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Polish yers: Representation and analysis[1]

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This article proposes a new analysis of yers in Polish and addresses the issue of how yers should be represented. Reviving the debate started by Kiparsky (1973), the article argues that diacritic use of phonological features is superior to phonological use of diacritic features. Since diacritic representation of yers misses generalizations, yers are better represented as floating melodic segments (Rubach 1986, Kenstowicz & Rubach 1987). The patterns of Yer Vocalization and Yer Deletion are derived without recourse to syllable structure constraints such as *COMPLEX-Coda. Yer Deletion applies at an earlier level than Yer Vocalization and is enforced by a distribution-based constraint. Yer Vocalization, on the other hand, is a context-free process that is driven by the need to parse segments in output representations.

KEYWORDS: abstractness, Optimality Theory, Polish phonology, Slavic phonology, yers

A central problem in the phonology of Slavic languages is the treatment of vowels that alternate with zero called 'yers'. The issue is illustrated by the pair *sen* 'dream' (NOM.SG) – *sn+u* (GEN.SG), where the *e* of the root is deleted when a vocalic ending is appended. It is idiosyncratic whether *e* alternates with zero or not. Thus, next to *sen* – *sn+u*, we have *basen* 'pool' (NOM.SG) – *basen+u* (GEN.SG), where *e* does not delete when a suffix is added to the root. Yer alternations must therefore be treated as special or phonologically exceptional. I argue that the distinction between yers and non-yers must be made at the level of segments, not at the level of morphemes. That is, yers must have a different underlying representation from non-yers.

This article revisits the issue of how yers should be represented and constructs an OT grammar that accounts for yer alternations in Polish. Section 1 introduces the data and states preliminary generalizations. Section 2 reviews Gouskova's (2012) Whole Morpheme Hypothesis. Section 3 discusses the representation of yers. Section 4 presents an account of yer alternations. Section 5 addresses the problem of Yer Vocalization and Yer Deletion as well as related issues in terms of Derivational Optimality Theory. Section 6 debates an alternative representation of yers that makes use of diacritic features. Section 7 summarizes the conclusions.

[1] I would like to thank the three *Journal of Linguistics* reviewers for discussion and criticism, which led to considerable improvement of both the content and the presentation of my analysis. However, let me add that the responsibility for this article is solely mine.

1. Background

The examples in (1) illustrate the pattern of *e*–zero alternations that is characteristic for yers.

(1) e–*zero alternations*

(a) Masculine nouns

NOM.SG	GEN.SG	GLOSS
oset [ɔsɛt]	ost+u [ɔstu]	'thistle'
ocet [ɔtsɛt]	oct+u [ɔtstu]	'vinegar'
poczet [pɔʧɛt]	poczt+u [pɔʧtu]	'retinue'
bez [bɛs]	bz+u [bzu]	'lilac'
berek [bɛrɛk]	berk+a [bɛrka]	'tag'
palec [palɛts]	palc+a [paltsa]	'finger'
wrzesień [vʒɛɕɛɲ]	wrześn+ia [vʒɛɕɲa]	'September'
chaber [xabɛr]	chabr+a [xabra]	'cornflower'
handel [xandɛl]	handl+u [xandlu]	'commerce'
kubeł[2] [kubɛł]	kubł+a [kubła]	'bucket'

(b) Feminine and neuter nouns[3]

NOM.SG	GEN.PL	GLOSS
klusk+a [kluska]	klusek [klusɛk]	'noodle'
misk+a [mʲiska]	misek [mʲisɛk]	'bowl'
owc+a [ɔftsa]	owiec [ɔvʲɛts]	'sheep'
wiosn+a [vʲɔsna]	wiosen [vʲɔsɛn]	'spring'
łyżw+a [łɨʒva]	łyżew [łɨʒɛf]	'skate'
miotł+a [mʲɔtła]	mioteł [mʲɔtɛł]	'broom'
pudł+o [pudłɔ]	pudeł [pudɛł]	'box'
żebr+o [ʒɛbrɔ]	żeber [ʒɛbɛr]	'rib'
lustr+o [lustrɔ]	luster [lustɛr]	'mirror'

[2] The letter *ł* stands for velarized *l* in Eastern Polish, so *kubeł* is [kubɛł]. Other dialects have a process of Lateral Vocalization, which turns [ł] into [w] in contexts that do not warrant Palatalization. Here and below, I will ignore Lateral Vocalization and use the transcription [ł]. Also, I will transcribe soft labials as [pʲ bʲ mʲ vʲ fʲ] rather than as [pʲj bʲj mʲj vʲj fʲj], so *pies* is transcribed [pʲɛs] 'dog' rather than [pʲjɛs]. This is correct for Eastern Polish. Other dialects insert [j] after soft labials.

[3] Feminine nouns have the ending *-a* while neuter nouns have the ending *-o* in the NOM.SG.

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The preliminary generalization is that *e* alternates with zero when a vocalic suffix is added to the stem, as in *oset* 'thistle' (NOM.SG) – *ost+u* (GEN.SG). Inspection of further data shows that the generalization is incorrect because there are *e*s that do not follow this pattern. The examples in (2) are minimal or near minimal pairs, where *e*'s alternate with zero in some words but not in others.

(2) *Unpredictable deletion*

bez [bɛs] 'lilac' (NOM.SG) – bz+y [bzɨ] (NOM.PL) *versus*
bez [bɛs] 'meringue' (GEN.PL) – bez+y [bɛzɨ] (NOM.PL)

oset [ɔsɛt] 'thistle' (NOM.SG) – ost+y [ɔstɨ] (NOM.PL) *versus*
gorset [gɔrsɛt] 'corset' (NOM.SG) – gorset+y [gɔrsɛtɨ] (NOM.PL)

kuter [kutɛr] 'cutter' (NOM.SG) – kutr+y [kutrɨ] (NOM.PL) *versus*
skuter [skutɛr] 'crator' (NOM.SG) – skuter+y [skutɛrɨ] (NOM.PL)

ocet [ɔtsɛt] 'vinigar' (NOM.SG) – oct+y [ɔtstɨ] (NOM.PL) *versus*
facet [fatsɛt] 'guy' (NOM.SG) – facet+y [fatsɛtɨ] (NOM.PL)

