Partial Ranking and Alternating Vowels in Polish

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1. Introduction

The three nominal paradigms in (1) illustrate the fundamental problem posed by Slavic alternating vowels, called yers. In (1b) a full vowel appears throughout the inflectional paradigm; the stem is invariant. In (1c) the stem is also invariant and ends in a consonant cluster regardless of the following inflectional morphology. The paradigm in (1a) contains the yer vowel (underlined). This vowel is phonetically identical to the [ɛ] in (1b), but, unlike the vowel in (1b), the yer only appears when the following inflection is null and deletes otherwise, creating an alternation in the stem.

(1) Three Representative Paradigms

a. Yer Vowel - 'sweater'	b. Full Vowel - 'setter'	c. Final Cluster - 'Peter'
sfɛtɛ̲r-Ø (nom.sg.)	sɛtɛr-Ø (nom.sg.)	p^jotr-Ø (nom.sg.)
sfɛtr-a (gen.sg.)	sɛtɛr-a (gen.sg.)	p^jotr-u (gen.sg.)
sfɛtr-ami (instr.pl.)	sɛtɛr-ami (instr.pl.)	p^jotr-ami (instr.pl.)

From these three paradigms, which are all fully productive and span both native and borrowed lexical strata in Polish, it can be seen that the stem alternation in (1a) is not due to epenthesis or deletion of regular [ɛ]. Deletion of [ɛ] in [sfɛtr-a] is excluded by the existence of [sɛtɛr-a] wherein the same vowel is maintained in an identical context. On the other hand, epenthesis of [ɛ] in [sfɛtɛ̲r-Ø] is excluded by the existence of [p^jotr-Ø] wherein an identical final consonant cluster is tolerated. For these reasons previous accounts have unanimously treated yers as abstract vowels, underlyingly distinct from regular [ɛ].

In contrast to these prespecification approaches, this paper presents an Optimality Theoretic (Prince and Smolensky 1993) analysis relying on a partial order grammar (Anttila 1997, 2002) for Polish that predicts the observed classes of alternations without positing an underlying distinction between [ɛ] and the yer vowel. In this partial order account the distinct behavior of paradigms like those shown in (1a) and (1b) results from different grammars, cophonologies, that are both active in the language. The analysis accounts for alternations in both simple paradigms like those in (1) and derived paradigms, paradigms with morphologically complex bases. In addition, the question of lexical control is tackled, and an explicit proposal is made for associating lexical items with subgrammars. This proposal leads to an analysis that reveals systematicity in the way lexical control is instantiated.

Section 2 briefly discusses previous work on yers. Section 3 lays out the proposal for lexical control of variation and introduces the partial order account of paradigms with morphologically simple stems. Section 4 discusses the application of the proposed grammar to paradigms with morphologically complex stems and discusses the patterns that emerge with respect to lexical control. The analysis presented in this section includes data that have previously been treated as exceptional. Finally, Section 4 summarizes and presents concluding remarks as well as implications of this proposal.

2. Previous Work on Yers

There is a large body of literature on yers in Slavic and providing a detailed review is not possible due to space restrictions (Gussmann 1980, Rubach 1984, 1985, Spencer 1986, Szpyra 1989, 1992, Piotrowski et al 1992, Yearley 1995, Rowicka 1999, Scheer in press, Jarosz 2005). All previous accounts, however, treat yers as abstract vowels, differing from full vowels by the lack of a root node, melodic specification, or special feature settings. Furthermore, many of the previous accounts rely on some form of a rule called 'Lower', which vocalizes a yer when followed by another yer in the next syllable (Gussmann 1980, Rubach 1984, 1985, Spencer 1986, Szpyra 1989). Yers are deleted otherwise. For example, the input /VCECE/ (where /E/ is an underlying yer) would surface as [VCɛC], while /VCEC/ would surface as [VCC].

