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Constraint domains in Kashaya

EUGENE BUCKLEY

University of Pennsylvania

Most work in Optimality Theory (Prince and Smolensky 1991, 1993) refers to only one level of representation (or, a single step relating the underlying and surface representations). While there are exceptions — e.g. McCarthy and Prince (1993a) make use of three levels in 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)	*English*	LEVEL 1 SUFFIX	placid ity $]_W$
		LEVEL 2 SUFFIX	placid$]_W$ 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 Kashaya, for a number of reasons. Most pertinently, the language has been argued to re-

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quire five levels rather than two (Buckley 1994), and the suffixes of these levels cannot be prosodically defined.

(2) SOME LEVEL 3 SUFFIXES eṅ, iċ, ala
w, ciṅ, mac, mul, ˀta

SOME LEVEL 5 SUFFIXES em, iš, ela
w, ṡuw, ṁa, mela, ˀli

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

1. Uses of levels

Consider first what we must give up. The intermediate representations that Lexical Phonology provides are quite useful in accounting for various patterns. The first to be discussed involves the realization of underlying /ṅ/. Normally it becomes becomes [d] when it occurs in the onset.

(3) a. ṅu-hluṅ-ba
→ duhluṅba 'after picking'

b. ṅu-hluṅ-aṅ-in
→ duhludaadun 'while continuing to pick'

c. ca-ht-aṅaṅaṅ-aṅaṅ-in
→ cahtadaadadaadadun 'while flying randomly *(pl)*'

d. ṅu-ˀq̇oˀṅi-waṅ-in
→ doˀq̇oˀdiwaadun 'while fixing'

There is, however, a morphologically triggered process changing /ṅ/ to [ċ] regardless of syllable position, but only when the feature {Plural Agent} is present. This pre-empts the [d] rule but only if the /ṅ/ is final in the root (shown in bold) or later in the word.

(4) a. ṅu-**hluṅ**-ba
→ duhluċba 'after picking *(pl)*'

b. ṅu-**hluṅ**-aṅ-in
→ duhluċaaċin 'while continuing to pick *(pl)*'

c. **ca**-ht-aṅaṅaṅ-aṅaṅ-in
→ cahtaċaaċaċaaċaċin 'while flying along *(pl)*'

d. ṅu-**ˀq̇oˀṅi**-waṅ-in
→ doˀq̇oˀdiwaaċin 'while fixing *(pl)*'

Buckley (1994) gives a derivational analysis which runs briefly as follows. The prefix and root are subject to the rule *ṅ → d* before level 3; this pre-empts *ṅ → ċ*, which does not apply in the early levels. At this early level, the root-final /ṅ/ is unaffected because it is not (yet) in an onset.

(5)	LEVEL 1	MORPHOLOGY	ṅu-hluṅ {plur}
		ṅ → d	duhluṅ
	LEVEL 3	MORPHOLOGY	duhluṅ-aṅ
		ṅ → ċ	duhluċaċ
		ṅ → d	*bled*
	LEVEL 5	MORPHOLOGY	duhluċaċ-in

At level 3, when the relevant suffixes are added, *ṅ → ċ* precedes and bleeds *ṅ → d*. The root-final consonant enters level 3 as /ṅ/, where *ṅ → ċ* is active and applies equally to the root-final and suffixal tokens of /ṅ/. This analysis succeeds in accounting for these complex facts with minimal stipulation, but relies crucially on rule application at the intermediate representation of level 1.

2. Problems with levels

While necessary for the account in (5), the use of intermediate rule application also causes complications. 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 stem-final consonants which do not behave as coda consonants. In Kashaya, for example, the demonstrably 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/.

(6)	a.	dahyut-i	'break it! (sg)'
	b.	dahyut^h-meʔ	'break it! (formal)'

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.

(7)	*right*	LEVEL 1	dah . yu <t>	dah . yu <t>
		LEVEL 5	dah . yu . ti	dah . yut^h . meʔ
(8)	*wrong*	LEVEL 1	dah . yut^h	dah . yut^h
		LEVEL 5	*dah . yu . t^{h}i	dah . yut^h . meʔ

The same argument can be made based on iambic lengthening in open syllables, a level 3 process which is not blocked by a stem-final consonant.

