Małgorzata Ćavar, University of Zadar, Croatia

Derived Environment Effects in A Surface-Oriented Theory[1]

1. Introduction

Phonological literature knows many examples of processes which do not apply across-the-board, i.e., whenever the structural description is met, but rather their application is restricted to the so-called derived environment. The notion of derived environment has been defined in Kiparsky (1973) as in (1).

(1) Derived Environment (Kiparsky 1973, cited after Rubach 1984)
(a) Two segments are separated by a morphological boundary.
(b) A segment is created in the course of phonological derivation, i.e. it is not present at the underlying level but rather it is derived by applying a rule.

A classical example of the derived environment effect comes from Finnish, where /t/ changes to [s] before [i] as in (2a). Yet, not all [i]s trigger spirantization: morpheme-internal /t/s are not changed to [s] before surface [i]s, compare (2b).

(2) Derived environment effects in Finnish
(a) Rule applies at a morpheme boundary

halut+a	halut+koon	halut+en	halus+i	'want'
piet+æ	piet+køøn	piet+en	pikes+i	'pitch'
filmat+a	filmat+koon	filmat+en	filmas+i	'film'

(b) Rule doesn't apply morpheme-internally
tila 'room'
æiti 'mother'
mæti 'roe'
silti 'however'
limonaati 'lemonade'
valtion 'public'

The rule applies also morpheme-internally, but only if the trigger is not underlying but instead it is derived via an earlier applied rule, as in (3):

(3) Finnish: derived environment via application of an earlier rule.
(a) Rule applies morpheme-interenally if the trigger is not underlying
vete+næ 'water' essive sg. vesi 'water' nom. sg.
(b) Earlier rule /e/ → [i] creating the surface trigger for spirantization.
mæke+næ 'hill' essive sg. mæki 'hill' nom. sg.

Whereas this kind of effects received lots of attention and a framework-internally motivated account within Cyclic and Lexical Phonology, the distinction between across-

[1] I would like to thank Joanna Błaszczak for her help in the preparation of the final version of the article.

the-board and derived environment phenomena has so far escaped a systematic and broadly-recognized account within the Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1986/1996, McCarthy 2002; henceforth OT).

In this article, I offer a new systematic approach to explain derived environment effects without reference to derivations, which can be incorporated into OT-type analysis. This solution, however, does not intrinsically rely on OT concepts but rather is a general surface-oriented approach that can be adopted by any-surface oriented phonological framework. In section 2, I will review the classical approach to the derived environment within the Cyclic and Lexical Phonology framework. Section 3 discusses some earlier approaches to the derived environment within OT, most importantly that of Łubowicz (1998, 2002), and section 4 offers an alternative approach in terms of the alternating environment. In section 5 the new approach is tested against the problematic data from previous sections. Section 6 discusses general predictions of Łubowicz's solution (1998, 2002) and of the related approach by McCarthy (2003). Finally, section 7 provides the summary of the findings.

2. Derived Environment, Cyclic and Lexical Phonology

It is often assumed that most palatalization processes in Polish apply across morpheme boundaries only; that is, they apply only if the target is stem-final and the trigger is suffix-initial, and the adjacency is due to morpheme concatenation.

(4) Example of morpheme-boundary palatalization

lip+a	li[p^{j}j]+e	'linden', nom. sg. versus loc. sg.
ry[b]+a	ry[b^{j}j]+e	'fish', nom. sg. versus loc. sg.
la[t]+o	le[tɕ]+e	'summer', nom. sg. versus loc. sg.
ra[d]+a	ra[dʑ]+e	'advice', nom. sg. versus loc. sg.
ra[s]+a	ra[ɕ]+e	'rase', nom. sg. versus loc. sg.
ra[z]	ra[ʑ]+e	'one time', nom. sg. versus loc. sg.
kro[k]	kro[tš]+ek	'step' versus 'step' dimin.'
móz[g]	móż[dž]+ek	'brain' versus 'brain' dimin.

The distribution of palatalized and non-palatalized segments morpheme-internally is, on the other hand, unpredictable, thus, palatalization must be part of the underlying representation.

