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Derived environment effects in GP

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1. Introduction

This paper takes up the currently topical issue of derived environment effects (DEE) that is mainly to be found in the Optimality Theory (OT) literature (Itô & Mester 1996, Burzio 1998, Łubowicz 2002, McCarthy 2003) but see also Kiparsky (1993) and Inkelas (1998). The discussion involves revisiting an old problem highlighted in Kiparsky 1973's definition of opacity given in (1).

(1) Opacity (Kiparsky 1973:79)

A rule (A → B / C__D) is opaque to the extent that there are surafce representations of the form:

(i) A in the environment C__D (apparent underapplication, counterfeeding opacity)
(ii) B in the environment other that C__D (apparent overapplication, counterbleeding opacity)

Thus in 1(i) a rule fails to occur despite its conditions being met and in 1(ii) the effects of a rule are seen in environments where its conditions are not met. DEE are in this sense a case of 1(i), particularly; restricting phonological rules to applying only in derived environments while non-derived environments display the effects of 1(i). Morphologically derived environmnets involve phonological rules applying at morphological junctures or boundaries, while phonologically derived environments revolve around a segment that is in no such morphological environment.

Such apparent mismatches were easily accounted for in earlier phonological appraoches that took recourse to rule ordering by, for example, utilising the Strict Cycle Condition as in Kiparsky (1982). Unfortunately, since the advent of OT, all derivational approaches have been branded as endorsing rule ordering, (irrespective of the last couple of decades of research) and therefore as able to handle DEE. This paper aims to show that DEE are a problem for all phonological approaches that do not employ rule ordering whether they are derivational or not, and proposes a possible way of tackling DEE in Government Phonology, a derivational non-rule ordering framework.

The paper presents in section 2 the gist of the proposal that is then applied to phonologically derived environmnets in section 3. Morphologically derived environments (section 4) are seen to, on the one hand, utilise the basic principle that phonologically DEE do, but to also, on the other hand, require a solution that is sensitive to their morphologically complex nature. I offer some concluding remarks in Section 5.

2. DEE as a melodic structural effect

The question is why two segments that look identical on the surface and both belonging to language L are unable to undergo a phonological rule applying in language L, where one of the segments is derived and the other lexical? Only the former undergoes the rule. Consider for illustration the Kinyamwezi data in (2) where palatals may either be derived or lexical.[1] Palatalisation in (2a-c) in the causative forms is triggered by a causative suffix that itself does not surface idependently.

(2) Palatalisation: /s, k, n → ʃ, tʃ, ɲ/

stem			cauastive
a. bis-a	‘hide’	→	biʃ-a
b. bak-a	‘light’	→	batʃ-a
c. bon-a	‘see’	→	boɲ-a

Non-derived palatals

d. buutʃ-a	‘carry’
e. liiʃ-a	‘kill’
f. ʃook-a	‘go back’

There is a further rule that blocks a sequence of palatals (some kind of OCP effect), when palatalisation of an additional suffix would result in such a sequence. This rule is, however, restricted to occuring only with derived palatals (3a-c) and never with non-derived palatals where a sequence of palatals surfaces (3d-f).

(3) Palatal OCP

causative	causative+perfective		
a. biʃ-a	biʃ-ile	→	bis-ije
b. batʃ-a	batʃ-ile	→	bak-ije
c. boɲ-a	boɲ-ile	→	bon-ije

Non-derived palatals: no palatal OCP

d. buutʃ-a	buutʃ-ile	→	buutʃ-ije
e. liiʃ-a	liiʃ-ile	→	liiʃ-ije
f. ʃook-a	ʃook-i-a	→	ʃooʃ-a

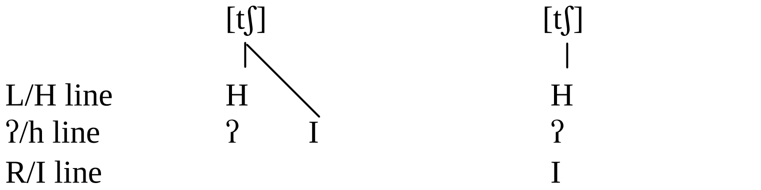
Thus in (3a-c) the palatals of the causative forms revert back to their non-palatal forms when the prefective *-ile*, which itself undergoes palatalisation is added.[2] In fact, we can view palatalisation of the prefective suffix from *-ile* to *-ije* as being triggered by the preceding palatal which is no longer seen in (3a-c) but is retained in (3d-f).