wieś [vʲɛɕ] 'village' (NOM.SG) – ws+ie [fɕɛ] (NOM.PL) *versus*
obwieś [ɔbvʲɛɕ] 'scoundrel' (NOM.SG) – obwies+ie [ɔbvʲɛɕɛ] (NOM.PL)

wrzesień [vʒɛɕɛɲ] 'September' (NOM.SG) –
wrześn+ie [vʒɛɕɲɛ] (NOM.PL) *versus*
jesień [jɛɕɛɲ] 'autumn' (NOM.SG) – jesien+ie [jɛɕɛɲɛ] (NOM.PL)

dureń [durɛɲ] 'idiot' (NOM.SG) – durn+ie [durɲɛ] (NOM.PL) *versus*
dereń [dɛrɛɲ] 'dogwood' (NOM.SG) – deren+ie [dɛrɛɲɛ] (NOM.PL)

These data show that the *e*–zero alternation cannot be analyzed in terms of *e*-deletion because it is unpredictable which *e*s do and which do not delete. The opposite assumption – that the pattern is due to *e*-insertion – is invalidated by the contrasts in (3).

(3) *Unpredictable insertion*

kurek [kurɛk] 'tap' (NOM.SG) – kurk+a [kurka] (GEN.SG) *versus*
bark [bark] 'shoulder' (NOM.SG) – bark+u [barku] (GEN.SG)

lask+a [laska] 'cane' (NOM.SG) – lasek [lasɛk] (GEN.SG) *versus*
łask+a [łaska] 'grace' (NOM.SG) – łask [łask] (GEN.PL)

oset [ɔsɛt] 'thistle' (NOM.SG) – ost+u [ɔstu] (GEN.SG) *versus*
post [pɔst] 'Lent' (NOM.SG) – post+u [pɔstu] (GEN.SG)

sweter [sfɛtɛr] 'sweater' (NOM.SG) – swetr+a [sfɛtra] (GEN.SG) *versus*
Piotr [pʲɔtr] 'Peter' (NOM.SG) – Piotr+a [pʲɔtra] (GEN.SG)

sierpień [ɕɛrpʲɛɲ] 'August'(NOM.SG) –
sierpn+ia [ɕɛrpɲa] (GEN.SG) *versus*
wapń [vapɲ] 'calcium' (NOM.SG) – wapn+ia [vapɲa] (GEN.SG)

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trumn+a [trumna] 'casket' (NOM.SG) – trumien [trumʲɛn] (GEN.PL) *versus*
hymn [xɨmn] 'anthem' (NOM.SG) – hymn+u [xɨmnu] (GEN.SG)

poczet [pɔʧɛt] 'retinue' (NOM.SG) – poczt+u [pɔʧtu] (GEN.SG) *versus*
poczt+a [pɔʧta] 'post office' (NOM.SG) – poczt [pɔʧt] (GEN.PL)

An analysis that posits *e*-insertion is unworkable because the context in which the putative insertion should occur and the context in which it should not occur are identical. For example, if *kurek* 'tap' were to be derived from underlying //kurk//,[4] *e*-insertion would need to break up the //rk// cluster, but then, by the same token, it would break up the //rk// cluster in *bark* //bark//, yielding the wrong output *[barɛk].[5]

Since neither insertion nor deletion can account for *e*–zero alternations, the conclusion is that the alternating *e* must be distinct from the non-alternating *e*. I address the issue of how to implement this distinction later. For the moment, I adopt the time-honored Slavic tradition of transcribing a yer as the capital letter *E*. Thus, the underlying representation of *kuter* 'cutter', which has a yer, is //kutEr// while the underlying representation of *skuter*, which has a regular vowel *e*, is //skutɛr//. I will refer to regular vowels as 'full vowels', so here the regular *e* is the full vowel *e*.

A number of words exhibit yer chains, that is, multiple occurrences of yers. Yer chains are commonplace in derivational morphology when two or more morphemes are combined into a single word.

(4) *Yer chains*

(a) win+a [vʲina] 'guilt' – win+ien [vʲiɲɛn] 'guilty' (SHORT FORM)

(b) win+ien [vʲiɲɛn] 'guilty' (SHORT FORM) –
win+n+y [vʲinnɨ] 'guilty' (LONG FORM)

(c) cł+o [tsłɔ] 'customs' (NOM.SG) – ceł [tsɛł] (GEN.PL)

(d) cel+n+y [tsɛlnɨ] (ADJ, NOM.SG)

The pair in (4a) shows that the adjective 'guilty' is derived from the root 'guilt' by appending a suffix whose surface representation is [ɛn]. A comparison of the short form and the long form of 'guilty' in (4b) demonstrates that the [ɛ] of [ɛn] deletes when a vocalic ending is added and, hence, the adjectivizing morpheme appears as [n] on the surface. We thus see an *e*–zero alternation, so the underlying representation is //En//. The noun 'customs' in (4c) has the same alternation and, consequently, is derived from underlying //tsEł+ɔ//. In (4d), the root //tsEł// and the adjectivizing morpheme //En// combine into a single word,

[4] I adopt the convention of enclosing underlying representations in double slashes, intermediate stages in single slashes and phonetic representations in square brackets.

[5] There is a consensus among researchers that the general pattern of *e*–zero alternations must be analyzed in terms of deletion rather than insertion. See, for example, Lightner (1963), Gussmann (1980), Rubach (1984), and Bethin (1992).

yielding a yer chain: //tsEɬ+En+i//, where //i// is the suffix of the MASC NOM.SG in the declension of adjectives.[6]

Larger yer chains than the chain in *cel+n+y* 'customs' (ADJ, MASC NOM.SG) are found, for example, in nouns containing the diminutive morpheme *-ek*. This morpheme contains a yer because *e* alternates with zero when a vocalic ending is added, as in *Karol* [karɔl] 'Charles' (NOM.SG) – *Karol+ek* [karɔlɛk] (DIMIN NOM.SG) – *Karol+k+a* [karɔlka] (DIMIN GEN.SG). The chains can be long because Polish morphology allows not only for simple diminutives but also for double diminutives.