(5) Unpredictable distribution of palatalization morpheme-internally

[b]ez	'without'	[b']es	'devil'
[t]en	'this'	[tɕ]eń	'shadow'
[s]er	'cheese'	[ɕ]erść	'fur'
[k]ępa	'river island'	[c]elce	'Kielce, place name'

To account for the difference between regular palatalization across morpheme boundary and the lack of palatalization morpheme-internally in forms such as those in (5), Rubach (1984) assumes that the palatalization in Polish applies in the derived environment. Notice that any explanation referring to co-phonologies, where palatalization applies in

native vocabulary and not in the vocabulary of a foreign origin, cannot be a solution. Words of a foreign origin undergo palatalization too, if the derived environment condition is fulfilled, i.e. in cases when a morpheme triggering palatalization is added onto a foreign stem the final consonant of the stem will be palatalized.

The Cyclic and Lexical Phonology analysis was that palatalization applies only across a morpheme boundary because it is cyclic, and cyclic rules are subject to Strict Cycle Condition, as below:

(6) Strict Cycle Condition (Kiparsky 1982:4)
Cyclic rules apply only to derived representations.
Definition: A representation φ is derived w. r. t. rule R in cycle j iff φ meets the structural analysis of R by virtue of a combination of morphemes introduced in cycle j or the application of a phonological rule in cycle j.

Thus, palatalization will apply in examples in (5) because the relevant sequence of a to-be-palatalized consonant followed by a palatalizing vowel is created by a morpheme concatenation.

3. OT and Derived Environment

In OT, we still have to account for the derived environment effects though we cannot refer to the notion of derivation, at least not in the main stream OT, which excludes the possibility of a serial derivation.[2] In the following, some OT approaches to the derived environment effects will be presented and evaluated, and it will be demonstrated why another solution of the derived environment problem needs to be proposed.

3.1. Root versus general faithfulness

One solution is to propose that satisfaction of faithfulness constraints for the roots is cross-linguistically more important than for the non-root morphemes (McCarthy and Prince 1995). Thus, a constraint ranking as in (7) is claimed to hold universally:

(7) Root-Faithfulness >> Faithfulness

Within this approach, the blocking of the markedness constraint morpheme-internally may be easily accounted for by the ranking of the markedness constraint higher than the general faithfulness constraint, and lower than the root-faithfulness:

(8) Root-faithfulness >> Markedness >> Faithfulness

Kager (1999) illustrates this mechanism on the example of the nasal substitution in Indonesian (Pater 1999). In verbs prefixed by /məN−/, the unspecified for place nasal consonant of the prefix is coalesced with the consonant of the stem when it is a voiceless consonant, leaving a nasal with the articulation place of the voiceless consonant, e. g.:

[2] An alternative would be to accept serial evaluation in OT (Kiparsky 2000, Rubach 2000, 2003)

(9) Indonesian nasal substitution (Kager 1999:59)

məN+pilih > məmilih	'to choose, to vote'
məN+tulis > mənulis	'to write'
məN+kasih > məŋasih	'to give'

The data in (9) is accounted for by a constraint ∗NC[-vd] (no nasals followed by voiceless consonants). As observed by Pater (1999), the nasal substitution does not occur morpheme–internally. Pater proposes a root particular version of Linearity-IO, as defined in (10), and further, a ranking, as shown in (11):

(10) RootLinearity-IO
The output reflects the precedence structure of the input segments of the root, and vice versa.

(11) Blocking of the root-internal fusion
RootLin-IO >> ∗NC˚ >> Linearity-IO

A ranking in (11) may correctly predict the surfacing of the sequence nasal + voiceless consonant morpheme-internally, see tableau (12):

(12) Fusion in Indonesian

(a) Example

/məN$_1$+p$_2$ilih/	Root Lin-IO	*NC[-vd]	Lin-IO
(a) məm$_1$p$_2$ilih		*!	
☞(b) məm$_{1,2}$ilih			*

