

Constraint domains in Optimality Theory

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Most work in Optimality Theory (Prince and Smolensky 1991, 1993) refers to only **one level of representation** (or, the UR and the SR). While there are exceptions — e.g. McCarthy and Prince (1993a) give three levels for Axininca Campa — most OT research focuses on the advantages of parallel derivation (which I will not repeat here). One reinterpretation of lexical levels is Lamontagne and Sherer (1993), who argue that the distinction between levels 1 and 2 in English is due to different **prosodification**: “level 1” suffixes join in the same word as the stem, while “level 2” suffixes are outside it.

- | | | | |
|-----|----------------|----------------|----------------------------|
| (1) | <i>English</i> | level 1 suffix | placid ity l _w |
| | | level 2 suffix | placid l _w ness |

This difference in prosodification is argued to follow from the fact that “level 2” suffixes are complete syllables (i.e. consonant-initial), while “level 1” suffixes are not and must join in the same word as the preceding consonant to satisfy syllabification requirements.

An analogous approach is not possible in all languages. In Kashaya, for example, affixes divide into five levels rather than two (Buckley 1994), and the affixes of these levels **cannot be prosodically defined**.

- | | | | | |
|-----|----------------|-----------------------|-------------|-----------------------|
| (2) | <i>Kashaya</i> | | V-initial | C-initial |
| | | some level 3 suffixes | eñ, ič, ala | w, ciñ, mac, mul, ʔta |
| | | some level 5 suffixes | em, iš, ela | w, šuw, ma, mela, ʔli |

In this paper I argue for a domains-based formalization of levels in the non-derivational OT framework.

Uses of levels

The intermediate representations that Lexical Phonology provides are quite useful in accounting for various patterns, e.g. Kashaya Iambic **Lengthening** in the strong branch of a foot (but not word-finally).

- | | | | | |
|-----|--------------------|---|-------------------------|-------------------------------|
| (3) | kel-ad-uwad-uced-u | → | (kelá·)(duwa·)(duce·)du | ‘keep peering here and there’ |
| | w-aq-ad-uced-u | → | (waqá·)(duce·)du | ‘keep going out!’ |
| | w-aqac-ed-uced-u | → | (waqá·)(cedu·)(cedu) | ‘keep going up!’ |
| (4) | kel-ad-uced-u | → | (kelá·)(duce·)du | ‘keep peering’ |
| | kel-mul-ad-uced-u | → | (kél)(mula·)(duce·)du | ‘keep peering around’ |
| | mo-mul-ad-uced-u | → | (momú·)(ladu·)(cedu) | ‘keep running around’ |

The following examples illustrate that suffixes *-p^hila*, *-eti*, *-ela* (among others) **fail to undergo lengthening** even when they are in the appropriate metrical position.

- | | | | | |
|-----|---|---|--|-----------------------------|
| (5) | kel-ala-p ^h ila | → | (kelá·)(lap ^h i)la | ‘after he peers down’ |
| | kel-c-ala-p ^h ila | → | (kél)(cala·)(p ^h ila) | ‘after he peeks down’ |
| | t-ala-meč-t ^h i-p ^h ila | → | (talá·)(meʔ)(t ^h ip ^h i)la | ‘after climbing up there’ |
| (6) | mo-mac-ed-eti | → | (momá·)(ced _e)ti | ‘although he runs in there’ |
| | mo-mac-eti | → | (momá·)(ceti) | ‘although he ran in there’ |
| (7) | mo-mac-ed-ela | → | (momá·)(ced _e)la | ‘I keep running in there’ |
| | mo-mac-ela | → | (momá·)(cela) | ‘I am running in there’ |
| | mo-mac-mela | → | (momác ^h)(mela) | ‘I ran in there’ |

This difference can be analyzed by subjecting the representation at **level 3** to a lengthening rule, which does not reapply in levels 4 and 5, where *-p^hila*, *-eti*, *-ela* are added (Buckley 1994).