(5) *Yer chains*

(a) kabel //kabEl// 'cable' (MASC NOM.SG) –
kabl+a //kabEL+a// (GEN.SG)
kabel+ek //kabEl+Ek// (DIMIN NOM.SG) –
kabel+k+a //kabEl+Ek+a// (GEN.SG)
kabel+ecz+ek //kabEl+Ek+Ek// (DOUBLE DIMIN NOM.SG) –
kabel+ecz+k+a //kabEL+Ek+Ek+a// (GEN.SG)
Note: *cz* denotes [ʧ] and is an effect of Palatalization: $k \rightarrow$ *ʧ*.

(b) szufl+a //ʃufEl+a// 'shovel' (FEM NOM.SG) –
szufel //ʃufEl// (GEN.PL)
szufel+k+a //ʃufEl+Ek+a// (DIMIN NOM.SG) –
szufel+ek //ʃufEl+Ek// (GEN.PL)
szufel+ecz+k+a //ʃufEl+Ek+Ek+a// (DOUBLE DIMIN NOM.SG) –
szufel+ecz+ek //ʃufEl+Ek+Ek// (GEN.PL)

(c) mask+a //masEk+a// 'mask' (FEM NOM.SG) –
masek //masEk// (GEN.PL)
masecz+k+a //masEk+Ek+a// (DIMIN NOM.SG) –
masecz+ek (GEN. PL) //masEk+Ek//

Yer chains are commonplace in Polish and their pattern of alternations is fully systematic.

The pattern of yer vocalization (the occurrence of [ɛ] in the surface representation) *versus* yer deletion (the absence of [ɛ] in the surface representation) is traditionally analyzed as an effect of the following two rules (Lightner 1963, Gussmann 1980, Rubach 1984, and others).

[6] A reviewer points out that some words show either the absence of the yer alternation in the GEN.PL or exhibit variation. Thus, *form+a* [fɔrma] 'form' surfaces with [ɛ] in the adjective *forem+n+y* [fɔrɛmni] but, irregularly, without [ɛ] in the GEN.PL *form* [fɔrm]. Similarly, we see an [ɛ]–zero alternation in *sarn+a* [sarna] 'deer' – *saren+k+a* [sarɛnka] (DIMIN) but the GEN.PL exhibits variation: *saren* [sarɛn] or *sarn* [sarn]. The absence of [ɛ] in the GEN.PL is an idiosyncratic property of a small class of nouns. This idiosyncracy cannot be accounted for in any formal analysis, and hence, paradoxically, plays no role in the debate concerning the representation of yers. The irregular GEN.PL forms must be simply listed as allomorphs in the underlying representation.

(6) (a) *Yer Vocalization*
$E \rightarrow \varepsilon / - C_0 E$

(b) *Yer Deletion*
$E \rightarrow \emptyset$

The descriptive generalization is that a yer vocalizes as [ɛ] when followed by a yer in the next syllable (6a). Unvocalized yers delete context-freely (6b).

2. The Whole Morpheme Hypothesis

The view that yers must be distinct from other vowels in the underlying representation has recently been challenged by Gouskova (2012). Gouskova's analysis, called the Whole Morpheme Hypotheis, treats morphemes containing yers as exceptional. The arbitrary designation that a given vowel is a yer resides not on the vowel itself but rather on the morpheme in which the vowel occurs. For example, the morpheme *kurek* 'tap', which contains a yer (compare the GEN.SG *kurk+a*), carries an arbitrary lexical index Lex-1. This diacritic makes *kurek* distinct from *taboret* 'stool', which does not contain a yer (compare the GEN.SG *taboret+u*) and hence does not carry Lex-1.[7]

In Gouskova's analysis yers are full vowels, so the yer //ɛ// in *kurek* is not in any way distinct from the non-yer //ɛ// in *taboret*. Since the //ɛ// in *kurek* deletes when a suffix is added, as in the GEN.SG *kurk+a*, there must be a constraint that compels the deletion. The desired constraint is *MID (don't be a mid vowel). It appears that the deletion of the //ɛ// in *kurk+a*, underlying //kurɛk$_{\text{Lex-1}}$+a//, follows from the ranking *MID >> MAX-V (don't delete a vowel). There is a problem, however. *MID >> MAX-V would delete, incorrectly, the non-yer //ɛ// in *taboret+a* //tabɔrɛt+a//, the GEN.SG of *taboret* 'stool'. To avert this deletion, *MID must be made inapplicable to non-yer vowels. The result is achieved by marking *MID with a lexical diacritic that indexes the constraint to the desired class of inputs. Since //kurɛk$_{\text{Lex-1}}$+a// is the input and since it carries the diacritic Lex-1, *MID must also carry the diacritic (lexical index) Lex-1, so that the indeces on the constraint and on the morphemes that should be evaluated by this constraint match. We thus have *MID$_{\text{Lex-1}}$, an exception constraint that has been cloned from the generic *MID. Given the ranking *MID$_{\text{Lex-1}}$ >> MAX-V >> *MID, deletion takes place in //kurɛk$_{\text{Lex-1}}$+a// but not in //tabɔrɛt+a// because the former does while the latter does not carry the lexical index Lex-1. The generic *MID that could potentially delete the vowel in //tabɔrɛt+a// has no force since it is ranked below MAX-V.

The missing part of the analysis is an answer to the question of why //ɛ// does not delete in the NOM.SG *kurek*, given that //kurɛk$_{\text{Lex-1}}$// and *MID$_{\text{Lex-1}}$ match in their lexical index Lex-1. The answer is that the deletion of //ɛ// shown in the

[7] It should be noted that Gouskova (2012) analyzes Russian, not Polish. In what follows, I consider whether her analysis can be extended to Polish and conclude that it cannot.

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output candidate [kurk] leads to the violation of *COMPLEX-Coda (no complex codas). Assuming further that the ranking is *COMPLEX-Coda >> *MID$_{\text{Lex-1}}$, the candidate [kurk] loses to thecandidate [kurɛk], the correct result.