(b) Blocking of root-internal fusion

/əm$_1$p$_2$at/	Root Lin-IO	*NC[-vd]	Lin-IO
(a) əm$_1$p$_2$at		*	
☞ (b) əm$_{1,2}$at	*!		*

Unfortunately, this solution is not applicable to Polish palatalization. Assuming that we have a constraint effecting palatalization (PAL), and a faithfulness constraint referring to either segments or particular features of the segments (Faith-IO), and the ranking with the faithfulness constraint operating in roots only dominating the markedness constraint PAL, the result of the evaluation would not deliver the correct output; see (13):

(13) Root faithfulness over Markedness approach: predictions for Polish

(a) No palatalization morpheme-internally

/test/	Root Faith-IO	Pal	Faith-IO
☞ (a) test		*	
(b) tɕest	*!		*

(b) Palatalization across morpheme boundary

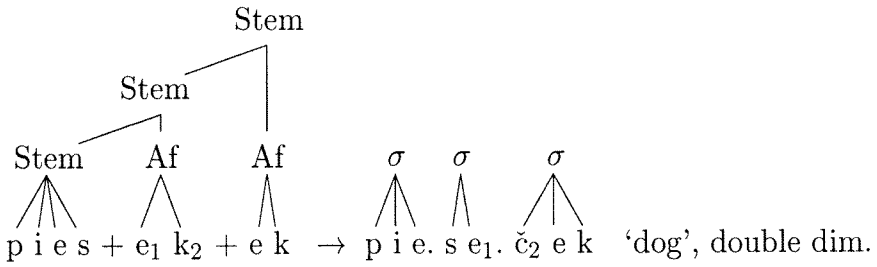
/krok+ek/	Root Faith-IO	Pal	Faith-IO
☞ (a) krokek		*	
☜(b) krotšek	*		*

The assumption that the root faithfulness is ranked over the markedness constraint, would explain why there is no palatalization morpheme-internally, but then we would actually expect that palatalization should not happen stem-finally either: in actual fact, it is a stem consonant that undergoes palatalization, that is, violates faithfulness. Thus, a root-particular faithfulness constraint does not solve the problem with the derived environment data in Polish.

3.2. Local conjunction with ANCHOR

Another approach has been proposed by Łubowicz (1998, 2002). She observes that, since the relevant palatalizing suffixes in Polish are always vowel-initial, and since a preceding consonant will always syllabify as an onset for the suffix-vowel, then the constraint which requires the rightmost edge of the stem in the input to correspond with the rightmost edge of the syllable in the output (cf. also Łubowicz 2002) will always be violated in forms with palatalization. This is illustrated in (14):

(14) Violation of stem: syllable anchoring among suffixes (Łubowicz 1998:24)



In (14), the [k_2] of the first affix is treated as stem-final. It will be syllabified as an onset of the final syllable if we add another suffix *–ek*. Thus, the right edge of the stem ([$č_2$]) does not correspond on the surface to the right edge of the syllable, which is [e_1].

Łubowicz (1998:24) postulates in her analysis R-ANCHOR(Stem; δ) constraint, as quoted in (15). Then, she proceeds to analyze the derived environment problem in terms of local conjunction of R-ANCHOR(Stem; δ) and a constraint inducing palatalization (in her approach understood as articulatory spreading):

(15) R-ANCHOR(Stem; δ)
The rightmost segment of a stem in the input has a correspondent at the right edge of a syllable in the output.

The following constraints were used in the analysis in Łubowicz (1998) but not specifically defined:

(16) Constraints used in Łubowicz (1998)
(a) PAL (yields adjoining of feature Coronal to the preceding consonant).
(b) R-ANCHOR(Stem; δ) & PAL understood as "palatalize when R-ANCHOR(Stem; δ) is violated".

A local conjunction is violated when both of its member-constraints are violated (Smolensky 1993). Thus, when only the first constraint is violated, or only the second one is violated, or none of them is violated, then the conjunct is not violated either, see the table (17) below.