The proposal here is to derive this difference from a representational difference in melodic structure between derived and non-derived palatals. In derived palatals the palatalising I-element is adjoined in a dependent structure to the rest of the phonological expression, i.e. it is adjoined to the elements that make up the non-palatal sound. In non-derived palatals on the other hand, the I-element is in no such

[1] Kinyamwezi is a language of Tanzania. Data are drawn from Maganga & Schadeberg (1992).
[2] The situation is slightly more complex than these data show. The alveolars {l nz nh} that give the same palatal outputs under palatalistaion as the velars {g ŋg ŋh} respectively, never, under OCP, revert back to their original alveolar forms but rather converge on the velar forms. I discuss this issue in Kula (to appear). However, both these and the given data suffice to illustrate an OCP effect on adjacent palatals.

dependent position but rather within an immediately dominated relation with the other elements of its expression. Consider the graphic representation of this in (4).[3]

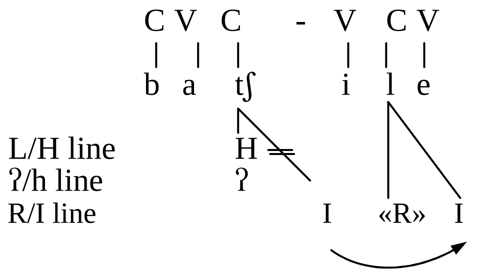
(4) a. derived palatal b. non-derived palatal



In this sense, there is a representational difference between a /t□/ that is lexical and one that has /k/ as its source, which is basically a [k (H.□)] that has acquired an I-element in the course of derivation.[4] This I-adjoined element, not being a core of the phonological expression, is totally displaced into a following target of palatalisation such as the prefective suffix where it also assumes an adjoined position. I have termed this process *element–hopping* in earlier work (Kula, to appear). This results in the OCP effect seen in (3a-c). The non-adjoined structure in (4b), on the other hand, can spread the I element while retaining its position and thereby fails to adhere to the OCP. I give the relevant derivations in (5).

(5)a.derived palatals: OCP

batʃ-ile → bak-ije ‘has made hide’ (example 3b)



Output: [bak-ije]

Here, the I-adjoined element is displaced (hops) to the following target of palatalisation and being so displaced, the root final palatal can no longer be palatal as it has lost the I palatalising element. This results in the observed surafce OCP effect where only the final palatal surfaces.

[3] I assume the strict CV version of GP and the element set (A I U L H h ʔ R) represented on autosegemntal lines distinguishing voice (L/H), manner (ʔ/h) and place (R/I). U and A are other places of articulation that are irrelevant for the data discussed.

[4] Notice that the ability to have different representations for derived versus non-derived segments is not tenable in versions of GP where no structure below the CV tier is assumed. I defend the position that elements are arranged in elemental geometries that characterise head-dependent relations between elements in Kula (2002). For an articulated theory of element dependency see Botma (2004).

b. non-derived palatals: no OCP

buutʃ-ile → buutʃ-ije ‘has made carry’ (example 3d)

```
C  V   C V C   -  V C V
|  |________/  |     |  |  |
b  u         tʃ      i  l  e
```

```
L/H line      H
ʔ/h line      ʔ
R/I line      I  ——→  I «R»
```

Output: [buutʃ-ije]

As opposed to (5a), the non-derived /tʃ/ spreads its I element into the following target and no OCP effect is noticed in this case.

The derived environment effect that results in OCP applying only to derived palatals is therefore here accounted for as a difference in structural representation of the phonological expressions of derived versus non-derived (lexical) segments. Notice that if two elements share the same autosegmental line only one can be active at any one given time, so that if a clash results one of the elements must be suppressed and remain unexpressed. Suppression is here indicated by angled brackets around the suppressed element. It will be shown that this general principle of melodic structural difference can be called upon in other cases of either phonologically derived or morphologically derived environment effects. Let us consider some examples in the following sections.