A problem arises when a yer morpheme contains more than one mid vowel but only one mid vowel should delete. The word *berek* 'tag' is a representative example.[8] It is a yer morpheme because we see an *e*–zero alternation in *berek* [bɛrɛk] (NOM.SG) – *berk+a* [bɛrka] (GEN.SG). Consequently, *berek* carries the Lex-1 index and hence is within the purview of *MID$_{\text{Lex-1}}$. Looking at the GEN.SG *berk+a*, the ranking *MID$_{\text{Lex}-1}$ >> MAX-V, necessary for *kurk+a*, delivers the wrong result because the candidate [brka], from underlying //bɛrɛk$_{\text{Lex-1}}$+a// wins with the attested surface form [bɛrka]. This result is due to the fact that [brka] fully obeys *MID$_{\text{Lex-1}}$ because it contains no mid vowel at all while [bɛrka] contains one mid vowel.

The undesired winner [brka] cannot be eliminated on the grounds that it exhibits a sonority violation: *r*, a liquid, is further away from the vowel than *k*, a stop.[9] The reason is that Yer Deletion is not guided by sonority considerations, which can be gleaned from the fact that *e* deletes in *brew* [brɛf] 'eyebrow' (NOM.SG) – *brw+i* [brv$^{\text{j}}$i] (GEN.SG). The winning candidate [brv$^{\text{j}}$i] is parallel to the undesired [brka].

To deal with the contradictions of the type just described, the Whole Morpheme Hypothesis makes two assumptions. First, word-initial segments can be parsed under the phonological word node (PW) rather than included into syllables. Consequently, the [br] of [brv$^{\text{j}}$i] is linked to the PW. Second, a new family of constraints, called Appendix constraints, prohibits parsing under the PW. The solution to the [brv$^{\text{j}}$i] – [brka] conundrum is now clear: unlike [brv$^{\text{j}}$i], [brka] must not be allowed to parse its [br] under the PW. This is achieved by making two further assumptions. First, there is a constraint that prohibits the parsing of two consonants of the cluster CCC under the PW. Second, the morpheme *berek*, whose GEN.SG form is *berk+a*, is indexed as an input to this constraint. Parentheses enclose segments that are linked to the PW.

(7) *(CC)C$_{\text{Lex-2}}$: Assign a violation mark for every sequence of unsyllabified consonants in morphemes lexically indexed as Lex-2.

The underlying representation of *berek* contains the index Lex-2 in order to be available for evaluation by *(CC)C$_{\text{Lex-2}}$. Since *berek* is a yer morpheme, the index Lex-1 making it visible to *MID$_{\text{Lex-1}}$ must also be present in the underlying representation: //bɛrɛk$_{\text{Lex-1,Lex-2}}$//. The GEN.SG form //bɛrɛk$_{\text{Lex-1,Lex-2}}$+a// is now

[8] For more examples and a more complete analysis, see Rubach (2013).

[9] More specifically, the Sonority Sequencing Generalization (SSG, Jespersen 1904, Selkirk 1982) requires that liquids (L) should be closer to the vowel than nasals (N), nasals should be closer to the vowel than fricatives (F), and fricatives should be closer to the vowel than stops (S), which yields the following sequencing of segments: S F N L V L N F S. As documented in Rubach & Booij (1990a), Polish suspends the SSG for obstruents, so fricatives and stops can occur in either order and can cluster with themselves in onsets and codas.

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evaluated as follows. As mentioned earlier, the segments in parentheses are parsed under the PW. Dots mark syllable boundaries.

(8) //bɛrɛk$_{\text{Lex-1,Lex-2}}$+a// → [bɛrka]

	*(CC)C$_{\text{Lex-2}}$	*MID$_{\text{Lex-1}}$	MAX-V
(a) bɛ.rɛ.ka		**!	
(b) (br)ka	*!		**
☞ (c) bɛr.ka		*	*

Given the ranking in (8), the result is correct as [bɛr.ka] is the attested surface form.

The list of the candidates in (8) is incomplete in a crucial way: it does not include the candidate [brɛ.ka]. Since Polish maximizes onsets (Rubach & Booij 1990a) and hence ranks *CODA (no codas) above *COMPLEX-Onset (no complex onsets), the candidate [brɛ.ka] would no doubt win in (8). In order to outlaw the undesired [brɛ.ka], we need a constraint that prohibits [br-] or, more generally, a constraint that prohibits complex onsets. This cannot be the generic *COMPLEX-Onset because, given onset maximization, *COMPLEX-Onset is bottom-ranked and plays no role.[10] The relevant constraint must be a cloned version of *COMPLEX-Onset that carries lexical indexing.

(9) *COMPLEX-Onset$_{\text{Lex-3}}$: No complex onsets in morphemes indexed Lex-3.

The morpheme *berek* must now be equipped with the lexical index Lex-3, so that it is available for evaluation by *COMPLEX-Onset$_{\text{Lex-3}}$. Crucially, morphemes that actually have [br-] or, more generally, complex onsets in the surface representation should not be marked Lex-3. For example, *bruk* [bruk] 'pavement' does not carry Lex-3 and, consequently, is not affected by *COMPLEX-Onset$_{\text{Lex-3}}$, the result being that its [br] onset is attested on the surface.

In sum, the morpheme *berek* carries three diacritics: Lex-1, Lex-2 and Lex-3 that make it available to *MID$_{\text{Lex-1}}$, *(CC)C$_{\text{Lex-2}}$ and *COMPLEX-Onset$_{\text{Lex-3}}$, respectively. The fact that one morpheme carries three diacritics is not a problem because the Whole Morpheme Hypothesis sets no limit on the number of permissible diacritics, so morphemes may have as many diacritics as are required by a given analysis.

Complete with the candidate [brɛ.ka], the evaluation in of *berk+a* in (8) is now replaced with the evaluation in (10).

[10] See Section 4 below for examples illustrating complex onsets in Polish.

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(10) //bɛrɛk$_{\text{Lex-1,Lex-2,Lex-3}}$+a// → [bɛrka]

	*COMPLEX-Onset$_{\text{Lex-3}}$	*(CC)C$_{\text{Lex-2}}$	*MID$_{\text{Lex-1}}$	MAX-V
(a) bɛ.rɛ.ka			**!	
(b) (br)ka		*!		**
☞ (c) bɛr.ka			*	*
(d) brɛ.ka	*!		*	*

The result is correct since [bɛr.ka] is the attested surface form.