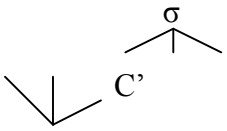
(17) Local conjunction: predictions

	R-ANCHOR(Stem, σ) & PAL	R-ANCHOR(Stem, σ)	PAL
i.	not violated	violated	not violated
ii.	not violated	not violated	violated
iii.	not violated	not violated	not violated
iv.	violated	violated	violated

The four cases in (17) will be discussed below in detail to demonstrate that the application or non-application of palatalization in Polish is not regulated by the conjunction of PAL and R-ANCHOR(Stem; σ), in other words, other factors have to be included.

Case iv. of (17) predicts correctly that given violation of ANCHOR, PAL has to be satisfied to satisfy Local Conjuction. Case i., where ANCHOR constraint is violated and PAL is not violated, corresponds to the cases when palatalization applies across a morpheme boundary. The prediction is that palatalization should apply in this environment.

(18) ANCHOR violated, PAL not violated

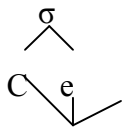


Stem

k r o tš e k

Case ii., where ANCHOR is not violated and PAL is violated, corresponds to two situations. First, morpheme-internal sequences consonant + front vowel in line with the predictions of the Local Conjunction approach are not palatalized.

(19) ANCHOR not violated morpheme-internally



Stem

g e n

However, there is a small set of data which constitutes a counter-evidence to the conjunction approach. This is data involving so-called Surface Velar Palatalization (cf. Rubach 1984), where underlying /k, g/ surface as prevelars [c, ɟ] before surface front vowels. Surface Velar Palatalization normally also applies only across a morpheme

boundary. Yet, it applies also morpheme-internally when the trigger is not an underlying front mid vowel but rather it is derived from an underlying yer. In the derivational approach, such cases fall under the phonologically derived environment. The examples are numerous:

(20) Examples of Surface Velar Palatalization

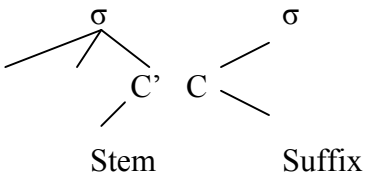
[ɟ]ez	[g]zy	'gadfly', sg. versus pl.
szwa[ɟ]er	szwa[g]r+a	'brother-in-low', nom. versus gen. sg.
is[c]er	is[k]r+a	'spark', gen. pl. versus nom. sg.
cu[c]er	cu[k]r+u	'sugar', nom. versus gen.'

If Surface Velar is induced by the conjunction of a constraint triggering palatalization with R-ANCHOR(Stem, δ), then the prediction would be that [ɟ]ez and [g]en should be treated the same way, which is not borne out, compare (21).

(21) R-ANCHOR & PAL

Another environment where case ii. obtains involves sequences where the morpheme boundary intervenes between two consonants. The first consonant is syllabified as a coda of the syllable within the stem, the second syllable is syllabified as an onset of the syllable containing the suffix, and the morpheme boundary coincides with the syllable boundary. Thus, ANCHOR is not violated. Łubowicz (2002:265) assumes that her model makes a general prediction "that a C-C boundary will not in general trigger derived environment effects because it does not result in stem-syllable misalignment".

(22) ANCHOR not violated stem finally



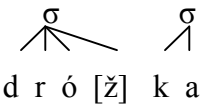
The prediction would be that palatalization does not apply. Yet, there is a set of data that contradicts this prediction. These are the cases of palatalization triggered by underlying yers which do not surface, though palatalization applies in the surface form.

(23) dró[ž]+k+a 'way', dimin., cf. drog+a 'way'
UR: /dŕog +ьk+a/ for ь=palatalizing yer

If the output surface syllabification is considered, according to the definition given by Łubowicz (1998:24), ANCHOR is not violated, because in the absence of a surface

nucleus, the final segment of the stem syllabifies as a coda to the syllable containing other segments of a given morpheme; compare (24).

(24) Surface syllabification of dró[ž]+k+a



If we wanted to evaluate the syllabification with the vocalic segment, we would have to refer to the underlying representation (input). This is problematic for two reasons. First, we would have to assume that there is syllabification in the input already, stored in the lexicon. Second, we would have to evaluate the input – which is against the theorem of Richness of the Base, for example, as defined in Kager (1999):

(25) Richness of the Base (Kager 1999:19)
No constraints hold at the level of underlying form.