3. Phonologically derived environments

Łubowicz (2002) presents intereting data with respect to phonologically derived environment effects that she accounts for in OT with conjoined constraints that conjoin a markedness constraint on the locus of change with a faithfulness constraint on the intermediate output of a phonological rule. (See Łubowicz (2002) for details). I consider here how these data can be analysed under the proposed GP account.

3.1 Polish first velar palatalisation and spirantisation

The polish data of interest here are very similiar to the Kinyamwezi data already discussed. In Polish, a process of first velar palatalisation derives palatals from velars. A following high vowel can be considered the trigger. A subset of these derived palatals (only the voiced ones) are then subject to a process of spirantiastion which does not apply to non-derived (voiced) palatals. Consider the following data of this distribution in (6) taken from Łubowicz (2002), but see also Rubach (1984) for a thorough discussion of these data.

(6) First velar palatalisation spirantisation

a. kro[k] -i-c	→	kro[č]-y-ć		‘to step’
b. wa[g]-i-c	→	wa[ǯ]-i-ć	wa[ž]-y- ć	‘to weigh’
c. stra[x]-i-c	→	stra[š]-y-ć		‘to frighten’

Non-derived palatals: no spirantisation

a. bry[ǰ]-ik-ɨ	→	bry[ǰ]-ek-ɨ	‘bridge’
b. ban[ǰ]-o	→	ban[ǰ]-o	‘banjo’
c. [ǰ]em-ɨ	→	[ǰ]em- ɨ	‘jam’

Needless to say one would have to accurately work out the permitted elemental combinations of the segment inventories of all the languages to be dicussed here, as the constraints on elemental combination are crucial for every analysis. The elements already defined will suffice for the current illustration.

In the polish case we could think of the spirantisation process as introducing frication which in element terms is the h-element. Given that this only happens in cases where palatalisation has taken place the insertion of the h-element has to be parasitic on I-adjunction so that non-derived palatals are immediately removed from the equation and hence giving us the desired DEE. Clearly, voicing (L-element) plays a role in spirantisation as only voiced palatals are subject to it. We can thus tentatively charachterise the conditions of spirantisation as in (7a) to yield a structure as in (7b).

(7)a. Constraints on spirantisation

Adjoined I atrracts h
h and H do not combine

b. Spirantisation: ǰ → ž

	ǰ	ž
L/H line	L	L
ʔ /h line	ʔ	«ʔ» h
R/I line	I	I

Non-derived palatals, which fail to meet the melodic structural configuration of targets of spirantisation, do not undergo spirantisation. On the other hand, other derived palatlas such as the voiceless /č/ and /š/ are ruled out by the additional constraint on spirantisation that blocks the mutual expression of the elements H and h.

3.2 Slovak diphthongization

In Slovak, two rules; vowel lengthening and diphthongization, are in a feeding relation that results in DEE when non-derived long vowels fail to undergo diphthongization. (See for details, Kenstowicz and Rubach 1987, Rubach 1993). Vowel lengthening is triggered by some affixes that are thus analysed as consisting of a lexical mora. We will for the current discussion mimic this analysis and assume that the relevant affix involves the addition of an empty CV. The diphthongization process only targets mid vowels and /æ/. Data are here taken from Łubowicz (2002).

(8)

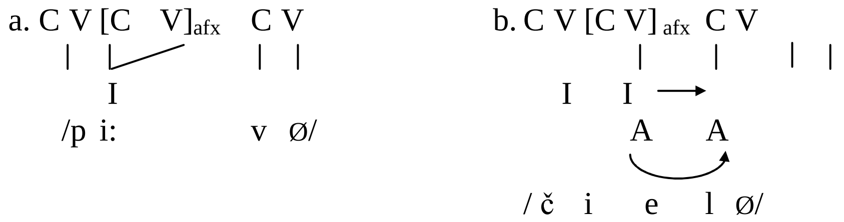
		vowel lengthening		diphthongization	
a. p[i]v + CV_{affix}	→	p[i:]v			‘beer’
b. č[e]l + CV_{affix}	→	č[e:]l	→	č [ie]l	‘forehead’
c. š[o]p + CV_{affix}	→	š[o:]p	→	š [uo]p	‘shed’
d. m[æ]s + CV_{affix}	→	m[a:]s	→	m[ia]	‘meat’

Non-derived long vowels: no diphthongization

e. dc[e:]r-a	→	dc[e:]ra	‘daughter’
f. m[o:]d-a	→	m[o:]da	‘fashion’

Here again, we would like to derive the difference between derived versus non-derived long vowels from a melodic structural difference. Notice here though that the difference will result from the addition of the empty affixal CV to the CV tier. As in previous cases the association of the melodic content of the vowels will differ in this derived environment. Consider the two possible derived long vowel structures in (9).