Empirical difficulties come to light when we consider derivational morphology. The relevant example is the diminutive form *berecz+ek* [bɛrɛʧɛk] (NOM.SG) – *berecz+k+a* [bɛrɛʧka] (GEN.SG), where the diminutive suffix *–ek* is a yer morpheme because it exhibits an *e*–zero alternation (see also Section 1). The underlying representation of *berecz+k+a* is therefore //bɛrɛk$_{\text{Lex-1,Lex-2,Lex-3}}$+ɛk$_{\text{Lex-1}}$+a//. In the evaluation below, I ignore the issue of Palatalization, *k* → *ʧ*, but I return to this issue in Section 5. The pointer ☜ marks the undesired winner while the sad face icon marks the desired winner.

(11) //bɛrɛk$_{\text{Lex-1,Lex-2,Lex-3}}$+ɛk$_{\text{Lex-1}}$+a// → [bɛ.rɛ.ʧka] (failed evaluation)

	*COMPLEX-Onset$_{\text{Lex-3}}$	*(CC)C$_{\text{Lex-2}}$	*MID$_{\text{Lex-1}}$	MAX-V
☜ (a) bɛ.rɛ.ʧɛ.ka			***!	
☹ (b) bɛ.rɛ.ʧka	*!		**	*
(c) bɛr.ʧka	*!		*	**
(d) brɛ.ʧka	*!		*	**
(e) (br)ʧɛ.ka		*!	*	**

It should be noted that the onset [ʧk-] is not anything unusual in Polish. It occurs in words such as *czkać* [ʧkatɕ] 'have a hiccup' and *wycieczka* [vɨ.tɕɛ.ʧka] 'excursion'. Similarly, we have [kp-] in *kpić* [kpʲitɕ] 'joke', [ʤg-] in *dźgać* [ʤgatɕ] 'stab', [gd-] in *gdy* [gdɨ] 'when', [kt-] in *kto* [ktɔ] 'who' and so forth. As noted in footnote 9, the generalization is that Polish suspends the Sonority Sequencing Generalization in the class of obstruents, so obstruents can cluster with themselves in all kinds of configurations: stops with stops, fricatives with fricatives and fricatives with stops (Rubach & Booij 1990a).

The evaluation in (11) yields the wrong result as [bɛrɛʧka] and not *[bɛrɛʧɛka] is the attested surface form. The problem is that the source of the trouble – the

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*COMPLEX-Onset$_{Lex-3}$ constraint – cannot be abandoned because it plays a crucial role in the evaluation of *berk+a* in (10).

Similar empirical difficulties occur with any input that contains yer chains. The point is illustrated by *pies+ek* [pʲɛsɛk], the diminutive of *pies* [pʲɛs] 'dog', a yer morpheme as the deletion of //ɛ// in the GEN.SG *ps+a* [psa] documents. The evaluation in (12) uses *COMPLEX-Coda, the constraint that derives the correct surface form in *kurek* 'tap' discussed earlier in this section.

(12) //pʲɛs$_{Lex-1}$+ɛk$_{Lex-1}$// → [pʲɛ.sɛk] (failed evaluation)

	*COMPLEX-Coda	*MID$_{Lex-1}$	MAX-V
☹ (a) pʲɛ.sɛk		**!	
(b) pʲɛsk	*!	*	*
☜ (c) psɛk		*	*

The result is incorrect as [pʲɛ.sɛk], not *[psɛk], is the attested output form.

An attempt to revive *COMPLEX-Onset$_{Lex-3}$, the failed constraint in (11), cannot solve the problem as *ps+a* [psa], the GEN.SG of *pies* [pʲɛs] illustrates.

(13) //pʲɛs$_{Lex-1,Lex-3}$+a// → [psa] (failed evaluation)

	*COMPLEX-Onset$_{Lex-3}$	*COMPLEX-Coda	*MID$_{Lex-1}$	MAX-V
☜ (a) pʲɛ.sa			*	
☹ (b) psa	*!			*

I conclude that the Whole Morpheme Hypothesis founded on the assumption that morphemes are marked diacritically for yer alternations cannot deliver the correct results. The distinction between yers and non-yers must therefore be made at the level of segments, not at the level of morphemes. That is, yers must have a different underlying representation from non-yers.

The representation and the analysis of yers has been subject to much debate in the past fifty years. The amassed literature has an impressive volume and includes, *inter alia*, Lightner (1963, 1965, 1972), Steele (1973), Laskowski (1975), Gussmann (1980, 2007), Rubach (1984, 1986), Spencer (1986), Czaykowska-Higgins (1988), Gorecka (1988), Szpyra (1989, 1992), Bethin (1992), Piotrowski, Roca & Spencer (1992), Rowicka (1999), Cyran (2005, 2010),[11] and Jarosz (2005, 2008). Rather than reviewing this literature, the next sections focus on the issue

[11] Rowicka (1999), Gussmann (2007) and Cyran (2005, 2010) investigate the problem of yers in terms of Government Phonology.

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of representation (Section 3) and on the construction of a new account of Yer Vocalization and Yer Deletion (Sections 4, 5 and 6).

3. REPRESENTATION

As argued in the preceding section, yer vowels and non-yer vowels must have different underlying representations. In the case of Polish, the *e*-yer, transcribed as //E//, must have a different representation from the full vowel //ɛ//. The distinction is eliminated in the surface representation. For example, *kuter* //kutEr// 'cutter', which contains a yer, and *skuter* //skutɛr// 'scooter', which has a full vowel *e*, surface phonetically with the same [ɛ]: [kutɛr] and [skutɛr], respectively. This situation is depicted in (14).