Łubowicz (2002) explains the cases as in (23) in terms of faithfulness to a sympathetic candidate (McCarthy 1999; for a critique of Sympathy Theory, see e.g. Kager 1999). Apart from the fact that an independent mechanism needs to be invoked to account for a subset of data, it seems also that the choice of the selector constraint and, consequently, of the sympathetic candidate is not independently justified.

The examples in (20) and (23) are actually not excluded by local conjunction approach. Case iii. of local conjunction (cf. (17)) actually predicts exactly the opposite of what case ii. predicts. In cases when ANCHOR is not violated, palatalization can apply and still satisfy the local conjunction. The data involving morpheme-internal sequences without palatalization as in (20) are an apparent counterevidence to case iii., and the data with a yer triggering palatalization across morpheme boundary, as in (23), seem to support the analysis. What this shows is that the local conjunction does not regulate palatalization processes for at least two sets of data, in (20) and (23). In other words, local conjunction predicts that palatalization may either apply or not apply. The generalization that palatalization does not apply as a process morpheme-internally and it does apply as a process across a morpheme-boundary escapes explanation. The actual table for the Polish data should be rather as below:

(26) The actual effects of the local conjunction and the Polish data

		R-ANCHOR (Stem,σ)	PAL
i.	Desired surface result (kro[tš]+ek)	violated	not violated
ii.	Correct prediction stem-internally (kelner), incorrect prediction stem-finally (dró[ž]+k+a)	not violated	violated
iii.	Incorrect prediction stem-internally (kelner), correct prediction stem-finally (dró[ž]+k+a)	not violated	not violated
iv.	Excluded in line with facts	violated	violated

Łubowicz (1998) observes that case iii. may deliver undesired effects in that it will not predict that morpheme-internal consonants have to remain unpalatalized. To exclude case iii. of the local conjunction from the discussion, Łubowicz argues (1998: 24-25):
"Since Palatalization is activated by the violation of anchoring, there is no Palatalization of a segment that vacuously satisfies anchoring, such as tautomorphemically. Only stem final segments can palatalize, precisely because only such segments can incur a violation of anchoring. (. . .) The locally conjoined constraint is only relevant when the palatalizing segment is stem final (. . .) Otherwise, the conjoined constraint has no force, and so lower ranked constraints are decisive."

It seems that this argumentation is equal to saying that some candidate is not evaluated with respect to a particular constraint, because there is no way this candidate can violate the given constraint. I am not aware of other formal applications of the distinction between vacuous and non-vacuous application of a rule/constraint/generalization. In any case, the analysis involving local conjunction leaves a number of unanswered questions.

4. An alternative proposal: Alternating Environment

In what follows, I propose an alternative solution to the derived environment problem. This idea was inspired by Timberlake (1978), who distinguished between alternating versus non-alternating environments in language change. What differentiates the morpheme-boundary environment from a stem-internal environment on the surface is the fact that in the across-the-morpheme environment, different sequences of neighboring segments may occur: throughout the paradigm and within a word family. Let us, for example, consider the paradigm of *sinus* 'sinus':

(27) Paradigm of *sinus* 'sinus'
Nom. [sinus], [sinusɨ]
Gen. [sinusa], [sinusuv]
Dat. [sinusovi], [sinusom]
Acc. [sinus], [sinusɨ]
Instr. [sinusɛm], [sinusami]
Loc/Voc. [sinuʨe], loc. pl. [sinusax]
Dimunitive [sinuʨik], etc.

Whereas after [s_1] of [$s_1$inus$_2$] – throughout all the forms of the paradigm – the sequence of the following segments is [-inu], [s_2] is followed by a number of various segment sequences. This might account for a different status of the segments: [s_1] will not palatalize, [s_2] will undergo palatalization. Let us define formally the Alternating versus Uniform environment.

(28) Alternating Environment: definition
For A, which is a target, B – a potential trigger, C – an adjacent segment, an environment is alternating when there is more than one surface realization of the underlying sequence of A, B, (C) within the set of morphologically related surface forms.