To understand the motivation for Lower it is necessary to consider the behavior of alternating vowels in derived paradigms. These patterns, which are shown in (2), pose the primary challenge for prespecification approaches. This is because the stem yers, once a derivational suffix is added, behave as if they were regular vowels: they no longer alternate. The simple paradigm from (1) is repeated in (2a), while (2b) and (2c) show the diminutive and double diminutive paradigms respectively. In addition to the yer found in the stem, the diminutive morpheme [ɛk] itself contains a yer. In the double diminutive [sfɛtɛr-ɛtʃ-ɛk] multiple consecutive yers appear on the surface, or vocalize. According to previous accounts employing the Lower rule, this surface form is derived from underlying /sfɛtEr-Etʃ-Ek-E/. The rule of Lower vocalizes the first three of the four yers. The final yer, which always deletes, is an abstract yer posited to ensure vocalization of the yer in the suffix.

(2) Regular Simple and Derived Paradigms for 'sweater'

a.	simple paradigm	b.	diminutive paradigm	c.	dbl diminutive paradigm
	stem + infl.		stem+ ɛk + infl.		stem+ ɛk+ ɛk + infl.
	sfɛtɛr-Ø (nom.sg.)		sfɛtɛr-ɛk-Ø (nom.sg.)		sfɛtɛr-ɛtʃ-ɛk-Ø (nom.sg.)
	sfɛtr-a (gen.sg.)		sfɛtɛr-k-a (gen.sg.)		sfɛtɛr-ɛtʃ-k-a (gen.sg.)

As noted in some authors, however, the rule of Lower is not phonologically motivated (Szpyra 1992, Yearley 1995, Rowicka 1999, Scheer in press, Jarosz 2005). There is nothing particular about the presence of a yer vowel that should bring about the vocalization of a yer in a preceeding syllable, suggesting that this view is a descriptive artifact. In addition, these accounts have to postulate abstract representations in which null inflections are actually underlying yers that never surface. Some more recent proposals have abandoned the rule of Lower altogether and argued in favor of syllable structure based accounts (Szpyra 1992, Yearley 1995, Rowicka 1999, Scheer in press, Jarosz 2005); however, like the earlier proposals, these accounts also rely on prespecification. This paper proposes an alternative to prespecfication, the partial order account, which requires no underlying distinction between yers and full vowels.

3. The Partial Order Account of Vowel Zero Alternations

This section describes the theoretical analysis of simple paradigms and the assumptions behind the partial order model. Section 3.1 introduces the partial order model proposed by Anttila (1997, 2002). Section 3.2 introduces the proposal for lexical control that will be developed further in Section 4. Finally, Section 3.3 presents the constraints and partial order grammar that account for the three paradigms shown in (1).

3.1 Introduction to Partial Orders

A partial order of Optimality Theoretic constraints (Anttila 1997, 2002) is a ranking of constraints where the relative ranking of some constraints is unspecified. A partial order describes a variable grammar, one that is consistent with multiple fully ranked grammars, or total orders. For example, the partial order A >> B, C is consistent with the two fully ranked grammars A >> B >> C and A >> C >> B.

Thus, in addition to accounting for strict grammatical regularities, a partial order account is able to capture variation as well due to coexistence of several cophonologies. Partial order analyses have been proposed to account both for free variation (Anttila 1997) and declension classes or lexical strata (Anttila 2002). Viewing the paradigm classes in (1) in this way, as lexical subregularities, eliminates the need for abstract underlying distinctions and for constraints that refer to these distinctions. In addition, this view allows the stem yers that behave like regular vowels in derived paradigms (2) to be reanalyzed as regular vowels. Section 4 will return to this point.