(9) derived long vowels & diphthongization



In (9a) where only one element is present it must spread to the following empty position of the affix and we expect and have no diphthongization effects. In (9b), on the other hand, where a complex expression with at least two elements is involved we may expect constraints on association. Thus while the I element may spread to the empty position, two adjacent A elements are illicit so A must hop rather than spread. We can assume the following vowel representations and constraints as deriving the effects of diphthongization.

(10) Complex vowels — Simplex vowels

e (I.A) o (U.A) æ (A.I) — i (I) u (U) a (A)

Constraint on diphthongization

non-head elements cannot spread

Under this formulation when an element is head in an expression (indicated by underlying in (10)) it can spread into a following empty position while non-heads can only hop, i.e. non-heads may not be adjacent in a sequence of segments. A further constraint on never leaving the initial expression empty must also hold to avoid (I) also hopping from the (A.I) expression so that the diphthong /ia/ results from /æ/.[5]

Non-derived long mid-vowels would in essence be identical to (9a) despite having complex expressions. The reason for this follows from their non-derived nature, i.e. they are lexcically specified with a complex melodic expression that is associated to two V slots as illustrated in (11) below.

[5] One could also formulate a constraint specific to A such as; Only non-head A can (and must) *hop*. This would avoid any further stipulations.

(11) non-derived long vowel

```
C V C V C V
 |   |___/   |   |
  U
  A
/m   o:      d  a/
```

A non-derived long mid-vowel therefore has no options of *hopping* its elements and can as such never show diphthongization effects.

3.3 Lenition in Campidaninan Sardinian

Bolognesi (1998) discusses voicing and lenition phenomenon in Campidaninan Sardinian (CS) that provide a further example of phonologically derived environment effects. In CS, a postvocalic voicing rule voices obstruents out of which voiced stops (and affricates) further undergo lenition. As should by now be expected, non-derived voiced stops do not undergo such lenition. Consider the data in (12).

(12)			post-vocalic voicing		lenition	gloss
a.	s:a [f]amil:ia	→	s:a [v]amil:ia			'the family'
b.	bɛl:u [p]iʃ:i	→	bel:u [b]ish:i	→	bɛl:u [ß]iʃ:i	'nice fish'
c.	dɛ[k]uat:ru	→	dɛ[g]uat:ru	→	dɛ[ɣ]uat:ru	'of four..'
	non-derived stops: no lenition					
d.	s:a [b]ia	→	s:a [b]ia			'the road'
e.	s:u [g]atu	→	s:u [g]atu			'the cat'

Similar to the Polish data, addition of the voicing element brings along with it the h-element that results in additional weakening of the voiceless stops. Fricatives that already contain h get no further h-element added and therefore we see no lenition effects there (12a). Since lenition is parasitic on voicing we expect no lenition in non-derived voiced stops as at no point do they get an L-element added to them. Voicing but no lenition for fricatives, versus, voicing and lenition for stops is shown in (13).

(13) Constraint on lenition

Lenition adds both L and h

```
              a.    f →v            b.   p→b→ß
                    |\                    |\
L/H line            H  \                 «H»  \
ʔ/h line            h    L               «ʔ»    L
R/I line                 h                      h
```

We have thus in the foregoing seen that the use of melodic structural differences between derived and non-derived segments in phonologically derived environments can account for the observed effects where non-derived segments fail to undergo particular phonological processes.

Although full consonantal inventories and the licensing constraints that derive them need to be established before concrete analyses can be made, the foregoing suffices to illustrate the feasibility of the proposed approach. It should also be noted that the solutions are in no way adhoc as similar processes of palatalisation and spirantisation are seen across langugaes and are in GP treated uniformly as resulting from the spread of the I element. In the same vein, for the Slovak diphthongization, the decomposability of complex vocalic expressions that is assumed in GP is also seen at play in various vowel fusion and coalescence processes cross-linguistically. Finally, lenition is standardly treated as the loss of stopness in combination with voicing and therefore the proposed analysis for Campidinian Sardinian is in this respect standard.