An alternating environment refers to morpheme-boundary environments, where A and B belong to a separate morpheme, as in (29).

(29) Environment

Non-alternating	Alternating
AB+C, AB+D	A+B(C), A+(C)

for A = target, B = environment, C, D = adjacent segments

An alternating environment would encompass also the cases of the derived environment without a morpheme boundary, i.e., where it has been created via the application of earlier rules within the framework of cyclic/lexical phonology, or using OT formalism, when the generalization holds for only those surface candidates where the trigger is unfaithful to the input anyway:

(30) Phonological derived environment
(a) Deletion/Epenthesis: ABC versus AC
(b) Feature changing: ABC versus ADC

The difference in the application of certain constraints in the alternating versus non-alternating environments may be motivated by the learning strategies characteristic to the human cognitive system. In a uniform environment, we have no positive evidence for the application of any constraint the representation obeys. An alternating environment, in contrast, makes the generalization more salient; it is more obvious that there is some requirement on the surface form depending on the properties of the environment, since the same segment may surface in different environments.

Finally, markedness requirements may be blocked by the faithfulness constraints in the uniform environment more likely than in the alternating environment; cf. Anderson (1981). Whereas other OT solutions are more abstract (e.g., they employ theoretical concepts such as affix, stem, syllabification, anchoring), the concept of the alternating versus uniform environment refers to surface sequences of segments, and might be psychologically grounded.

Formally, to distinguish between the alternating and uniform environment in OT, a constraint Uniform is postulated:

(31) Uniform ABC
A sequence of segments A, B, C is realized on the surface in a uniform way throughout a paradigm and morphologically related word forms, where A, B, C are adjacent segments out of which A is a potential target of a generalization, and B – a potential trigger.

For example, in the word [$s_2$inus$_2$ax] (cf. (27)), the sequence [$s_1$in−] satisfies Uniform because it is rendered uniform throughout the paradigm. In contrast, [−$s_2$ax] violates uniform because, first, [s_2] may be followed by a different sequence of segments [−i̶], [−ami], [−Ø], and, second, [s_2] itself may correspond to another segment which differs in the featural make-up, i.e., [ç]. A constraint limited to the alternating environment may be formally expressed as disjoint with Uniform; see (31):

(31) Constraint X ABC ∨ Uniform ABC
Logical Inequivalence "Constraint X ABC ∨ Uniform ABC" is satisfied when either Constraint X ABC is satisfied, or Uniform ABC is satisfied.

The effect of the macro-constraint in (31) is that as if any given Constraint X is activated by the alternating environment. That is, the relationship between the two constraints is rather that of a Logical Inequivalence (exclusive OR), where the expression is true only if one of the subexpressions is true, but not if both subexpressions are true.[3]

5. Comparison

Since the solution based on the difference between stem-particular and general faithfulness constraints (Pater 1999) cannot be applied in Polish, we concentrate in this section on the comparison of Łubowicz's solution and the one proposed in this paper.

It has been argued earlier that Łubowicz's approach does not account for the data of Surface Velar Palatalization, as repeated below.

(32) Surface Velar[4]

(a) Surface Velar applies obligatory across morpheme boundary

krok	kro[c]+em	'step' nom. versus inst. sg.
bra[k]	bra[c]+em	'lack' nom. versus inst. sg.
wyso[k]+a	wyso[c]+ej	'tall' nom. versus gen. sg. fem.
	wyso[c]+emu	'tall', dat. sg. masc./neut.
dłu[g] + a	dłu[ɟ] + ej	'long' nom. versus gen. sg. fem.
	dłu[ɟ] + emu	'long', dat. sg. masc./neut.

(b) No Surface Velar morpheme-internally

[g]en	'gen'
[k]elner	'waiter'

In fact Polish has no sequences [k]+e, [g]+e, where the two sounds would be separated by a morpheme boundary, i.e. velar stops are obligatorily surface palatalized before a front vowel. On the other hand, there is no such requirement for morpheme-internal sequences, as demonstrated in (32b).