3.2 Lexical Control in Partial Orders

While partial orders straightforwardly account for variation as described above, the formalization of lexical control poses a complex problem, particularly in the case of lexical strata. When there are multiple strata in the lexicon, with each associated with a different subgrammar; how exactly do individual words become associated with the correct subgrammar? There are numerous potential means by which lexical control could be enacted, and several have been discussed in the literature (Inkelas et al. 1997, Burzio submitted). Perhaps the simplest method is to allow each lexical item to indicate, via a diacritic of some sort, the cophonology it requires. A second possibility involves assigning each morpheme to a particular cophonology. Both of these approaches have been criticized for their redundancy since in addition to the statement of the language's grammar, each word or morpheme must reference a full grammar as well.

This paper proposes a third possibility. This approach assumes that morphemes are able to specify ranking requirements that are unspecified but consistent with the grammar as a whole. That is, a morpheme may require a particular ranking of constraints whose ranking is not determined by the partial order. This approach differs from the previous approaches in that neither morphemes nor lexical items necessarily specify full cophonologies.

For example, consider the partial order given by A >> B and C >> D, which yields six cophonologies: A >> B >> C >> D, A >> C >> B >> D, A >> C >> D >> B, C >> A >> B >> D, C >> A >> D >> B, and C >> D >> A >> B. According to the first strategy, each full lexical item would have to choose one of these six cophonologies. According to the second strategy, a morpheme could choose one of these six cophonologies. Under this proposal, however, each morpheme makes a ranking requirement, such as A >> C, which may be consistent with several cophonologies (namely, A >> B >> C >> D, A >> C >> B >> D, and A >> C >> D >> B) and does not refer to cophonologies explicitly.

For morphologically complex words, where more than one morpheme's ranking requirements are present, the ranking is determined by evaluating the ranking requirements of all morphemes in the item. When the ranking requirements of all morphemes are consistent, such as A >> C and B >> D, yielding existing cophonologies (A >> B >> C >> D and A >> C >> B >> D), all requirements contribute to the ranking. In cases where the ranking requirements of morphemes in a complex word conflict, the final ranking will only satisfy some of the morphemes' requirements. The analysis suggests that ranking requirements combine according to the morphological structure of the word. These cases will be examined in detail in Section 4.

Thus, like the first lexical control strategy, this proposal associates a single ranking with a lexical item, but unlike the first strategy, the association is not direct but results from the combination of ranking requirements made by morphemes. As in the second strategy, lexical control is handled by the morphemes, but unlike the second strategy, each morpheme's requirements are not absolute or full cophonologies, and may be overridden by the requirements of other morphemes. This approach does not require morphemes to duplicate the work of the grammar; morphemes may only make requirements that are not made by the grammar. Therefore, the critique of redundancy does not apply as it does to the previous proposals, and additionally, this approach reveals a systematic structure in the way these ranking requirements combine.

3.3 The Analysis

In this proposal most of the vowel alternations are due to deletion of regular [ɛ] in order to satisfy stress uniformity within an inflectional paradigm. The constraints that will be employed in this analysis are shown in (3)-(7).

(3)	MAX-ɛ	No deletion of underlying ɛ
(4)	DEP-ɛ	No epenthesis of ɛ
(5)	FAITHOV	Cover constraint for MAX and DEP constraints for other vowels
(6)	PENSTRESS	Cover constraint for minigrammar requiring penultimate stress
(7)	OPSTRESS	Optimal Paradigms constraint (McCarthy 2005) that requires main stress to fall on the same vowel within an inflectional paradigm.

The partial order of these constraints that accounts for the three paradigm classes in (1) is shown in (8).

(8) FAITHOV >> PENSTRESS >> DEP-ɛ , OPSTRESS, MAX-ɛ
DEP-ɛ >> MAX-ɛ

The constraints MAX-ɛ, which prohibits deletion of ɛ, and OPSTRESS, which requires uniform stress within an inflectional paradigm, are unranked with respect to one another, and this competition is what drives the variation between classes (1a) and (1b). Polish has regular penultimate stress, which is enforced by the cover constraint PENSTRESS (see Kraska-Szlenk (1995) for a complete Optimality Theoretic account of Polish stress). FAITHOV and PENSTRESS are unviolated constraints in Polish and are therefore top ranked, and will be omitted from the tableaux for simplicity[1]. In addition, the ranking of FAITHOV above DEP-ɛ is independently motivated as [ɛ] is the epenthetic vowel in Polish. Finally, DEP-ɛ must be ranked above MAX-ɛ because the repair for violating stress uniformity is deletion, not epenthesis of [ɛ].