- | | | | |
|-----|---------|--------------------------------|--|
| (8) | LEVEL 3 | (kela·) la | (lengthening) |
| | LEVEL 5 | (kela·)(lap ^h i) la | (suffix <i>-p^hila</i> ; lengthening no longer active) |

Drawbacks of levels

While necessary for the account in (8), intermediate representations have been criticized as complicated, abstract, and cognitively implausible. Particularly glaring is that a stepwise lexical phonology analysis (even assuming noncyclic levels) must make use of **final-consonant extrasyllabicity** at intermediate stages to account for provisionally stem-final consonants which do not behave as coda consonants (cf. Itô 1986, Rice 1990).

(9)	<i>right</i>	LEVEL 3	(<i>mo</i> ma·) <c>	(<i>lengthening</i>)
		LEVEL 5	(<i>mo</i> má·) (<i>ce</i> t <i>i</i>)	(<i>suffix -eti</i>)
(10)	<i>wrong</i>	LEVEL 3	(<i>mo</i> mac)	(<i>no lengthening in closed syllable</i>)
		LEVEL 5	*(<i>mo</i> má) (<i>ce</i> t <i>i</i>)	(<i>suffix -eti</i>)

The lengthening rule cannot be permitted to apply in level 5, as demonstrated in (8). But this prevents us from expressing directly the generalization that the rule simply **respects the surface syllabification**.

Another example is that the lexical process of **aspiration in the coda** (it feeds a lexical rule of debuccalization) must be prevented from applying to a stem-final stop which eventually surfaces in the onset. Note the alternations in the root-final /t/. (Cf. also the /c/ in (7).)

(11)	a.	<i>dahyut-i</i>	'break it! (<i>sg</i>)'
	b.	<i>dahyut^h-me?</i>	'break it! (<i>formal</i>)'

If there is a level of representation at which the level 5 suffix *-i* is not present — such as level 1 where *da-* is added — the stem-final C must be excluded from the coda there; else it would undergo Aspiration.

(12)	<i>right</i>	LEVEL 1, with <C>	<i>dah.yu</i> <t>	<i>dah.yu</i> <t>
		LEVEL 5	<i>dah.yu.ti</i>	<i>dah.yut^h.me?</i>
(13)	<i>wrong</i>	LEVEL 1, no <C>	<i>dah.yut^h</i>	<i>dah.yut^h</i>
		LEVEL 5	* <i>dah.yu.t^hi</i>	<i>dah.yut^h.me?</i>

Similarly, this device is necessary to prevent Coda Debuccalization of a provisionally final uvular stop (this is a lexical rule which applies only in derived environments).

The intuition behind this use of extrasyllabicity is clear: since it is not certain whether the next suffix will force the final C to be in the onset or coda, the C is excluded from syllable structure to reflect its indeterminate status. The problem is that this intuition is entirely **out of the system**: it is not incorporated into the formal theory, and the use of extrasyllabicity here is ad hoc. There is no reason on the surface to think that these intermediate stem-final consonants are special.




A **surface-oriented** analysis has no need of this device, and explains directly why e.g. the pre-suffixal consonant in *dahyut-i* is excluded from the coda — because it is always in the onset. Since the facts regarding Coda Aspiration, Iambic Lengthening, and other processes follow directly from the surface syllabification, it is much simpler to base the analysis on the surface form.

Contrast this use with **final-consonant extrasyllabicity** in e.g. Classical Arabic, where a word-final extrasyllabic consonant accounts for superheavy syllables in that position. The crucial difference is that in Arabic the consonant singled out is, in fact, special: this is the only position in the word which permits a superheavy syllable (and where a VC rime is light). In the Kashaya derivation, no such special status holds: the syllable from which the provisionally final consonant is excluded is subject to the same well-formedness requirements as any other syllable in the word.