Interesting for us is the data as in (20), repeated here in (33), where the front vowel appears morpheme-internally but still triggers Surface Velar. Rubach (1984: 176-177) notes that there is a "systematic relationship" between palatalized velars and underlying yers. Underlying yers, if they surface, they surface as front mid vowel and trigger secondary palatalization (Surface Velar Palatalization) on the velar stops, as in (33):

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[3] Crowhurst and Hewitt (1997) proposed a typology of constraint interaction based on the principles of Boolean logic, and assumed that the cases like the one discussed in (17) are really examples of a disjunction. They did not discuss cases of type (31).

[4] In fact, the generalization is broader, embracing also sequences with a high front vowel, but this is irrelevant for our argument and is not going to be discussed.

(33) Yer-zero alternation/Surface Velar (Rubach 1984: 177)

[ɟez] ‘gadfly’	[gz+ɨ] nom. pl.
szczy[ɟew] ‘bird art’	szczy[gw]+a gen. sg.
szwa[ɟer] ‘brother-in-law’	szwa[gr]+a gen. sg.
is[cer] ‘spark’, gen. pl.	is[kr]+a nom. sg.
cu[cer] ‘sugar’	cu[kr]+u gen. sg.
cer[cev] ‘orthodox church’	cer[kv]+i gen. sg.

There are no cases in Polish where a morpheme-internal yer would surface after a velar, and the velar would not be palatalized.

In (33), morpheme-internal sequences are treated like the sequences at the morpheme boundary. This is predicted by the definition of the alternating environment that I proposed in section 4. Throughout the paradigm, we observe alternations with respect to the sequences in question between the presence versus absence of a surface vowel. Consequently, the examples in (20)/(33) may be analyzed in the same way as sequences at the morpheme boundary. Since it is an alternating environment, the prediction is that surface palatalization will apply as in the case of the morpheme boundary context. The prediction is borne out.

Similarly, the alternating environment approach has no problem with accounting for the data of ‘dró[ž]ka’ type, as in (23). The paradigm of ‘dró[ž]ka’ is given below.

(34) Paradigm of ‘dró[ž]ka’

Nom.sg. dró[ž]+k+a, Gen. sg. dró[ž]+k+i, Dat. sg. dró[ž]+[ts]+e, Acc.sg. dró[ž]+k+ę, Inst.sg. dró[ž]+k+ą, Loc.sg. dró[ž]+[ts]+e, Nom.pl. dró[ž]+k+i, Gen.sg. dró[ž]+ek, Dat.sg. dró[ž]+k+om, Acc.pl. dró[ž]+k+i, Instr.pl. dró[ž]+k+ami, Loc.pl. dró[ž]+k+ach

The final segment of the stem is followed on the surface by either [k], or [ts], or vowel [e], thus, it appears in an alternating environment and is subject to palatalization.

6. Further discussion

Łubowicz’s solution makes another prediction, that there are no derived environment effects triggered non-locally. Łubowicz (2002) analyzes one potential counterexample: Vowel Raising in Basque (Hualde 1989). She proposes a solution in terms of an independent mechanism, i.e., positional faithfulness (Beckman 1995, 1997, McCarthy and Prince 1995), similar like the approach to Indonesian nasal substitution discussed in the previous section. Thus, the apparent counter-examples are not covered by Łubowicz’s proposal but require an independent account.

There are apparently more counter-examples to the predictions made by Łubowicz’s proposal. Apart from the Basque Vowel Raising, Blaho (in press) shows that Łubowicz’s approach cannot be adopted for the derived environment effects applying to pre-sonorant voicing in Slovak because pre-sonorant voicing in Slovak takes place independently from the syllabification of the affected consonants. Thus, Łubowicz’s solution does not seem to offer a general cross-linguistically applicable approach to Derived Environment effects.