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[1] In fact the analysis of stress is somewhat more complex because monosyllabic words that are stressed do exist in Polish although they violate PENSTRESS. The constraint violated by stressed monosyllabic words is foot binarity, which must be allowed to vary its ranking with respect to DEP-ɛ. The details of this part of the analysis are not crucial to the discussion of the paper.

The interaction of these constraints is demonstrated in Tableaux (9)-(11). Following McCarthy (2005), the input to optimization is an entire paradigm, and violations are summed for all forms in the paradigm[2]. Directly below the input paradigm is a list of derivational morphemes and their ranking requirements. In all classes, the inflectional morphemes are the same; only the shape of the stem varies.

Tableau (9) demonstrates the optimization of an input with a final consonant cluster. In this case the relative ranking of OPSTRESS and MAX-ɛ plays no role because the faithful candidate (9a) satisfies all three constraints. Therefore the optimal candidate is the faithful candidate, with no vowel-zero alternation.

(9) Final Cluster: Class (1c)

/pʲotr-Ø/, /pʲotr-a/ /pʲotr/: ???	DEP-ɛ	OPSTRESS	MAX-ɛ
☞ a) pʲótr, pʲótr-a			
b) pʲótɛr, pʲótr-a	*!		

When the input stem contains in underlying [ɛ], the relative ranking of OPSTRESS and MAX-ɛ is crucial. The two cases are shown in (10) and (11). When MAX-ɛ outranks OPSTRESS, faithfulness to the input overrules the pressure to maintain uniform stress. As in the previous case, the candidate that epenthesizes a vowel (10c) to obtain uniform stress is ruled out by high ranked DEP-ɛ. This results in a faithful winner (10a) and no vowel-zero alternation in the stem, corresponding to the regular vowel class of (1b).

(10) Underlying Vowel: Class (1b)

/sɛtɛr-Ø/, /sɛtɛr-a/ /sɛtɛr/: MAX-ɛ >> OPSTRESS	DEP-ɛ	MAX-ɛ	OPSTRESS
☞ a) sɛ́tɛr, sɛtɛ́r-a			*
b) sɛ́tɛr, sɛ́tr-a		*!	
c) sɛtɛ́rɛ, sɛtɛ́r-a	*!		

When the reverse ranking holds (OPSTRESS >> MAX-ɛ), faithfulness is compromised in favor of stress uniformity, yielding a paradigm that contains a

[2] The entire Polish nominal paradigm consists of fourteen forms, two numbers and seven cases. Only two representative cases are shown for simplicity. All but one of the inflectional suffixes are either null or one syllable long. The plural instrumental suffix ending is [-ami], which always carries stress on the penultimate syllable, thereby violating stress uniformity. This case is not a problem for the analysis as deletion of these vowels is prohibited by a top ranked constraint FaithOV. Therefore the optimal paradigm in the yer class will actually incur one violation of OPStress.

vowel-zero alternation and uniform stress (11b). The language wide restriction of DEP-ɛ >> MAX-ɛ prevents candidate (11c), which epenthesizes a vowel to maintain uniform stress, from being optimal. This paradigm corresponds to the yer paradigm class of (1a).

(11) Yer Vowel: Class (1a)

/sfɛtɛr-Ø/, /sfɛtɛr-a/ /sfɛtɛr/: OPSTRESS >> MAX-ɛ	DEP-ɛ	OPSTRESS	MAX-ɛ
a) sfɛ́tɛr, sfɛtɛ́r-a		*!	
☞ b) sfɛ́tɛr, sfɛ́tr-a			*
c) sfɛtɛ́rɛ, sfɛtɛ́r-a	*!		