Domain-restricted constraints

Any strictly surface analysis must make reference to **morphological structure** in order to account for the phonological differences that have traditionally motivated lexical levels. In Kashaya, for example, we must explain why a vowel in a “level 3” suffix undergoes Lengthening, but one in a “level 5” suffix does

(20)

	CLITIC	*CLASH ^[0]	PARSESYL
a.  (émbe) ?i			*
b. (èm) (bé?i)		*!	
c. (émbe) ?i=be	*!		**
d.  (èm) (bé?i) =be		*	*
e. (sàgo) (dé-n-ti) na			*!
f.  (sàgo) (dè-n) -(tína)		(*)	

The clashing feet in (f) are ignored because the clash (*dèn*)(*tína*) is not located within the root [*sagode*]₀. This analysis, like that of Kashaya, accounts for level-ordering phenomena by means of a domain-specific constraint, while avoiding the creation of structure which never surfaces. Under a reranking approach, this example seems incompatible with the claim that only faithfulness constraints can be reranked (Itô and Mester 1995).

C-domains

In many cases, the domain of a phonological process is identical to some morphological constituent — for example, the Manam root. But in other cases, the match is not perfect. This motivates the creation of **phonological domains which are based on, but not necessarily identical to, morphological structure**.

McCarthy and Prince (1993a) make use of prefix, suffix, and word levels in *Axininca Campa*. One motivation is that in **prefixes**, material is **deleted** to obey syllable structure; but in the **root and suffixes**, an **epenthetic** vowel or consonant is inserted.

- (21) a. [[ir [saik]₀]₁ i]₂ → i<r
 b. [[no [ana]₀]₁ ni]₂ → n<o

(22) a. [[no-N [č^hik]₀]₁ wai i]₂ → noñč^hik_{ai} 'I will continue to cut'
 b. [[i-N [koma]₀]₁ i]₂ → iŋkoma_i 'he will paddle'

In the approach adopted here, this difference can be handled as a **special ranking** for prefixes.

- (23) For prefixes FILL » PARSE

Under a reranking approach, outside the prefixes we require PARSE » FILL; under a single-ranking approach, we must assume FILL ^[pre^h] » PARSE. Either the effect of FILL (or equivalent) is quite specific here, or we require another constraint which prevents wholesale creation of extra syllables within the stem and suffixes.

Given standard assumptions about the structure of affixation, however, the prefixes do not constitute a constituent independent of the root to which they are attached (cf. (14)). This suggests that the M-constituents themselves cannot serve directly as the relevant domains of particular processes: rather, it must be **mediated** by derived prosodic structure, a concept familiar from the phonology–syntax interface (cf. Selkirk 1978, Nespor and Vogel 1986). Adapting ideas from Inkelas (1989), Cole and Coleman (1992), Kisseberth (1994), and Cole and Kisseberth (1994), I propose that constraints are relativized not to the morphological constituents themselves, but rather to **C[onstraint]-domains** which are based on them. A set of constraints require the presence of C-domains corresponding to the M-constituents of the word: these constraints take the form M1≈C1, M2≈C2, etc., and belong to the same family as the well-known LEX≈PRWD. Each constraint is shorthand for two alignments.

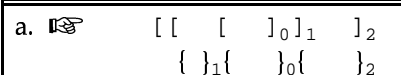
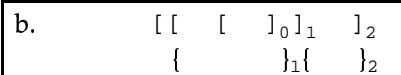

- (24) M_n≈C_n = ALIGN(M_n, Left; C_n, Left)
 ALIGN(M_n, Right; C_n, Right)

If each morphological constituent can make different demands on the constraint ranking, and if these constituents are nested, we are led to a contradiction: how can one constituent make different demands than the larger constituent in which it is embedded? I assume a property of GEN such that **overlapping C-domains are impossible**. A set of ALIGN constraints will then yield representations such as the following, where C-domains are indicated by curly brackets and, unlike M-constituents, are not nested.

- (25) $[[[\textit{prefix} [\textit{root}]_{M0}]_{M1} \textit{suffix}]_{M2}$
 $\{ \textit{prefix} \}_{C1} \{ \textit{root} \}_{C0} \{ \textit{suffix} \}_{C2}$

Of course, under these conditions, the constraint aligning a C-domain to the **innermost M-domain must dominate constraints for the larger C-domains**, or else the innermost domains will simply be absent. The following tableau illustrates that the perfect alignment of larger domains would be achieved only at the expense of the smaller, and higher-ranked, domains; and this is rightly prevented.