The two approaches, that of Łubowicz (1998, 2002) and the one proposed here, would make different predictions in one more respect. Notice that Łubowicz’s solution

makes a principal distinction between the two kinds of the derived environment, i.e. morphological (by morpheme concatenation) and phonological. The derived environment of a morpheme boundary will be explained by a local conjunction with ANCHOR constraint, and the derived environment resulting from a prior application of a rule will be expressed by a conjunction with faithfulness: a surface effect will only occur when the underlying feature is not faithfully rendered on the surface (cf. Łubowicz 1998). The solution proposed here does not make an a priori distinction between the two types of the derived environment, consequently, the same surface effect might appear with or without surface morpheme boundary, as long as the environment is alternating.

One can also ask about the external grounding of a PAL & ANCHOR conjunct: is it articulatory, acoustic, perceptual or psychological? What is the particular relation between triggering palatalization and the correspondence between the edge of a morpheme and its syllable affiliation on the surface? This relation seems arbitrary, an artifact of the theory rather than a valid observation. On the other hand, the current proposal seeks external, independent grounding.

Yet another approach to the derived eenvironment is that of McCarthy (2003) who differentiates between the 'old' violations of markedness present already in the input (M_O), and the 'new' violation of markedness introduced in the output (M_N). Also, McCarthy assumes that this division will hold for both OO-Correspondence and IO-Correspondence. This mechanism tackles aptly the problems that Local Conjunction was designed to solve. It accounts for the difference in the treatment of sequences morpheme-internally and sequences across a morpheme boundary, since morpheme internal sequences violate only 'old' markedness constraints, and the sequences across the morpheme boundary violate 'new' markedness constraints. This mechanism also accounts for the difference in the treatment of sequences involving underlying trigger and the sequences involving a derived trigger because the former sequences will violate the 'old' markedness and the latter – the 'new' markedness. Apart from the proliferation of constraints and rankings, which might be seen as undesired, the prediction of this approach would be, similarly as in Łubowicz's Local Conjunction, that phonological and morphological derived environment are unrelated because they are regulated by two independent sets of constraints: IO-constraints and OO-constraints, respectively. Thus, the prediction would be that this is a pure coincidence if a given process applies both in a phonological and a morphological derived environment in a given language. It is difficult or even impossible to falsify this prediction, yet the two languages discussed in this paper in more detail, Finnish and Polish indicate rather something to the opposite, that is, that phonological and morphological effects in principle can be treated the same way. Another question is, of course, that of psychological reality of the distinction between old and new markedness and the distinction between input-output and output-output correspondence. Finally, and most importantly, the solution proposed by McCarthy (2003) is not surface-oriented as it requires an indirect evaluation of the input structure and seems yet another compromise of the theory towards the data.

7. Summary

There seems to exist a systematic distinction between processes which apply across-the-board and those which are limited to the derived environment, yet OT did not work out a systematic approach to derived environments effects. The solution in terms of the

universal ranking of Stem-Faithfulness over general Faithfulness proposed by Pater (1999) cannot apply to Polish data because it does not explain why some stem consonants (stem-final) do alternate whereas some others (stem-internal) do not. The solution offered by Łubowicz (1998) in terms of a conjunction of constraints with ANCHOR, basically relying on the relationship between the palatalization and morpheme and syllable edges does not account for two sets of data. First, it does not cover the palatalization without the surface trigger. Second, it makes wrong predictions for morpheme-internal palatalization, which in earlier approaches has been regarded as the second case of derived environment (cf. the definition in (1)), with the trigger derived not from the concatenation of morphemes but from the prior application of another rule. Finally, McCarthy's (2003) Comparative Markedness is not a surface-oriented solution, as it requires a reference to the input.

The new proposal in terms of the alternating environment does not refer to either derivation or to the underlying representation, but instead refers to simple surface regularities. It is argued that the derived environment effects apply actually in an alternating environment, defined as a relation of the segment to the adjacent segments, which does not surface as uniform throughout the paradigm. The prediction is that the two cases of the derived environment, i.e., those which involve a morphological boundary, and those which are triggered by segments violating faithfulness, can and should be treated in the same way. This seems to be a desired effect with respect to the Polish (and Finnish) data. The notion of the alternating environment does not need to rely on any OT theory internal concept and, thus, can be adopted in any output-oriented phonological theory.

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