Let us now consider a few cases of morphologically derived environment effects and see if these too can be shown to follow from melodic structural differences.

4. Morphologically derived environments

There are two kinds of morphologically derived environment effects that are to be distinguished in morphologically complex stems. Those that restrict processes to applying only at morpheme boundaries and those that restrict phonological processes to applying to either the stem or the affix. I will view these two types of morphologically derived environments separately, for reasons that will become clear presently. Let us first consider cases where particular phonological processes only apply at morpheme junctures.

4.1 Junctural effects

Inkelas (1998) discusses a process of Turkish velar deletion that deletes stem final velars when an affix is added. Inkelas discusses these data in the context of developing an analysis of morphologically derived environment effects referred to as non-derived environment blocking. Her analysis, which will not be discussed here, utilises a notion of structural immunity by which segments may or may not be prepsecified for particular features. Archiphones that are underspecified for particular features can then be subject to the acquisition of features, i.e. be targets of phonological processes, while prespecified segments cannot, and hence show the relevant blocking effects. The reader is referred to Inkelas (1998) and references therein, for full details.

The Turkish data of relevance are shown here in (14).

(14) a.	bebek	‘baby’	b. sokak	‘street’
	bebe-i	‘baby-acc’	soka-ɨ	‘street-acc’
	bebe-e	‘baby-dat’		

In (14a) the suffixed forms of the accusative and dative both undergo /k/ deletion. Similarly, in (14b) the stem final /k/ also undergoes /k/ deletion. However, in (14b) the stem-medial /k/ does not delete because it does not occur at a morpheme juncture. An analysis that would treat velar deletion as conditioned by an intervocalic environment woud therefore fail to capture this failure of /k/ deletion.

Structurally, in GP, velar deletion takes place in the environment of reduction that applies when two empty positions occur in a sequence.[6] This follows from the assumption that all words end in a V and start in a C position. In this sense the stem

[6] Reduction can either be regarded as erasing the adjacent empty V and C positions or as failing to project them to higher structure (importantly the nuclear projection). In the latter sense, which we here adopt, these positions are inert and cannot be the target of spreading or alternation. Reduction is only an option in morphological contexts where morphological boundaries are irrelevant to phonology.

ends in a V position and the suffix begins in a C position. Consider the illustration of the environment of velar deletion in (15) below.

(15)a. velar deletion in reduction context

```
C V C V C V -  C V
  |  |  |  |  |          |
b  e  b  e  k  Ø     Ø  i    → [bebei]
```

b. medial *k*:no deletion in non-reduction context

```
C V C V C V -  C V
  |  |  |  |  |          |
s  o  k  a  k  Ø     Ø  ɨ    → [sokai]
```

The reduction context thus also presents a structural difference, albeit not a melodic one, between the context where a phonological rule applies and one where it does not. We can therefore account for morphologically derived environments of this sort by reference to a structural difference in the CV tier that results from suffixation.

Interestingly, for Turkish, the velar deletion rule does not apply to a suffix initial velar as the data in (16) show.

(16) No velar deletion in suffix

a. dört-gen	→	dortgen	'quadrilateral'
b. yedi-gen	→	yedigen	'septagon'
c. ora-da-ki	→	oradaki	'there-loc-rel'

The accurate generalisation then is that the deleting velar must be followed by an empty position, which is not the case in the data in (16) and therefore the suffix initial velar is not deleted.

The reduction context can also be seen to be at play for the first velar palatalisation process discussed earlier for polish, that is restricted to applying in morpheme boundaries alone. Recall that I-containing vowels in Polish trigger palatalisation of a preceding velar. Consider the additional data in (17) that show that first velar palatalisation does not occur in monomorphemic words.

(17) Restriction on first velar palatalisation

a. [ke]lner	'waiter'
b. a[ge]nt	'agent'
c. [x'i][gi]enistka	'hygienist

All the forms in (17a-c) fail to palatalise because they do not occur in a reduction context.

Another case where the reduction context plays a role is in Finnish assibilation (Kiparsky 1973, 1993) where /t/ assibilates to /s/ before /i/ but only when /i/ is a suffix. Thus in the examples in (18) stem initial /ti-/ does not assibilate.