(26)

	M0 ≈ C0	M1 ≈ C1	M2 ≈ C2
a. 		*	*
b. 	*!		*
c. 	*!	*	

Notice that the smallest C-domain has perfect alignment with the smallest M-constituent; the next largest domain contains only what is not in the smallest; and so on.

Another sort of **mismatch** occurs in *Kashaya*. A process called **Sonorization** changes /c/ to [y] when followed by the sequence [ic] or [iç]. (The triggering [ç] can result from /ñ/ (cf. (30)), and the [i] from the raising of /e/ between palatals.) The right edge of the root, which corresponds to the right edge of M1, is shown as \downarrow . Outside this domain, Sonorization applies (27), but within it does not (29). This failure of Sonorization within the root can also account for apparent blocking in nonderived contexts (28b,c).

- (27) a. $\text{?ihya} \downarrow \text{c-iç-i} \rightarrow \text{?ihyayi} \cdot \text{çi}$ 'strengthen yourself'
 b. $\text{ma}^{\text{?a}} \downarrow \text{c-iñ-in} \rightarrow \text{ma}^{\text{?ay}} \cdot \text{çin}$ 'while eating one bite (pl)'
 c. $\text{da-su} \downarrow \text{ic-iç-i} \rightarrow \text{dasuyi} \cdot \text{çi}$ 'scratch yourself once!'
 d. $\text{mo} \downarrow \text{ht-añ-icēñ-in} \rightarrow \text{mohtaçi} \cdot \text{yiçin}$ 'while running along (pl)'
- (28) a. $\text{nihçēñ} \downarrow \text{?k}^{\text{he}} \rightarrow \text{nihçičk}^{\text{he}}$ 'will say (pl)'
 b. $\text{du} \cdot \text{çič} \downarrow \text{ela} \rightarrow \text{du} \cdot \text{çičela}$ 'I know'
 c. $\text{çicaq} \downarrow \rightarrow \text{çicaq}^{\text{h}}$ 'fishhook'

A **root-final /c/**, however, does undergo the rule (29), just as one in a suffix does.

- (29) a. $\text{tubic} \downarrow \text{iç-?k}^{\text{he}} \rightarrow \text{tubiyičk}^{\text{he}}$ 'will begin'
 b. $\text{šic} \downarrow \text{iç-in} \rightarrow \text{šiyi} \cdot \text{çin}$ 'while saying about oneself'

There is a **mismatch** between the morphological constituent and the phonological domain: the root-final consonant behaves as part of the suffixes. This pattern is difficult to account for under lexical phonology; only an ad hoc solution whereby root-final /c/ is underspecified in a way that root-internal /c/ is not seems to work (cf. Kiparsky 1993).

This domain mismatch is **confirmed** by the **realization of underlying /ñ/** in the presence of the morphological feature Plural Agent. Within M1, it surfaces as [d] in the onset, as it does when the Plural Agent feature is absent; outside of M1, it surfaces as [ç].

- (30) a. $\text{ña} \downarrow \text{mañic-qa-w} \rightarrow \text{dama} \cdot \text{çic}^{\text{h}} \text{qaw}$ 'they arrived'
 b. $\text{ñu-?qo?ñi} \downarrow \text{wañ-in} \rightarrow \text{d}^{\text{o}} \text{?qo?diwa} \cdot \text{çin}$ 'while fixing (pl)'

Once again, a **root-final consonant patterns with the suffixes**: it becomes [ç]. Note that this is true whether the consonant is in the onset or the coda.