To summarize, stems with final clusters do not require any particular ranking and are derived from stems with underlying final clusters. The stems containing alternating vowels and stems containing full vowels are underlyingly identical but belong to different cophonologies. Stems containing yer vowels are stems that require OPSTRESS >> MAX-ɛ, while non-alternating stems require MAX-ɛ >> OPSTRESS. Thus, this partial order allows a restricted amount of variation that corresponds to the observed three classes, while ruling out other logically possible alternations, such as those in (10c).

4 Analysis of Derived Paradigms

This section presents the analysis of yer patterns in derived paradigms and examines the interaction of ranking requirements in morphologically complex forms. Two suffixes are discussed, the diminutive and the abstract nominalizing suffix. The behavior of these suffixes suggests that it is the ranking requirement of the suffix that determines to which cophonology the morphologically complex word belongs.

4.1 The Diminutive Suffix

As described in Section 1, yer vowels in derived paradigms behave like regular vowels: the stem vowels do not alternate. The diminutive paradigms shown in (12) correspond to the three classes in (1), with the diminutive suffix appended. The diminutive suffix itself contains a yer vowel. Unlike the simple paradigms in (1), the diminutive paradigms in all three classes behave identically, just like the yer class of (1a). The root vowels remains invariant, while the diminutive itself alternates between [-ɛ̱k] and [-k]. Furthermore, the phonological shape of the derived yer class (12a) and the derived full vowel class (12b) is identical; these two classes neutralize under suffixation. As in the alternating class of (1a), the alternation in the diminutive allows for stress to fall on the same vowel throughout the paradigm.

(12) Three Representative Paradigms with Diminutive Suffix (-ε̲k)

	a. Yer Vowel - 'sweater'	b. Full Vowel - 'bicycle'	c. Final Cluster - 'Peter'
nom.sg.	sfεtέ̲r-ε̲k-Ø (nom.sg.)	sεtέr-ε̲k-Ø (nom.sg.)	p^{j}ótr-ε̲k-Ø (nom.sg.)
gen.sg.	sfεtέ̲r-k-a (gen.sg.)	sεtέr-k-a (gen.sg.)	p^{j}ótr-k-u (gen.sg.)

This behavior suggests that these paradigms all belong to a cophonology that ranks OPSTRESS above MAX-ε: uniformity of stress is achieved at the expense of faithfulness to the input. By allowing the diminutive to require the ranking OPSTRESS >> MAX-ε and its requirement to overrule the stem's requirements, these data follow from the present grammar.

(13) Diminutive of Stem with final cluster (12c)

/p^{j}otr-ε̲k-Ø/, /p^{j}otr-ε̲k-a/ /-ε̲k-/: OPSTRESS >> MAX-ε	DEP-ε	OPSTRESS	MAX-ε
☞ a) p^{j}ótr-ε̲k, p^{j}ótr-k-a			*
b) p^{j}ótr-ε̲k, p^{j}otr-έ̲k-a		*!	

Tableau (13) shows the optimization of a non-alternating cluster-final stem with the diminutive suffix attached. The stem [p^{j}otr] does not require any particular ranking of OPSTRESS and MAX-ε, and the suffix's requirement prevails. The winning candidate (13a) deletes the [ε] before [-a] inflection in order to allow stress to fall on the [o] in both forms.

(14) Diminutive of Stem with Full Vowel (12b)

/sεtεr-ε̲k -Ø/, /sεtεr-ε̲k -a/ /-ε̲k-/: OPSTRESS >> MAX-ε /sεtεr/: ~~MAX-ε >> OPSTRESS~~	DEP-ε	OPSTRESS	MAX-ε
☞ a) sεtέr-ε̲k, sεtέr-k-a			*
b) sεtέr-ε̲k, sεtεr-έ̲k-a		*!	