(18) Finish /t → s/ assibilation only in reduction context

a.	halut-a	‘to want’	b. tilat-a	‘ to order’
	halus-i	‘wanted’	tilas-i	‘order-3sg.pret.’

As in Polish, the finnish facts follow from the assumption that assibilation applies only in reduction contexts so that the stem initial *-ti-* seuqence, that does not involve a reduction context, fails to trigger assibilation.

Further support for the reduction context as a relevant context for the application of phonological rules comes from cases of prefixation where lone consonant suffixes can be seen to be in an almost parallel context to the stem final position, i.e. followed by an empty nuclei, and are targets of phonological processes to the exclusion of stem internal positions. Consider in this respect pre-coronal laminalization in Chumash as documented in Applegate (1972). Pre-coronal laminalization turns /s/ into /□/ before another coronal but only when the intended target is morpheme final. Thus the data in (19a-c) with pre-coronal laminalization contrast with those in (19d-f) that do not exhibit the process. This difference is captured by the fact that a morpheme final coronal occurs before an empty position while a stem internal one trivially does not.

(19) Pre-coronal laminalisation

a.	s-lok’in	→	ʃlok’in	‘he cuts it’
b.	s-tepuʔ	→	ʃtepuʔ	‘he gambles’
c.	ka-s-tepet	→	kaʃtepet	‘it rolls’

No pre-coronal laminalization in monomorphemic words

d.	stumukun	‘mistletoe’
e.	wastuʔ	‘pleat’
f.	slowʔ	‘eagle’

(20) Pre-coronal laminalization only preceding an empty position

```
C  V  -  C  V  C   V  C  V
|  |     |  |  |   |  |  |
s  Ø     t  e  p   u  ʔ  Ø
```

(20) shows that a C-final prefix has a following V position under the basic assumptions of GP. It is important to point out here that the relevant empty positions for morphologically derived environments are morphologically empty positions as the attentive reader will no doubt wonder about the representation of (19d-f). In these cases the empty positions are phonologically empty and indeed licensed by proper government by the following realised vowel. Contrary to this, the empty position in (20) is licensed by verture of being in a morpheme (prefix) final position.

Morpheme junctural effects can thus be uniformly accounted for as occuring in a context where the target of alternation is followed by an empty position (that may or may not be subject to reduction). Let us now consider a few cases where morpheme intergrity rather than morpheme boundaries plays a role in determining where phonological processes apply.

4.2 Morpheme intergrity effects

Apart from morphologically derived environment effects that restrict phonological processes to applying only at morpheme junctures there is also another kind of DEE that restricts particular phonological processes to applying only either to the root or the affix. Consider in this respect the phonotactic requirement on Turkish derived words to be disyllabic, that some speakers display (Ito & Hankamer 1989, Orgun 1996). Thus while derived words such as (21a-b) are ungrammatical, the non-derived monosyllables in (21c-d) are acceptable.

(21) Turkish derived word minimality

a. *fa-m ‘musical note *fa*-1sg.poss: my *fa*’ (sol-um ‘my note *sol*’)
b. *be-n ‘eat-pass.’ (yut-ul ‘be swallowed’)

Non-derived words: no minimality

c. fa ‘musical note *fa*’
d. ye ‘eat!’

(21a-b) can have alternative derived forms, as shown in brackets, that do not violate the derived word minimality. This disparity between the phonology of roots and affixes is most insightfully treated in GP as a result of domain interaction in phonology-morphology relations. Building up on work in Kaye (1995), Kula (2002) notes that stems/roots and affixes can be regarded as forming independent domains that are themselves in head-dependent relations.[7] The Turkish distribution in (21) can in this sense be regarded as a restriction on the size of the dependent affix domain if it is present. The dependent must contain at least one syllable with a full vowel. An illustration is given in (22a-b).

(22) Domain dependency

a. * [[fa]$_H$ [mØ]$_D$] b. [[sol]$_H$ [ØumØ]$_D$] c. [fa]

(22a) shows a dependent domain that has no full vowel and is hence ungrammatical. (22b) shows an acceptable dependent, and (22c) shows monomorphemic words that have no dependents and hence no environment for the minmality effects to apply on, resulting in possible monosyllabic outputs. The fact that the two domains are independent has some bearing on the requirement for at least one full vowel. Vowelless syllables are probably not good independent words in Turkish and therefore despite empty nuclei being allowed in general within words and at the end of words, an independent domain cannot conatin no realised vowel at all. Needless to say that the relevant generalisation is not one formed on syllables in GP as -CØ- is a well-formed syllable.