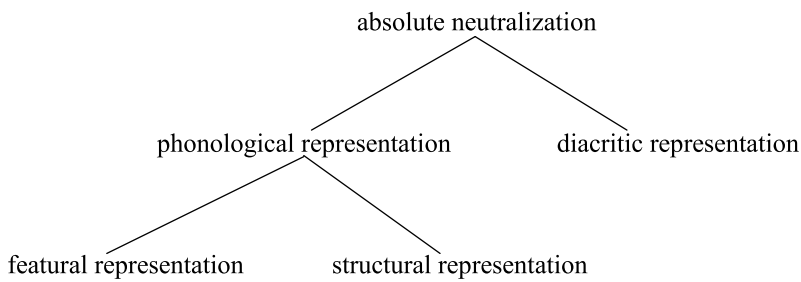
(14) Underlying representation: E ɛ

Surface representation: ɛ

Since the distinction between //E// and //ɛ// is eliminated on the surface in one hundred percent of cases, (14) is an instance of absolute neutralization. As originally discovered by Kiparsky (1973), absolute neutralization can be analyzed in two ways. First, we can use phonological properties of segments in a diacritic way. Second, we can use diacritic features in a phonological way. In the latter case, arbitrary diacritics distinguish segments in the underlying representation, so the segments themselves can be represented as identical to the segments that occur in the surface representation.

Advances in the theory of representation made since the publication of Kiparsky's article have added subtlety to the concept of what constitutes phonological properties of segments. Importantly, distinctions between segments can be drawn either in terms of phonological features, an option that was available in 1973, or in terms of phonological structure, an option that was not available in 1973. The latter option is afforded by skeletal theories that make a distinction between the melodic tier and the skeletal tier.

(15)



A diacritic solution to the problem shown in (2) would be to assign a non-phonological property to the yer *E* and thus make it different from the full vowel //ɛ//. For example, *E* could be analyzed as //ɛ// that carries the diacritic [blue]

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or some other equally arbitrary diacritic. The representation of *kuter* 'cutter', containing a yer vowel, and *skuter* 'scooter', containing a full vowel *e*, would then be as follows.

(16) *Underlying representation:* //kutɛ[blue]r// – //skutɛr//

I postpone the discussion of the diacritic representation till Section 6 as then, given the phonological analysis in Sections 4 and 5, this discussion will be clearer than it can be at this point.

The phonological representation of *E* can take two guises. First, the contrast between *E* and //ɛ// can be expressed in terms of phonological features (featural contrast). Second, the contrast can be made in terms of the relation between the melodic tier and the skeletal tier (structural contrast). Assuming featural contrast, we could, for example, follow Lightner (1963) and represent *E* as the high lax vowel //ɪ//, which would make it distinct from //ɛ//. However, *E* could not be simply //i// because //i// exists in Polish and surfaces phonetically as [i], so the neutralization //i// → [ɛ] could not be effected correctly. Since //i// is [+tense], it suffices to assume that the high vowel standing for *E* is [–tense]. The difference between *kuter* 'cutter', a yer root, and *skuter* 'scooter', a non-yer root, would then be as follows.

(17) *Underlying representation:* (a) //kutɪr// (b) //skutɛr//

In this analysis, Yer Vocalization lowers //ɪ// to [ɛ] in some contexts while Yer Deletion eliminates //ɪ// in the remaining contexts. The result is that underlying //ɪ// is never found as [ɪ] in the surface representation, a classic case of absolute neutralization.

The difference between *E* and //ɛ// can be encoded as a structural difference. Given the distinction between the melodic tier and the skeletal tier (Clements & Keyser 1983, Levin 1985, Hayes 1989, *inter alia*), two solutions are readily available. First, *E* can be represented as a floating mora or X-slot or, conversely, *E* can be represented as a floating melodic segment, that is, as a segment that lacks a mora or an X-slot, depending on which skeletal theory is assumed (the moraic theory or the X-slot theory).

Assuming the floating mora representation, the difference between *kuter* 'cutter', a yer root, and *skuter* 'scooter', a non-yer root, can be depicted as follows.

(18) *Underlying representation:* (a) //k u t μ μ r// (b) //s k u t ε μ r//

In this analysis, Yer Vocalization supplies the melodic content to the floating mora by filling in [ɛ], which functions as a default vowel. In contexts in which Yer Vocalization cannot apply, such as that before the vowel ending of the GEN.SG *kutr+a*, the mora remains floating and deletes.

The opposite assumption is to represent yers as floating melodic segments, that is, as melodic segments that lack a mora (or an X-slot in the X-slot skeletal theory).

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(19) *Underlying representation:* (a) //k u t ɛ r// (b) //s k u t ɛ r//

In terms of the feature content, the *e*-yer in (19a) and the full vowel *e* in (19b) are identical. In this analysis, Yer Vocalization consists in inserting a mora. Once the yer has obtained a mora, it becomes indistinguishable from the full vowel [ɛ] that inherits the mora from the underlying representation, as in *skuter* (19b). In contexts in which Yer Vocalization has not applied, such as that before the vowel ending of the GEN.SG *kutr+a*, the yer remains a floater and deletes.

Of the three representations in (17), (18) and (19), the floating mora representation in (18) carries no promise of success. The reason is that it runs into difficulty when a language has more than one yer, which is a typical situation.

(20) (a) *Slovak*
liter [litɛr] 'liter' (NOM.SG) – litr+a [litra] (GEN.SG)
lotor [lɔtɔr] 'rascal' (NOM.SG) – lotr+a [lɔtra] (GEN.SG)

(b) *Polish*
osioł [ɔɕɔł] 'donkey' (NOM.SG) – osł+a[12] [ɔsła] (GEN.SG)
wioseł [vʲɔsɛł] 'oar' (GEN.PL) – wiosł+o [vʲɔsłɔ] (NOM.SG)

If yers are floating moras (18), then both *liter* and *lotor* in Slovak have the same representation of their yers.

(21) *Underlying representation:* (a) //l i t r// (b) //l ɔ t r//

The problem is that Yer Vocalization that inserts a melodic segment underneath the floating mora is unable to distinguish (21a) from (21b) because the mora appears in exactly the same context: between [t] and [r]. This is an issue because Yer Vocalization should insert [ɛ] in (21a) and [ɔ] in (21b) in order to derive *liter* and *lotor*, respectively.