- (31) a. $\text{ñu-hluñ} \downarrow \text{añ-in} \rightarrow \text{duhluç}^{\text{a}} \cdot \text{çin}$ 'while continuing to pick (pl)'
 $\text{ñu-hluñ} \downarrow \text{ba} \rightarrow \text{duhluç}^{\text{b}} \text{ba}$ 'after picking (pl)'
 b. $\text{cañ} \downarrow \text{in} \rightarrow \text{caçin}$ 'while looking (pl)'


Because the C-domain is aligned by violable constraints, it is possible for **misalignments** to occur, forced by higher-ranking constraints outside the M=C family. In Kashaya, the final consonant of M1 patterns with the suffixes. These data motivate an alignment constraint which **requires C0 to end in a vowel**.

(32) $\text{ALIGN}(C_0, V) = \text{ALIGN}(C\text{-domain } 0, R; \text{Vowel}, R)$

This constraint is formally related to NOCODA, insofar as the latter is $\text{ALIGN}(\sigma, R; V, R)$; see McCarthy and Prince 1993b, Itô and Mester 1994. Note, however, that $\text{ALIGN}(C_0, V)$ does not demand an open syllable, only a vowel-final domain (i.e. the domain boundary need not correspond to a syllable break). Of course, for those languages in which the final consonant of some word-internal domain acts as a coda — as if syllabified at an earlier level — a monostratal OT analysis can invoke $\text{ALIGN}(M_n, R; \sigma, R)$.

The interaction of the two alignment constraints provides an explanation for the fact that the root-final consonant in Kashaya patterns with the suffixes: it is outside the root domain, C0. The brace } shows the right edge of the C-domain, while] here indicates the root-suffix boundary.

(33)

	/ tubic] ič-ʔk ^h e /	ALIGN(C0,V)	M0 ≈ C0
a.	tubic] } ičk ^h e	*!	
b. 	tubi] y] ičk ^h e		*

These candidate forms all tacitly satisfy the segmental constraints determining the outcome of /c/. Notice that this approach excludes the root-final consonant from the effect of C0 constraints, but without excluding it from syllable structure (as the lexical level analysis does), and while including it in another C-domain, that of the first suffix.

Having assumed that overlapping domains are prohibited, we can explain the **direction of misalignment** of the right edge of C0. Note that }₀ is misaligned by one segment to the **left** (34a) rather than one to the right (34b) even though both equally satisfy $\text{ALIGN}(C_0, V)$.


- (34) a. misalignment to the left tubi]₀ y] ič
 b. misalignment to the right *tubic i] }₀ č

Left misalignment follows from the effect of a **lower-ranked basic alignment constraint**; in this case M3=C3, since the following suffix -ič belongs to that morphological class.

(35) [[[tubic]_{M0} ič]_{M3} ʔk^he]_{M5}

The left boundary }₃ seeks to align with the left edge of M3, which is at the left of the entire word, as shown in the (35). If domains cannot overlap, however, }₃ cannot be any further left than }₀ but can still **push it to misalign leftward** rather than rightward, the better to satisfy its own alignment.

(36)

	ALIGN(C0,V)	M0 ≈ C0	M3 ≈ C3
a. tubic] } ₀ } ₃ ič	*!		*****
b.  tubi] ₀ } ₃ y] ič		*	*****
c. tubic] i] ₀ } ₃ č		*	*****!*

The full instantiation of C-domains in Kashaya is shown below (cf. (14)). C0 misalignment is not indicated.

(37) { prefix }_{C1} { root }_{C0} { suffix }_{C2} { suffix }_{C3} { suffix }_{C4} { suffix }_{C5}

Interaction across C-domains

The following data show that in a Kashaya fixed (a,b,c) or reduplicative (d) prefix, **aspiration is lost** before another aspirated consonant (Buckley 1994). The root is shown bracketed.

- (38) a. p^ha [hol] ʔ → pahol' 'look for an unseen object with end of stick'
 b. c^hi [c^ha·] w → cic^haw 'grasp with handled instrument'
 c. p^hi [hmi] w → pihmiw 'see in detail'
 d. t^he· [t^he] ñ → te·t^heñ 'my mother'

In OT this should be attributed to an OCP constraint on [asp], which is unconstrained by PARSE[asp], holding within the domain C1. Note now that a **root-internal aspirate does not delete**, whether followed by an aspirate in a suffix (a,b), in a following root under compounding (c), or within the root (d,e).