(9)	*right*	LEVEL 3	duh . lu . daa <ṅ>	*(lengthening)*
		LEVEL 5	duh . lu . daa . dun	*(suffix -un)*
(10)	*wrong*	LEVEL 3	duh . lu . daṅ	*(no lengthening)*
		LEVEL 5	*duh . lu . da . dun	*(suffix -un)*

The lengthening rule cannot be permitted to apply in level 5, since it does not affect level 5 suffixes; rather, it simply respects the surface syllabification (Buckley 1994).

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.

Contrast this use with the use of final-consonant extrasyllabicity in Classical Arabic *katabt* 'I wrote', where a word-final extrasyllabic consonant accounts for superheavy syllables in that position.

(11)

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a.     σ    σ                 b.   *  σ    σ
       |   /\                         |   /\
       μ   μ  μ                       μ   μ  μ
      /\  /\  |                      /\  /\  |\
     k a  t a b  <t>                k a  t a b  t
```

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 VC is light). In the Kashaya lexical 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.

A surface-oriented analysis has no need of this device, and such an analysis explains directly why 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.

3. C-domains

Any strictly surface analysis must make reference to morphological structure in order to account for the different phonological characteristics that have traditionally motivated lexical levels. In Kashaya, for example, we must explain why in the Plural Agent an /ṅ/ within a prefix or root surfaces as [d], but one in a suffix surfaces as [ċ]. The full morphological constituency of a Kashaya word is shown below.

(12) [[[[[*pref* [*root*]$_{M0}$]$_{M1}$ *suff*]$_{M2}$ *suff*]$_{M3}$ *suff*]$_{M4}$ *suff*]$_{M5}$

The constituent M1 consists of the root and a possible prefix. This corresponds closely to the domain in which [d] surfaces, but as we have seen the final consonant of M1 patterns with the suffixes. This shows that the M-constituents themselves cannot serve directly as the relevant domains of particular processes: rather, it must be mediated by derived prosodic structure (cf. Selkirk 1978, Nespor and Vogel 1986).

Adapting ideas from Inkelas (1989), Cole and Coleman (1992), Kisseberth (1994), and Cole and Kisseberth (1994), I make use of **C[onstraint]-domains** which are defined relative to phonological or morphological categories. A set of constraints require the presence of C-domains corresponding to the M-constituents shown in (12): these constraints take the form M0≈C0, M1≈C1, etc., and belong to the same family as the well-known LEX≈PRWD. Each constraint is shorthand for two alignments.

(13) M0≈C0 = ALIGN(M0, Left, C0, Left)
ALIGN(M0, Right, C0, Right)

Other constraints can be specified as holding sway, or having a certain rank, only within specified C-domains. This duplicates to a large extent the function of lexical levels, but a very important difference is that the word is evaluated once as a whole, and **no input-output relationship** is possible among the various domains.[1]

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[1] No suffixes of M2 contain /ṅ/; I will thus focus on the behavior of M3 suffixes. If no M2 suffix is present, that M-constituent is absent from the representation; the same is true of other levels. Thus the form in (9) would be [[[□*ṅu*[*hluṅ*]$_{M0}$]$_{M1}$ *aṅ*]$_{M3}$ *in*]$_{M5}$. Since C-domains correspond to M-constituents, this claim provides a promising avenue for the treatment of certain derived environment effects (cf. Inkelas & Orgun 1993).

4. Domain misalignment

As noted, the domain of a process — a C-domain — need not correspond exactly to an M-constituent. This is due to minimal **misalignments** of a C-domain forced by higher-ranking constraints outside the M≈C family. In Kashaya, the final consonant of M0 patterns with the suffixes in becoming [ċ] in the Plural Agent. These data motivate an alignment constraint which requires C0 to end in a vowel.[2]

(14) ALIGN(C0,V) = ALIGN(C-domain 0, R, Vowel, R)