In (14) the stem belongs to the non-alternating class (1b), which requires MAX-ε >> OPSTRESS, while the suffix requires the opposite ranking of the two constraints. Because the correct form (14a) involves alternation, the requirements made by the suffix must trump the requirements of the stem. Both requirements are listed below the input, and the stem's requirement is overruled.

Finally, in (15) the requirements of the stem and suffix coincide, and the resulting ranking yields an alternating paradigm (15a). The optimal paradigms in (14) and (15), although derived from stems that select opposing rankings, behave identically once suffixed with the diminutive morpheme.

(15) Diminutive of Stem with Yer Vowel (12a)

/sfɛtɛr-ɛk -Ø/, /sfɛtɛr-ɛk -a/ /-ɛk-/: OPSTRESS >> MAX-ε /sfɛtɛr/: OPSTRESS >> MAX-ε	DEP-ε	OPSTRESS	MAX-ε
☞ a) sfɛtɛ́r-ɛk, sfɛtɛ́r-k-a			*
b) sfɛtɛ́r-ɛk, sfɛtɛr-ɛ́k-a		*!	

Recall that the yer vocalization pattern in forms like [sfɛtɛ́r-ɛk] provides the primary motivation for the rule of Lower due to the vocalization of multiple consecutive yers. In this analysis, the pattern follows from fact that yer vowels are simply regular vowels underlyingly, and their vocalization in the stem needs no special explanation. The alternation of yers in stems results from a ranking requirement made by the stem, which is then supported by the diminutive suffix. Thus, the account of alternations in derived forms is identical to the treatment of alternations in underived forms. This analysis does not depend on abstract underlying representations for yers or on abstract yer inflectional endings that never surface in order to obtain the correct behavior in underived forms.

In sum, these patterns indicate that in derived paradigms involving the diminutive suffix, the ranking requirements made by the suffix, rather than the stem, determine the cophonology to which the complex word belongs. By looking at a second suffix, Section 4.3 addresses the question of whether this pattern is particular to the diminutive, the particular cophonology, or a generalization about suffixes in Polish. The next section discusses a subregularity within the cluster-final class that can be incorporated into the current analysis but has to be treated as exceptional in previous accounts.

4.2 Subregularity Within the Cluster-Final Class

In addition to the variation observed in the language as a whole, one of the classes, the class ending in a consonant cluster (1c), allows a second possible derived form with the diminutive suffix. This variant, shown in (16b), has been treated as irregular in previous work.

(16) Subregularity Within in Cluster-Final Stem Class

	Stem Paradigm	Stem+ diminutive	Other Stems
a.	pʲótr, pʲótr-a	pʲótr-ɛk, pʲótr-k-a	vilk, hɛwm, knajp, most
b.	vʲátr, vʲátr-u	vʲatɛ́r-ɛk, vʲatɛ́r-k-u	tsɨfr, bitf, pʲɛɕnʲ, baɕnʲ

The regular behavior of the cluster-final stem is repeated from (12c) in (16a). Here the final consonant cluster of the stem is maintained in the derived form; in the irregular variant, the cluster is broken up by [ε], which was not present in underived form. (16) also provides example stems belonging to each subclass.

The designation of stems belonging to subclass (16b) as irregular fails to capture the uniformity among the final clusters in this subclass. The final clusters in these stems violate sonority sequencing, while those in (16a) do not.

To account for this subregularity, the constraint Son, which penalizes rising sonority in codas and falling sonority in onsets, is introduced. This constraint is violated by candidate (17b), which was the correct paradigm for the regular variant in (13), because the [trk] cluster cannot be syllabified without violating sonority. This means that the stem [v^jatr] must require the ranking of Son >> Dep-ɛ in order to compel epenthesis; this is shown in the tableau below the input[3].