The Polish example in (20b) strengthens the observation that the distribution of yers is unpredictable from context. The data demand that Yer Vocalization should make the following changes.

(22) (a) osioł 'donkey' (NOM.SG)
//ɔ ɛ ɬ// → [ɔ ɛ ɔ ɬ]

[12] There are only three stems in Polish that contain the yer *o* (see below), but this does not mean that they are irrelevant. The point is that the floating melodic segment theory can while the floating mora theory cannot account for these stems. See the discussion later in this section.

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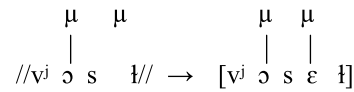
(b) wioseł ‘oar’ (GEN.PL)



If the phonological context were to play a role in the distribution of yers, we would expect that (22a) should select the front vowel [ɛ] because the preceding consonant [ɕ] is soft (prepalatal) and hence [–back]. On the other hand, (22b) should select [ɔ] because the preceding consonant [s] is hard and hence [+back].[13] The attested facts are exactly the reverse of this expectation: [ɔ] occurs after soft [ɕ] and [ɛ] after hard [s]. The conclusion is that the floating mora representation of yers is not a viable option and, consequently, will not be discussed any further.

The following discussion compares the featural theory of yers represented in (17) and the floater theory represented in (19). For typographic ease, I retain the transcription //E// from Section 1 to represent a yer, but from now on //E// denotes exclusively a floater (a floating melodic segment) and does not stand any longer for a yer that is distinguished from other vowels in terms of phonological features. The discussion below considers five issues: (i) plausible inventories, (ii) length predictions, (iii) phonological interaction, (iv) melody – skeleton independence, and (v) syllabification effects.

(i) Plausible inventories

Yers derive historically from the Proto-Slavic lax high vowels, [ɪ] and [ʊ], which are no longer attested phonetically in any Slavic language. The fallout of the historical changes is different in different languages, as the following examples illustrate.

(23) (a) *Russian:* [ɛ ɔ]
lev ‘lion’ (NOM.SG) – lv+a (GEN.SG)
son ‘dream’ (NOM.SG) – sn+a (GEN.SG)

(b) *Bulgarian:* [ɛ ə]
venec ‘wreath’ (SG) – venc+i (PL)
lakət ‘elbow’ (SG) – lakt+i (PL)

(c) *Serbian:* [a]
pas ‘dog’ (NOM.SG) – ps+a (GEN.SG)
zamak ‘castle’ (NOM.SG) – zamk+a (GEN.SG)

From the point of view of the featural theory, all that matters is that yers are kept distinct in the underlying representation from other vowels of a given language in terms of their feature make-up. This goal is achieved in (17) by assuming that the

[13] I follow the Slavic tradition and use the terms ‘soft consonant’ and ‘hard consonant’. Soft consonants are [–back] because they are palatalized or prepalatal while hard consonants are [+back] because they are velarized. See Wierzchowska (1963) and Rubach (1984, 2003a).

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e-yer derives from underlying //ɪ//. The problem with this approach is that there is no way of constraining the representation of yers, which may lead to implausible inventories of underlying vowels. For example, Jarosz (2005) postulates that Polish yers should be represented as //ɪ// and //ɘ//. In this analysis, the system of underlying vowels includes the following segments.

(24) *Underlying vowels in Polish* (Jarosz 2005)

i	ɨ	u
ɪ		
		ɘ
ɛ		ɔ
	a	

The system contains high tense vowels //i ɨ u//, high front lax //ɪ//, mid back tense unrounded //ɘ//, mid lax //ɛ ɔ// and low back //a//. The question is whether a system such as the one in (24) can exist in a natural language. In particular, it appears to be unlikely that a language could have //ɘ// without having the two other mid tense vowels: //e// and //o//.

The featural theory may lead to many other implausible systems. For example, nothing stands in the way of assuming that the *e*-yer in Polish derives from mid front lax rounded //œ// since the absolute neutralization rule taking //œ// to [ɛ] is just as simple (unrounding) as a rule that takes //ɪ// to [ɛ] (lowering). However, this analysis is implausible because it is not known that a language can have a rounded front mid vowel without also having a rounded front high vowel. Worse, if a language has many yers, postulating implausible vowel systems is not an option but a necessity. The point is illustrated by Slovak.

(25) *Slovak yers* (Dvonč & Ružicka 1966, Zauner 1966, Rubach 1993)

e [ɛ] – zero:	*pes* ‘dog’ (NOM.SG)	*ps*+a (GEN.SG)
i [i] – zero:	chudáč*ik* ‘poor man’ (NOM.SG)	chudáč*k*+a (GEN.SG)
ä [æ] – zero:	odo*pä*+ť ‘undo’ (PERFECTIVE)	odo*pn*+úť (IMPERFECTIVE)
o [ɔ] – zero:	o*vos* ‘oats’ (NOM.SG)	o*vs*+a (GEN.SG)
u [u] – zero:[14]	*ku* kave ‘to the coffee’	*k* rieke ‘to the river’
a [a] – zero:	do*sák* ‘board’ (GEN.PL)	do*sk*+a (NOM.SG)

As (25) shows, all vowels can be yers in Slovak. The inventory in (26) lists underlying short vowels. The corresponding yers appear in italics.

[14] The yers [i] and [u] occur marginally. Yet, they are worth mentioning since, as I point out below, depending on the theory of representation, they either can or cannot be accounted for.

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(26) *Underlying short vowels in Slovak*

i	*i*	u	*u*
ɛ	*ɛ*	ɔ	*ɔ*
æ	*æ*	a	*a*

It is hard to imagine how the featural theory could represent the yers in (26). The vowels in italics would have to be different in terms of phonological features from the corresponding full vowels. For example, the yer corresponding to //i// could probably be represented as lax //ɪ//, but how would the yers corresponding to //ɛ// and //ɔ// look? Since the feature inventory is large, technically, it would be possible to find enough features in order to make the distinctions in (26). However, a vocalic system that would emerge from this endeavor would be implausible.[15]

In contrast to the featural theory, the floater theory has no problem dealing with multiple yers. As shown in (19), the difference between a yer and a full vowel is structural rather than featural. Yers are vowels that lack a mora. On the melodic tier, yers and full vowels are non-distinct. This way of representing yers does not run into the problem of implausible inventories because yers are harvested from the existing inventory of underlying vowels. The prediction is that, in the extreme case, all the vowels of a language may have corresponding yers. This is exactly what we find in Slovak.