The interaction of the two alignment constraints provides an explanation for the fact that the root-final /ṅ/ becomes [ċ] rather than [d]: it is outside the domain at which *ṅ → d* is highly ranked. The brace } shows the right edge of a C-domain, while] here indicates the root-suffix (M0-M3) boundary.

(15)

/ṅu-hluṅ-aṅ.../	ALIGN(C0,V)	M1 ≈ C0
a. duhlud}] aċ...	*!	
b. ☞ duhlu}ċ] aċ...		*

(16)

/ṅu-hluṅ-meʔ/	ALIGN(C0,V)	M1 ≈ C0
a. duhluṅ}] meʔ	*!	
b. ☞ duhlu}ċ] meʔ		*

These candidate forms all tacitly satisfy the segmental constraints determining the outcome of /ṅ/. For the Plural Agent exponence, I assume an ad hoc requirement of direct mapping (*ṅ → ċ*), which is highly ranked only in the presence of the morphosyntactic feature {Plural Agent}, or whose formulation ensures that it will have an effect only in the presence of this feature.

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, in this case C3.[3]

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[2] This constraint is formally related to NoCoda, insofar as the latter is Align(σ, R, V, R); see McCarthy and Prince 1993b, Itô and Mester 1994. Note, however, that Align(C0,V) does not demand an open syllable, only a vowel-final domain (i.e. the domain boundary need not correspond to a syllable break).

[3] 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 Align(M*n*, R, σ, R).

5. Desonorization

The actual change to [d] is effected by a combination of constraints. The basic cause is well-motivated in Kashaya and elsewhere: glottalized sonorants are banned from onsets by the constraint *[$_\sigma$□[+son, gl] (cf. Kingston 1985). Various PARSE constraints, plus *[voiced, gl], which bans implosives, force nonparsing of [gl] and [+son].[4] To focus on the matter of domains, I collapse all of these constraints into one abbreviation: *[$_\sigma$ ṅ → d*. The crucial claim here is that for domain C3 (which includes suffixes), *ṅ → ċ* dominates *ṅ → d* and thus we find [ċ] rather than [d]. For domain C0, however, the ranking is the opposite, and we find [d].

(17)

/ṅu-hluṅ-aṅ.../	ṅ → ċ $^{\{3\}}$	[$_\sigma$ ṅ → d	ṅ → ċ $^{\{0\}}$
a. duhlu}$_0$d] ad}$_3$	*!*		*
b. ċuhlu}$_0$ċ] aċ}$_3$		***!	
c. duhlu}$_0$d] aċ}$_3$	*!	*	*
d. ☞ duhlu}$_0$ċ] aċ}$_3$		**	*

The standard view in OT is that all constraints are always present in a particular ranking; the inertness of a constraint is due to its low rank (Prince and Smolensky 1993). Under this view it would seem to follow that we do in fact require the constraint *ṅ → ċ* $^{\{0\}}$ as shown in (17), even though it is dominated and has no effect. Another view is that the constraint *ṅ → ċ* has a constant rank but only holds sway in a subset of domains, including C3; in other domains, whatever violations occur are simply ignored, as indicated by the parentheses in the following tableau (cf. Cassimjee 1994).

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[4] To derive /ṅ/ from [d] requires several changes: minimally, [+son] and [gl] must be lost, while [voiced] must remain. Undominated constraints are *[$_\sigma$□[+son, gl] and *[voiced, gl]; the rankings PARSE[voiced] » PARSE[gl], PARSE[+son] must also hold. (We can assume that [+nas] is lost from a [–son] segment.) To derive [n] from the same underlying segment, which is what we find when word-final /ṅ/ syllabifies as an onset, we seemingly need lose only [gl]. If /ṅ/ → [d] requires this as well as loss of [+son], how is it ever preferred? The problem is that while [n] and [ṅ] share [+son], evidence from, for example, Kwakwala stress shows that they are not identical in sonority (e.g. Zec 1988). Assume a sonority hierarchy which includes the ranking *n > ṅ > d*, and that [ṅ] is [–son], and what it shares with [n] is just [+nas]; then the motivation for the loss of [gl] in the onset (along with [gl] on glides and liquids) is a matter of the sonority hierarchy and not the **feature** [+son] per se (contra Buckley 1992, 1994; cf. Urbanczyk 1992). Within a word, PARSE[–son] » PARSE[+nas], so that /ṅ/ becomes [d] rather than [n]. At the larger domain (perhaps the basic ranking of the language), PARSE [+nas] » PARSE[–son] and [n] is chosen over [d].