- (39) a. [c^ha] hqa-w → c^hahqaw 'cause to fall'
 b. [p^ha] t^hu-ʔ → p^hat^huʔ 'don't bake!'
 c. [t^he] [q^hale] → t^heq^hale 'elderberry' ("big tree")
 d. [p^heʔ] m-w → p^heʔ^hmaw 'to razz'
 e. [c^hoq^w] muč-bi-w → c^hohmučbiw 'they were shooting at each other'

This indicates that within the root (C0), PARSE[asp] does have an effect; that is, either PARSE[asp] simply fails to hold in C1, or is lower ranked there. Note that this analysis provides an interesting solution to the problem — easily stipulated in a traditional rule — of determining which [asp] fails to surface.

A question arises as to what exactly the OCP means in this context: in particular, if the two identical autosegments are in different C-domains, does the constraint have to hold for both of the domains? Or does the constraint target a particular autosegment, such that any (sufficiently close) identical autosegment will induce a violation? The Kashaya data do not decide between the two analyses, since it's possible to say that the OCP holds throughout the word, but is dominated by PARSE for all but the prefixes.

The Manam examples in (17a,b) illustrate that *CLASH^[0] counts against clashes only when the two foot heads are both in the relevant domain, C0. The following example shows that the constraint is not violated unless the clashing feet are both **fully** located in C0, including the weak branch.

- (40) * *
 * (*)(* *)
 u- {zùŋʔáʔ} ₀-i 'I hid them'

This case suggests something about **feet**: they are **primitive units** (e.g. Hayes 1995, McCarthy and Prince 1993b) whose parts cannot be treated in isolation, rather than being composed of the smaller units heads and edges (e.g. Idsardi 1992, Halle and Idsardi 1995).

Other 'domains'

McDonough (1990) proposes the following basic morphological structure of the Navajo verb complex; the elements here are labeled according to traditional terminology, but in fact McDonough and others treat the disjunct 'prefixes' as clitics. Of greatest interest are the **two bracketed domains** shown.

- (41) disjunct prefixes [conjunct prefixes]_{infl} [classifier(s) - root]_{verb}

These two constituents or domains — INFL and VERB — are well established in the Athabaskan literature (e.g. Rice 1993), and motivated by their different morphological and phonological properties. I concentrate here on epenthesis. In the forms cited below I show the INFL and VERB constituents using brackets, and largely ignore any clitic which may also be present.

A **stranded consonant** within the **VERB domain** — always a classifier — syllabifies as a coda when preceded by a vowel (a); otherwise it deletes (b). In other words, **no epenthesis** occurs here. (In certain cases some features of the classifier survive by partial merger with another consonant.) Note that the domain boundary need not correspond to a syllable boundary.

- (42) a. [í] [ɬ-baas] → yíɬbaas 'he moves'
 [ní] [ɬ-baas] → níɬbaas 'you move'
 b. [nish] [ɬ-baas] → nisbaas 'I move'
- (43) a. [di] [l-yeed] → dilyeed 'he starts to run'
 b. [di-sh] [l-yeed] → dishyeed 'I start to run'
 [sis] [d-tin] → sistin 'I am frozen'

If **two classifiers** are present, only one surfaces after a vowel (a); and both delete after a consonant (b).

- (44) a. ha [biyí] [ɨ-l-yeed] → ha biyíɨyeed 'you cause it to come running out'
 b. ha [bi-ish] [ɨ-l-yeed] → ha biishyeed 'I cause it to come running out'

A **stranded consonant** within the **INFL domain**, however, is preserved by **epenthesis**.

