) is monosyllabic and would presumably be reconfigured as a single PrWord in the word-level phonology, there is arguably sensitivity to an intermediate stage with a PrWord boundary at the left edge of the stem. This prosodic analysis preserves Indirect Reference (Inkelas 1989) without going down the less desirable modularity-preserving route of considering prefixal and suffixal realizations of mobile affixes to be suppletive allomorphs (see Kim 2015).

### 3.3 Predictions

An empirical prediction of the current analysis is that the posited prosodic boundaries should be phonetically observable (Turk & Shattuck-Hufnagel 2000). It may also be possible to test the psycholinguistic reality of the relevant chunks. Informally, I have observed that speakers will often pause at the prefix-stem juncture or elongate the final prefix vowel when hesitating in speech, but I have the impression that similar hesitations between stems and suffixes are much less frequent and prominent; a phonetic corpus study would be needed to establish this phenomenon quantitatively.

A circumstantial observation in support of the separate prosodification of prefixes is that people in San Francisco del Mar tend to write prefixes separated by a space from the stem and suffixes. In a 2010 story pamphlet *Verdades de Ta Luis Vargas* produced by the Centro Comunitario de Alfabetización en Lengua Originaria Umbeyats in San Francisco del Mar, 28 of 32 Layer 1-prefixed verbs are written with separate prefixes, as in (19). The orthographically rendered version is shown in the first line.

- (19) **ta mulyich**            wix    tiol    umbe            **ta tach**            **ma sap**  
t-a-mul<sup>l</sup>-itʃ            wɨʃ    tʰil    u-mbe            t-a-tatʃ            m-a-sap  
CPL-TV-enter-CAUS    hand    in            POSS-mouth    CPL-TV-reach    SUB-TV-grab  
'(He) put (his) hand into its mouth and was able to grab...'

The sole monosyllabic Layer 1-prefixed form in the story is written as a single word, in accordance with the analysis in §3.2 that treats such forms as single PrWords.

- (20) **max**<sup>5</sup>            yow    mi    wakax  
m-a-htʃ    iw    mi-    wakaf  
SUB-TV-give    water    POSS    cattle  
'(that he) gives water to his cattle'

#### 4. Conclusion

To summarize, I have argued that a linear approach to phonological domain formation, rather than a lexical or a deep morphological one, is required in Huave, where the same morpheme can surface as a prefix or suffix depending on phonological conditions and is prosodified differently in the two cases. A morphosyntax-prosody mapping algorithm in terms of asymmetric edge-based Alignment was proposed. This analysis produces a PrWord boundary at the prefix-stem juncture without reference to prefixes and suffixes as morphologically primitive categories, and also derives non-isomorphism between morphological words and PrWords in a way that is not predicted by Match Theory. A constraint-based implementation of the analysis was shown to be crucial for repairing subminimal structures.

Asymmetrical edge-based alignment in PrWord formation has parallels elsewhere in the Prosodic Hierarchy, both at the phrasal level (Cheng & Downing, to appear) and arguably also at lower levels, if we consider the Halle & Idsardi (1995) approach to building metrical structure. Wagner (2005:339) unites these two levels by using the Halle & Idsardi asymmetrical bracketing formalism to derive linearity-driven asymmetries in prosodic phrasing in Germanic. He observes that functors are phrased separately if preceding arguments, but phrased together with their arguments if placed after them, in an intriguing parallel to the Huave pattern. For the Benue-Congo language Nupe, Kandybowicz (2009) argues that Edge Features are crucial to the analysis of both deep syntax and the phonology-syntax interface.

It remains to be seen whether there are other cases in which prefix-suffix asymmetries in PrWord formation must be attributed to linear factors. Notably, the present analysis

---

5 The spelling of this word reflects an optional phonological process that reduces [htʃ] to [ʃ].

has not derived the cross-linguistic tendency for prefixes to be non-cohering and suffixes to be cohering in such asymmetries, and there is nothing about ALIGN(Stem, L; PrWd, L) that would prevent other conceivable constraints in the family, for example ALIGN(Stem, R; PrWd, R), from being high-ranked in some language. Although prosodically non-cohering suffixes are attested in languages like Kyirong Tibetan, as analyzed by Hall & Hildebrandt (2008), the prefixes of Kyirong Tibetan are also non-cohering, and in any case the cross-linguistic tendency remains. The issue has larger implications for linguistic structure: Himmelmann (2014) provides evidence that the typologically robust “suffixing preference” in morphology is caused by the more basic prefix-suffix asymmetry in PrWord formation, but the real source of the latter has yet to be diagnosed.