(18)

/ṅu-hluṅ-aṅ.../	ṅ → ċ {3}	[σ ṅ → d
a. duhlu}$_0$d] ad}$_3$	*!* (*)	
b. ċuhlu}$_0$ċ] aċ}$_3$		***!
c. duhlu}$_0$d] aċ}$_3$	*! (*)	*
d. ☞ duhlu}$_0$ċ] aċ}$_3$	(*)	**

The crucial evidence for deciding between the two possibilities will be whether such a constraint can have an 'emergent' effect even in other C-domains, under appropriate conditions (cf. McCarthy and Prince 1994a, Itô and Mester 1995). Formally speaking, however, it seems possible that even in the approach illustrated in (18), the same constraint could be separately specified for several domains, even at different rankings, permitting an emergent effect. More precise determination of the power required by the theory must await further research.

6. Sonorization

Further support for the domain misalignment motivated by *ṅ* → *ċ* comes from a different process, which Buckley (1994) calls Sonorization. This changes /c/ to [y] when followed by the sequence [ic] or [iċ]. (The triggering [ċ] can result from /ṅ/, and the [i] from the raising of /e/ between palatals.) In this case we can show explicitly that the rule is active in C2, not just C3: the suffix -*c* in (19a, b) belongs to M2.

(19) a. **ˀihya**-c-iċ-i
→ ˀihya }$_0$ y̲iiċi 'strengthen yourself!'

b. **maˀa**-c-iṅ-in
→ maˀa }$_0$ y̲iiċin 'while eating one bite *(pl)*'

c. ṅa-**su**-ic-iċ-i
→ dasu }$_0$ y̲iiċi 'scratch yourself once!'

d. **mo**-ht-mac-iṅ-in
→ mo }$_0$ htimaay̲iċin 'while running in there *(pl)*'

A root-final /c/ undergoes the rule (20), but a root-internal one does not (21). This failure of Sonorization within the root can also account for apparent blocking in nonderived contexts (21c).

(20) a. **tuṁic**-iċ-ˀkʰe
→ tubi }$_0$ y̲iċkʰe 'will begin'

b. **šic**-iċ-in
→ ši }$_0$ y̲iiċin 'while saying about oneself'

(21) a. **nihceṅ**-ʔkʰe
→ nihc̲i }$_0$ ċkʰe ‘will say *(pl)*’

b. **ṅuuciċ**-ela
→ duuc̲i }$_0$ ċela ‘I know’

c. **cicaq**
→ c̲ica }$_0$ qʰ ‘fishhook’

If the constraint which sonorizes the /c/ is low-ranked in domain C0, but higher-ranked in C2-3, the same misalignment already discussed will account for the special behavior of the root-final /c/ — facts which are not amenable to a syllabification-based analysis of the sort proposed for the [d] ~ [ċ] pattern above.

7. Non-overlap

One could imagine either of the following two schematic C-domain constituencies.

(22) a. NESTED DOMAINS $\{\{\{\ \}_1\ \}_2\ \}_3$

b. ADJACENT DOMAINS $\{\ \}_1\{\ \}_2\{\ \}_3$

The nested domains in (22a) correspond more exactly to the morphological constituency (12), and are expected based on a simple implementation of M*n*≈C*n*; however, its interpretation would require an additional principle to resolve the incoherence of overlapping domains which reflect contradictory constraint rankings. (Under the assumptions of (18), overlap is perhaps less problematic.) I promote this principle to the status of a constraint on GEN, such that only the nonoverlapping domains in (22b) are possible. 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 can be achieved only at the expense of the smaller domains.

(23)

	M1≈C1	M2≈C2	M3≈C3
a. ☞ $[[[\ ]_1\ ]_2\ ]_3$ $\{\ \}_1\{\ \}_2\{\ \}_3$		*	*
b. $[[[\ ]_1\ ]_2\ ]_3$ $\{\ \}_2\{\ \}_3$	*!		*
c. $[[[\ ]_1\ ]_2\ ]_3$ $\{\ \}_3$	*!	*	

GEN cannot produce potential candidates such as (22a); essentially I attribute this to their incoherence, but a “no C-domain overlap” principle could also be stipulated. Having assumed that overlapping domains are prohibited, we can explain the direction of misalignment of the right edge of C0. Note that $\}_1$ is misaligned by one segment to the **left** (24a) rather than one to the right (24b) even though both satisfy ALIGN(C0,V) equally.

(24) a. MISALIGNMENT TO THE LEFT duhlu$\}_0$ ċ] aċ

b. MISALIGNMENT TO THE RIGHT *duhlud] a$\}_0$ ċ

Left misalignment follows from the effect of a lower-ranked alignment constraint; in this case M3≈C3, relevant to $\{_3$: this left boundary seeks to align with the left edge of M3, which is at the left of the entire word, as shown in the structure $[_{M3}$ $[_{M0}$ *root* $]_{M0}$ *suffix* $]_{M3}$ (cf. (12)). If domains cannot overlap, $\{_3$ 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.