- (45) a. [n-n-ósh] [ɨ-kaad] → nɨnóshkaad 'that I stop herding them'
 [ʔ-nish] [ɨ-bąąs] → ʔanishbąąs 'I arrived driving (s.t.)'
 b. baa [n-nish] [ɨ-teeh] → baa nɨnishteeh 'I gave you to him'
 baa [sh-ní] [ɨ-teeh] → baa shɨníteeh 'you gave him to me'
 c. [d-n-ish] [l-woʔ] → dɨnishwoʔ 'I'm a fast runner'
 bi [d-deesh] [chiɨ] → bi dɨdeeshchiɨ 'I will release it'
 biɨ [j-d-n-yiz] [bin] → biɨ jɨdɨneezbɨn 'he sat down with them'
 d. [h-sé] [ɨ-bɨʔ] → hoséɨbɨʔ 'build a hogan'
 [h-ni] [yá] → honiyá 'you're wise'
 [h-s-yoo] [l-tsííɨ] → hosɨyooltsííɨ 'a sound is traveling along'

McDonough analyzes the difference between these consonants by proposing that the classifier consonants lack a C-slot. I propose instead to attribute it to the more **general difference in domains**: in the VERB (=C0), epenthesis does not occur (as in Axininca prefixes); while in INFL (=C1), epenthesis does occur (as in the Axininca root and suffixes). I do not rule out a more subtle breakdown into domains. Segmental interactions among classifier consonants and stem-initial consonants (e.g. the famous 'd-effect') can also be treated by constraint rankings in C0, while those found only among inflectional prefixes will require rankings specific to C1.

Minimality

Under a strictly parallel approach, it is **not possible to express minimality requirements on an entire intermediate representation**; but alternative formalizations are available. In some cases the relevant constituents are present on the surface. For example, the Navajo INFL and VERB both have a minimal size of one syllable. If sufficient material is not underlyingly present, epenthesis occurs.

- (46) [∅] [cha] → yɨcha 'he cries'
 [∅] [ɨ-chééh] → yɨɨchééh 'he causes to cry'
 [∅] [d-ɨ-náád] → yɨlnáád 'it was licked'

Following McDonough (1990), both constituents are independent **stems**. (Nouns contain a single stem and are minimally monosyllabic.) This minimality can be expressed by a constraint such as STEM≈PRWD.

Similarly, in Axininca Campa, an unprefix root is **often augmented by epenthesis** when it is less than two moras (a); but not in all cases (b).

- (47) a. [na]₁ piro-aanc^hi → [nata]pirotaanc^hi 'to truly carry on shoulder'
 [p]₁ piro-aanc^hi → [paa]c^hitaanc^hi 'to truly feed'
 b. [na]₁ aanc^hi → [na]taanc^hi 'to carry on shoulder'
 [p]₁ aanc^hi → [p]aanc^hi 'to feed'

McCarthy and Prince (1993b) argue that the complex conditions on augmentation are best treated by the constraint SFX-TO-PRWD, requiring that **what precedes a suffix be minimally two moras**. Dominating constraints such as ALIGN(_{stem},]σ) and ONSET prevent augmentation in (b).

In Kashaya, the first syllable of a word is excluded from the leftmost foot (i.e. it is extrametrical) when the constituent M1 (prefix+root) is more than one syllable long (Buckley 1994). In other words, **at least one syllable head (vowel) affiliated with the root (M0) must be parsed into a foot**. One possible analysis: a highly ranked version of PARSESYL in C0 that is satisfied by parsing of a single syllable.

- (48) a. [cad]₀ uced-u → (cadú·)(cedu) 'keep looking' *ca(ducé·)du
 b. [libut]₀ ad-u → li(butá·)du 'keep whistling'
 du [kil]₀ ic-i → du(kilí·)ci 'point at yourself!'

Conclusion

I have argued that constraint domains permit OT to account for level-ordering phenomena without the complications created by intermediate levels. Some issues which await further research are:

- (54) a. Is **reranking** or **domain-restriction** the best solution? In either case, are some classes of constraints ineligible for reranking or restriction?
- b. Is it possible to define a **basic ranking** in a language, and then define minimal differences for each level? If so, what domain does this basic ranking correspond to? Perhaps the word level?
- c. Can **intermediate stages** be eliminated entirely? Is there anything special about the interface between lexical and postlexical domains? Can the traditional work of the postlexical component be divided among constraints and phonetics?

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