With such independent domain structures we can characterise both effects that apply only to roots and those that apply only to affixes by restricting the domain of application to the relevant domain. Basque /a/ to /e/ raising that is blocked in roots and only applies in suffixes and clitics can in this respect be formulated as a phonological process that targets dependent domains. In the same vein, a number of

[7] Kaye (1995) distinguishes between phonology-morphology interactions where internal morphological domains are phonologically visible; the case at hand, and where they are not; the junctural effects as discussed in section 4.1.

tonal processes in many Bantu languages can be shown to be restricted to the head domain.

Finally, given the independent domains scenario, we expect that phonological processes need not necessary target segments at the edges of morphemes but also those internal to morphemes. The Basque /a/ to /e/ suffixal raising is an example but consider another vowel raising process in Uighur as discussed in Orgun (1994, 1996). In Uighur, the rightmost vowel of a stem raises when it is in a non-final open syllable. Consider the data in (23) drawn from Inkelas (1998).

(23) Uighur vowel raising

a.	qazan	‘pot’	b.	bala	‘child’
	qazan-ni	‘pot-acc.’		balɨ-lar	‘child-pl.’
	qaz□n-i	‘pot-3sg.poss’		bal-lɨr-i	‘child-pl.-3poss’

In (23a) no raising of the stem final vowel is seen in the first form because (according to Orgun 1994, Inkelas 1998) it does not occur in a non-final open stem syllable. The same holds for the accusative form with a C-initial suffix. A vowel initial suffix as in the possesive form, on the other hand, triggers /a/ raising as the syllable containing /a/ is now the rightmost stem non-final open syllable. Similar effects are seen in (23b), where notice though that raising also applies to the suffix vowel in /bal-l□r-i/. This form also undergoes an unrelated vowel deletion rule.

The relevant derived environment here is that the raising process does not apply in unsuffixed stems (cf. form for *child* in 23b) but is rather restricted to suffixed stems and further, as (23) illustrtaes, it is the righmost vowel of the stem that is affected. Let us consider what structures derive these outputs in GP in (24).

(24) Uighur vowel raising domains

(i) applies:	a. [qazɨnØ-Øi]	b. [balɨ-larØ]	c. [balØ-lɨr-i]
(ii) does not apply:	a. [qazanØ-ni]	b. [bala]	

One could, gievn (24ic), concieve of the raising process as primarily applying at the right edge of suffixed forms, the trigger always being a suffix (trivially ruling out 24iib). A constraint on this process would then be that the triggering vowel must be adjacent to the target vowel (on the nuclear projection); a situation that is achieved by reduction in (24ia) but not in (24iia). The requirement for adjacency between trigger and target is also illustrated by (24ic) where the stem may not even be reached by the raising process allowing the possible stem target to even be deleted by another phonological process.

Under a domains analysis though, there would have to be no independent internal domains in (24) otherwise we would expect raising to always be restricted to one domain. These data would then, like in the juncture effects cases, have to be treated as consisting of a single domain whose morphological boundaries remain invisible to phonology. It therefore seems safe to conclude that if there is contact between the stem/root and the affix then one phonological domain is present and if there is none, in which case a disparity is seen between root and affix in rule appliaction, then two phonological domains are operative.

5. Conclusion

Derived environment effects, where particular phonological processes are restricted to applying only in derived environments have been treated in GP as best analysed as resulting either from melodic or constituent structural differences in both phonologically and morphologically derived environments. The former has been used to account for why only derived segments are, in the cases discussed, the only targets of further rule application; they, unlike non-derived segments, display the necessary configuration of elements. The latter has been used to account for junctural effects as essentially involving single phonological domains in morphologicaly complex words where either reduction or empty nuclear sites provide the context for phonological rule application. In addition, we have seen that morphologically complex words with internal phonological domains can be used to characterise phonological rule application that is restricted to either root/base or affix domains.

I leave the discussion of previous analyses and the assessment, both in terms of overlap and viability of approach, to a future occasion.

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