(25)

	ALIGN	M0≈C0	M3 ≈ C3
a. duhluċ] $\}_0$ $\{_3$ [aċ	*!		******
b. ☞ duhlu$\}_0$ $\{_3$ ċ] [aċ		*	*****
c. duhlud] [a$\}_0$ $\{_3$ ċ		*	******!*
d. duhlud] [aċ$\}_0$ $\{_3$	*!	**	********

Assuming nonoverlapping domains, what follows illustrates the fullest possible instantiation of C-domains in a Kashaya word.

(26) [[[[[*pref* [*root* $]_{M0}$ $]_{M1}$ *suff* $]_{M2}$ *suff* $]_{M3}$ *suff* $]_{M4}$ *suff* $]_{M5}$

{ *pref* $\}_{C1}$ { *root* $\}_{C0}$ { *suff* $\}_{C2}$ {*suff* $\}_{C3}$ {*suff* $\}_{C4}$ { *suff* $\}_{C5}$

Since domain C1 includes only the prefix, it is the alignment of C0 which is vital to the status of the root-final consonant. Both C1 and C0 are unaffected by *ṅ* → *ċ* , but the two domains differ in other ways: for example, only in C0 do we find translaryngeal harmony, and only in C1 is there aspiration dissimilation (Buckley 1994).

8. Examples from other languages

Buckley (1995) makes a similar use of domains in analyzing Manam roots, which have special stress properties. One of these is that a sequence V.V.(C)V receives antepenultimate stress (27a), rather than the normal penultimate pattern found in polymorphemes (b). A following clitic such as *=be*, however, overrides this pattern and causes penultimate stress in the domain preceding the clitic (c).

(27) a. móasi ‘song’
balíau (village name)

b. roá-gu ‘my wife’
toli-óti ‘all three’

c. moáne=be ‘man and’
i-tamoáta=be ‘he is a man and’

In a lexical phonology model, the root pattern suggests a special footing rule which applies before affixation; but then the effect of this rule would have to be undone in front of a clitic (and elsewhere).

(28) ROOT STRESS (móa)ne

CLITICIZATION (móa)ne=be

REFOOTING mo(áne)=be

If stress assigned happens only once, and can be sensitive to the presence of a clitic, the otiose first stage of footing can be eliminated entirely. The root pattern is expressed as a constraint on stress which holds only within the root domain (in present terms, C0). Somewhat informally (see Buckley 1995a for details):

(29) CLITIC Align the left edge of a clitic with the right edge of a [trochaic] foot.

VV Stress the first vowel of V.V.(C)V.
Holds only of C-domain 0.

ALIGNFT Align the right edge of a foot with the right edge of the word.

(30)

	CLITIC	VV $^{\{0\}}$	ALIGNFT
a. ☞ (móa)si $\}_0$			*
b. mo(ási) $\}_0$		*!	
c. (móa)si $\}_0$ =be	*!		*
d. ☞ mo(ási) $\}_0$ =be		*	*
e. to(lí $\}_0$ o)ti			*!
f. ☞ toli $\}_0$ (óti)		(*)	

This formalism can similarly be extended to other examples in the literature which have been analyzed using lexical levels. One class of cases requires simply the formalization of different phonological characteristics associated with particular morphemes. For example, McCarthy and Prince (1993a) make use of prefix and suffix levels in Axininca Campa, where material in prefixes is deleted to obey syllable structure, while in suffixes an epenthetic vowel or consonant is inserted. This difference can be handled by the domain structure {□*pref*}{ *root suff* }, with the ranking FILL » PARSE in the prefix domain.

A second class of motivations for intermediate structure involves prosodic 'schizophrenia', in which, for example, a consonant behaves as both an onset and coda, or a syllable behaves as the member of two different feet. Orgun (1994) shows that in Uighur /a/ raises to [ɨ] in a morpheme-final open syllable (*qazan-i* → *qazɨni*), even when that syllable is closed on the surface due to syncope (*qazan-i-ni* → *qazɨnni*). Kenstowicz (1994) discusses metrical examples such as Carib, where iambic lengthening occurs both within a stem (*kur<u>aa</u>ma*) and over the prefixed word (*kï-k<u>uu</u>r<u>aa</u>ma-ko*).

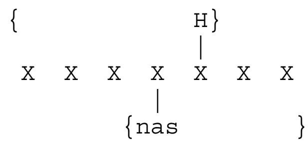