(17) Subregularity of Diminutive of Cluster-Final Stem

/v^jatr-ɛk-Ø/, /v^jatr-ɛk-u/ /-ɛk-/: OPStress >> Dep-ɛ /v^jatr/: Son >> Dep-ɛ	OPStress	Son	Dep-ɛ	Max-ɛ
☞ a) v^játɛr-ɛk, v^játɛr-k-u			**	*
b) v^játr-ɛk, v^játr-k-u		*!		*
c) v^játr-ɛk, v^jatr-ɛ́k-u	*!			

In addition, these data provide a way to determine the total ranking for the co-phonologies in the previous section. The ranking between OPStress and Dep-ɛ cannot be determined from those data alone, but the behavior of this stem (17a) in the diminutive paradigm reveals that in fact the diminutive requires OPStress to be ranked above Dep-ɛ. This ranking is crucial in order to prohibit candidate (17c), which avoids epenthesis but violates stress uniformity. The regular variant [p^jotr] requires the reverse ranking of Son and Dep-ɛ, and the stem surfaces faithfully.

The previous section suggests that the ranking requirements of the suffix override those of the stem when they are in conflict. This section extends this hypothesis by revealing that ranking requirements made by stems do prevail if they are not in conflict with the requirements of the suffix. This illustrates an important difference between this view of lexical control and previous proposals. Because morphemes do not require total orderings, their individual requirements are able to combine in a systematic fashion in order for both to contribute to the final ranking.

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[3] The stem [v^jatr] satisfies sonority because the final [r] may be placed into an appendix. See Jarosz (2005) for a proposal of Polish syllable structure along these lines.

4.3 The Abstract Nominalizing Suffix

This section provides further support for the hypothesis introduced section 4.1, that suffixes override the ranking requirements of stems. The abstract nominalizing suffix [-stv] is able to attach both to alternating and non-alternating stems, and in both cases the resulting grammar is non-alternating.

(18) summarizes the behavior of the three classes of stems when the abstract nominalizing suffix [-stv] is attached. This suffix is less productive than the diminutive, does not attach to many nouns, and none with a final cluster. However, its effect on stems from the two remaining classes reveals that, once again, the ranking requirements of the suffix override those of the stem. In both cases, regardless of the cophonology of the stem, the derived paradigm exhibits no alternating vowels.

(18) Representative Paradigms with Nominalizing Suffix [-stv]

a. Yer Vowel in Stem	b. Full Vowel in Stem	c. Final Cluster in Stem
- 'ministry'	- 'thievery'	- 'Peter'
minístɛ̲r -stf -Ø	zwódƶɛ̲j -stf -Ø	n/a
ministɛ̲́r -stf -a	zwodƶɛ̲́j -stf -a	n/a

When the [-stv] suffix is attached to an alternating stem, as shown in Tableau (19), the ranking requirement of the suffix overrides the alternating grammar of the stem. Deletion (19c) and epenthesis (19b) of [ɛ] allow stress to fall on the same vowel, satisfying OPSTRESS, but are ruled out by violations of MAX-ɛ and DEP-ɛ, respectively.

(19) Alternating Stem with Abstract Nominalizing Suffix (16a)

/ministɛ̲r-stf-Ø/, /ministɛ̲r-stf-a/ /-stv/: MAX-ɛ, SON >> OPSTRESS /ministɛ̲r/: ~~OPSTRESS >> MAX-ɛ~~	DEP-ɛ	MAX-ɛ	OPSTRESS
☞ a) minístɛ̲r-stf, minístɛ̲r-stf-a			*
b) ministɛ̲́r-stɛf, ministɛ̲́r-stf-a	*!		
c) minístɛ̲r-stf, minístr-stf-a		*!	