### References

- Bermúdez-Otero, Ricardo. 2011. Cyclicity. In *The Blackwell Companion to Phonology Volume 4*, eds. M. van Oostendorp, C. Ewen, E. Hume & K. Rice, 2019-2048. Oxford: Blackwell.
- Bobaljik, Jonathan & Susi Wurmbrand. 2001. Seven prefix-suffix asymmetries in Itelmen. In *Papers from the 37<sup>th</sup> Meeting of the Chicago Linguistic Society*, eds. M. Andronis, C. Ball, H. Elston and S. Neuvel, 205-219. Chicago: CLS.
- Booij, Geert & Jerzy Rubach. 1984. Morphological and prosodic domains in Lexical Phonology. *Phonology* 1:1-27.
- Cheng, Lisa & Laura Downing. 2012. Prosodic domains do not match Spell-Out domains. *McGill Working Papers in Linguistics* 22(1).
- Cheng, Lisa & Laura Downing. To appear. Phasal syntax = cyclic phonology? *Syntax*.
- Cohn, Abigail. 1989. Stress in Indonesian and bracketing paradoxes. *NLLT* 7(2): 167-216.
- D’Alessandro, Roberta & Tobias Scheer. 2013. Phase head marking. *Linguistic Analysis* 38(4): 305-330.
- Downing, Laura. 2010. An edge-based approach to the alignment of syntactic phases and prosodic phrases. *Transactions of the Philological Society* 108(3): 352-369.
- Hall, T. A. 1999. The Phonological Word: a review. In T. A. Hall & U. Kleinhenz (1999), eds., 1-22.
- Hall, T. A. & Kristine Hildebrandt. 2008. Phonological and morphological domains in Kyirong Tibetan. *Linguistics* 46(2): 215-248.
- Hall, T. A. & Ursula Kleinhenz (eds.). 1999. *Studies on the Phonological Word*. Amsterdam: John Benjamins.
- Halle, Morris & William Idsardi. 2005. General properties of stress and metrical structure. In *The Handbook of Phonological Theory*, ed. J. Goldsmith, 37-73. Oxford: Blackwell.
- Himmelmann, Nikolaus P. 2014. Asymmetries in the prosodic phrasing of function words: another look at the suffixing preference. *Language* 90(4): 927-960.
- Hyman, Larry. 2008. Directional asymmetries in the morphology and phonology of words, with special reference to Bantu. *Linguistics* 46(2): 309-349.
- Inkelas, Sharon. 1989. *Prosodic constituency in the lexicon*. PhD dissertation, Stanford University.
- Kandybowicz, Jason. 2009. Embracing edges: syntactic and phono-syntactic edge sensitivity in Nupe. *NLLT* 27: 305-344.

*Edge-based prosodic mapping in Huave*

- Kim, Yuni. 2008. *Topics in the phonology and morphology of San Francisco del Mar Huave*. PhD dissertation, UC Berkeley.
- Kim, Yuni. 2010. Phonological and morphological conditions on affix order in Huave. *Morphology* 20(1): 133-163.
- Kim, Yuni. 2015. Mobile affixation within a modular approach to the morphology-phonology interface. In *Affix Ordering Across Languages and Frameworks*, ed. S. Manova, 111-123. Oxford University Press.
- McCarthy, John & Alan Prince. 1994. Generalized alignment. In *Yearbook of Morphology 1993*, eds. G. Booij & J. van Marle, 79-153. Dordrecht: Kluwer.
- Nespor, Marina & Irene Vogel. 1986. *Prosodic Phonology*. Dordrecht: Foris.
- Newell, Heather. 2008. *Aspects of the Morphology and Phonology of Phases*. PhD dissertation, McGill University.
- Newell, Heather. & Glyne. Piggott. 2014. Interactions at the syntax-phonology interface: evidence from Ojibwe. *Lingua* 150: 332-362.
- Noyer, Rolf. 1994. Mobile affixes in Huave: optimality and morphological well-formedness. In *Proceedings of WCCFL 12*, eds. E. Duncan, D. Farkas & P. Spaelti, 67-82. Stanford: CSLI.
- Peperkamp, Sharon. 1995. Prosodic constraints in the derivational morphology of Italian. In *Yearbook of Morphology 1994*, eds. G. Booij and J. van Marle, 207-244. Dordrecht: Kluwer.
- Scheer, Tobias. 2011. *A Guide to Morphosyntax-Phonology Interface Theories*. Berlin: Mouton de Gruyter.
- Selkirk, Elisabeth. 1986. On derived domains in sentence phonology. *Phonology* 3: 371-405.
- Selkirk, Elisabeth. 1996. The prosodic structure of function words. In *Signal to Syntax: Bootstrapping from speech to grammar in early acquisition*, eds. J. L. Morgan and K. Demuth, 187-213. Mahwah, NJ: Lawrence Erlbaum Associates.
- Selkirk, Elisabeth. 2011. The syntax-phonology interface. In *The Handbook of Phonological Theory*, 2<sup>nd</sup> edition, eds. J. Goldsmith, J. Riggle and A. Yu. Oxford: Blackwell.
- Shwayder, Kobey. 2015. *Words and subwords: phonology in a piece-based syntactic morphology*. PhD dissertation, University of Pennsylvania.
- Turk, Alice & Stefanie Shattuck-Hufnagel. 2000. Word-boundary-related durational patterns in English. *Journal of Phonetics* 28: 397-440.
- van Oostendorp, Marc. 2004. Crossing morpheme boundaries in Dutch. *Lingua* 114(11): 1367-1400.
- Wagner, Michael. 2005. Asymmetries in prosodic domain formation. *MIT Working Papers in Linguistics* 49: 329-367.
- Wennerstrom, Ann. 1993. Focus on the prefix: evidence for word-internal prosodic words. *Phonology* 10: 309-324.

Yuni Kim  
yuni.kim@manchester.ac.uk