Such cases would seem to present the greatest challenge to the claim that there are no intermediate representations, since it is necessary to make reference to two different prosodifications. Note, however, that the facts do not in general appear to require the output of a rule based on one prosodification to serve as the input to a rule based on the other prosodification. Rather, they appear to require simply two different prosodifications, which could both exist on the surface. A likely implementation of this idea within Optimality Theory is **correspondence between outputs**, which can serve as a formalization of analogy (see McCarthy and Prince 1994b, cf. also Burzio 1994, Orgun this volume). That is, in Carib we find long [aa] in *kï-kuuraama-ko* because it is long in *kuraama*; and in Uighur we find raised [ɨ] in *qazɨnni* because it is raised in *qazɨni*, but in neither case treating the shorter form as an intermediate stage. See Buckley (1995c) for further discussion of this approach.

Finally, note that Orgun's (1994) point, "The number of applications of phonology must depend on morphological structure", is captured in the present framework: C-domains depend on M-constituents. He is certainly correct that alignment alone cannot directly account for all level and cyclic effects.

9. F-domains

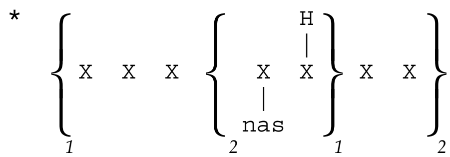
Cole and Kisseberth (1994) propose a theory of featural harmony within OT which makes use of domains defined by alignment constraints similar to those proposed here. These F[eature]-domains define a string of segments on which a harmonizing feature must be EXPRESSED. A fundamental difference from C-domains is that F-domains can overlap. For example, in a language with both H-tone spreading and nasal harmony, the domains of the two features might easily overlap. However, if F-domains are defined only for particular **autosegmental tiers**, there is still no overlap on a single tier (cf. Kisseberth 1994 for a variant perspective).

(31)



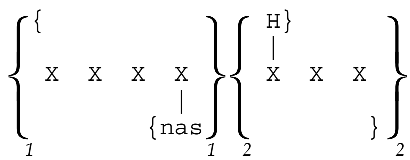
A C-domain, however, is defined for the **entire phonological representation**, i.e. it includes all tiers; thus there is no way to circumvent the fact of overlap.

(32)



The two types of domains are perfectly compatible, however, since they perform very different functions. An F-domain defines a set of anchors on which the feature on some tier must be expressed; it is then relevant only to constraints such as EXPRESS-F. A C-domain, on the other hand, defines a string for which a particular constraint ranking holds, and is relevant to every constraint.

(33)



Of course, EXPRESS-F is part of the overall constraint ranking, and so a combination of F- and C-domains can be used to explain the different harmonizing characteristics of, say, a root and a suffix (cf. the discussion of Shuluun Höh by Kaun, this volume).

10. Conclusion

I have argued that constraint domains permit OT to account for level-ordering phenomena without the complications created by intermediate levels. The partial reanalysis of Kashaya (and Manam) lexical phonology gives some indication of the framework proposed. Certainly many issues remain to be addressed. For example, what re-rankings are possible among different domains in the same language? Itô and Mester (1995) propose for Japanese that only Faithfulness constraints be re-ranked among domains, but their sense of domain is somewhat different: morphemes belong inherently to a particular domain of the vocabulary. Also, Reynolds and Nagy (1994) propose a 'floating' ALIGN constraint — it is freely re-ranked within a certain range to account for synchronic variation. Is it possible to define a basic ranking in a language, and then define minimal re-rankings for each level? If so, what domain does this basic ranking correspond to? Perhaps the word level? Can intermediate stages be eliminated entirely? Is there anything special about the interface between lexical and postlexical domains? These questions can be addressed only when a larger set of languages has been examined from the present perspective, but the formalism of constraint domains offers a promising means of capturing level-ordering effects without the intermediate stages required in lexical phonology.

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