The effect the [-stv] suffix has on selecting a non-alternating grammar supports the hypothesis that suffixes in general override the ranking requirements of stems. The facts that both [-stv] and [-ɛ̲k] neutralize the ranking requirements of the stems to which they attach, and that both alternating and non-alternating grammars can be overridden by the opposite ranking of a suffix, support the hypothesis that morphological structure determines how ranking requirements are combined.

4.4 Multiple Suffixes

This section provides a final argument in favor of the hypothesis that morphological structure guides lexical control. In a few cases the diminutive suffix is able to attach following the attachment of the abstract nominalizing suffix. Such a case is shown in (20).

(20) Multiple Suffix Paradigms

a.	'man'	pán -Ø	pán -a
b.	'nation'	pán^j -stf -Ø	pán^j -stf -a
c.	'little nation'	pan^j -stέv -ε̲k -Ø	pan^j -stέv -k -a

(20a) illustrates the base paradigm, which has no vowel zero alternation. (20b) shows the derived paradigm after the attachment of the abstract nominalizing suffix. This paradigm also has no vowel-zero alternations; as discussed in the previous section, the [-stv] suffix requires the non-alternating grammar. Finally, in (20c), the diminutive suffix is attached, and the resulting grammar is an alternating one. Thus, the diminutive, being the outer-most suffix, is able to reverse the ranking required by the inner suffix. The paradigm in (20c) follows from the present proposal as well.

(21) Optimization of Multiple Suffixes

/ pan^j -stεv -ε̲k -Ø /, / pan^j -stεv -k -a / /-ε̲k-/: OPSTRESS >> DEP-ε /-stv/: ~~MAX-ε,~~ SON >> OPSTRESS /pan/: SON >> DEP-ε	SON	OPSTRESS	DEP-ε	MAX-ε
☞ a) pan^j-stέv-ε̲k, pan^j-stέv-k-a			**	*
b) pán^j-stf-ε̲k, pán^j-stf-k-a	*!			*
c) pán^j-stf-ε̲k, pan^j-stf-έ̲k-a		*!		

To obtain the final ranking in (21), in addition to the requirements of the suffixes, the root [pan] must also require that SON >> DEP-ε. This is because this paradigm behaves like the subregularity described in Section 4.2, wherein epenthesis breaks up the stem-final cluster in the diminutive paradigm in order to avoid sonority violations. Thus, the ranking requirements of all three morphemes combine: those requirements made by inner morphemes that are consistent with the outer morphemes prevail, and inconsistent requirements, such as MAX-ε >> OPSTRESS, are ignored. The winning paradigm epenthesizes an [ε] to avoid sonority violations and exhibits vowel-zero alternation within the diminutive morpheme to satisfy stress uniformity.

5. Conclusion

This paper presents an analysis of alternating vowels in Polish that differs from prespecification analyses by treating yers as regular vowels and deriving their alternation and regular vowels' non-alternation from different cophonologies. This approach has the benefit that all processes and constraints are general and independently attested. No abstract underlying representations are needed to derive the difference between alternating vowels and regular vowels. In addition, no abstract representations are needed to account for the apparently distinct behavior of yers in simple and derived paradigms; in this account the patterns in simple and derived paradigms are not distinct and, in fact, follow from identical constraint rankings. Finally, the partial order account extends to data that have been treated as exceptional in previous accounts.

Furthermore, this paper presents an explicit proposal for achieving lexical control in both morphologically simple and complex paradigms. This analysis suggests that there is systematicity in the way lexical control interacts with morphological structure. Derivational morphemes make ranking requirements that refer to constraints left unranked by the language-wide partial order. An examination of the behavior of suffixes and their associated complex paradigms reveals that outer morphemes override the grammatical preferences of inner morphemes. Thus, when ranking requirements conflict, it is the requirement made by the outer morpheme that determines the final ranking. In addition, this analysis reveals that the requirements of inner morphemes that do not conflict with outer morphemes do contribute to the final ranking. Further work is needed to determine whether these findings generalize to other languages.

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