(ii) Length predictions

If yers are floaters and hence lack a mora, a prediction is made that no language may have long vowels as yers in the underlying representation. The reason is that length relations are represented on the skeletal tier, so a long vowel is a vowel that is linked to two moras. If yers are moraless, then by definition they cannot be long. A further prediction is that a surface occurrence of a long vowel derived from an underlying yer must be an effect of a lengthening process operating independently in a given language because length could not have been inherited from the underlying representation.

Both of these predictions are borne out in Slovak. First, there is no motivation to posit underlying long yers. Second, a long vowel in the surface representation that derives from a yer is invariably an effect of a lengthening rule. The data in (25) contain an example in point: the GEN.PL of *dosk+a* 'board' (NOM.SG) is *dosák* [dɔsa:k] with long [a:] that derives from //A// because of the alternation with zero in *dosk+a* //dɔsAk+a//. In the GEN.PL *dosák* //dɔsAk//, the yer vocalizes because it is not followed by a full vowel and hence gains a mora, which makes it indistinguishable from vowels that inherit moras from the underlying representation, for example, *par+a* 'steam'. Since Slovak has vowel lengthening in the. PL GEN, both //dɔsAk// and //par// lengthen their vowels, as depicted in (27).

[15] Slovak also has six underlying long vowels that correspond to the vowels in (26). See Rubach (1993).

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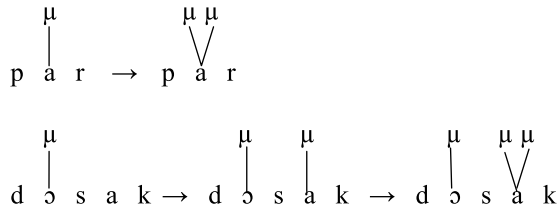
(27)



These predictions made by the floater theory are not available in the featural theory. In that theory, yers are full vowels because they carry a mora. Consequently, nothing stands in the way of representing yers as long vowels. Since Slovak has a system of short – long vowel contrasts involving all vowels in the underlying representation, yers could, in principle, be long vowels. The fact that there is no reason for yers to be long vowels is an accident in the featural theory. Similarly, no prediction is made that all surface instances of long vowels deriving from underlying yers must be a result of yer vocalization and lengthening processes that operate independently in the language.

(iii) Level predictions

In a variant of OT that uses levels in phonological evaluation (see Section 5 below), the floater theory, but not the featural theory, makes predictions regarding the interaction of processes. Relevant here are the processes that refer to the skeletal representation. We have just seen one such process: Vowel Lengthening in Slovak. Vowel Lengthening and Yer Vocalization interact in the sense that the former feeds the latter. It is predicted then that Vowel Lengthening cannot operate on the level on which Yer Vocalization has not had a chance to take its toll yet.

Similarly, Stress Assignment interacts with Yer Vocalization because vocalized yers count for stress. This is the situation in Polish, where stress is assigned to the penultimate syllable and vocalized yers play a role in the vowel count. Consequently, it is predicted that Stress Assignment must be active at the level at which yers have vocalized. The prediction is correct (see Section 5 below).

In contrast to the floater theory, the featural theory makes no predictions regarding the interaction between Yer Vocalization and Vowel Lengthening in Slovak or Yer Vocalization and Stress Assignment in Polish. The reason is that yers are full vowels in the featural theory, so they are linked to a mora at all levels of derivation.

(iv) Melody–skeleton independence

If the property of being a yer and the feature make-up are unrelated, as claimed by the floater theory, we expect that a language may develop ‘new yers’, that is, the inventory of vowels showing yer behavior may increase. This is exactly what happened in Polish.

Until the 19th century, the Polish words in (28) had the [ɛ] yer (28a). In the 20th century, [ɛ] changed into [ɔ]. The change of the vowel quality did not affect the pattern of alternations with zero (28b).

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(28) (a) *19th century*

NOM.SG	GEN.SG	GLOSS
osieł [ɔɕɛł]	osł+a [ɔsła]	'donkey'
kocieł [kɔʨɛł]	kotł+a [kɔtła]	'cauldron'
kozieł [kɔʑɛł]	kozł+a [kɔzła]	'goat'

(b) *20th century*

osioł [ɔɕɔł]	osł+a [ɔsła]	'donkey'
kocioł [kɔʨɔł]	kotł+a [kɔtła]	'cauldron'
kozioł [kɔʑɔł]	kozł+a [kɔzła]	'goat'

This development is unexpected in the featural theory that links yers to the quality of the vowel, but not in the floater theory that divorces the quality of the vowel from yer behavior. The observation is that the quality of the vowel has changed while the 'yerhood' property has remained unaffected.

(v) Syllabification effects

The floater theory predicts that unvocalized yers cannot count as vowels with regard to processes that refer to syllable structure. The reason is that unvocalized yers cannot erect syllables because they lack a mora. This prediction is not made by the featural theory that treats yers as full vowels. The matter can be discussed in a meaningful way only after we have seen the details of how Yer Vocalization and Yer Deletion function in Polish. Therefore the discussion of syllabification effects is postponed until Section 6.

In the remainder of this article, I assume that underlying yers are floaters, that is, they are melodic segments lacking a mora,[16] and, as noted earlier, a floater is transcribed as *E*.[17]

4. Basic pattern

This section presents an analysis of the patterns of Yer Vocalization and Yer Deletion. The proposal is founded on six new ideas. First, Yer Vocalization has nothing to do with syllable structure, so syllable optimization constraints such as *COMPLEX-Coda cannot be central to the process. Second, the occurrence of a consonant cluster plays a role in accounting for the vocalization of yers. Third, Yer Deletion is a phonotactic constraint that is sensitive to a specific configuration of

[16] This proposal was put forward by Rubach (1986) and Kenstowicz & Rubach (1987). There is a technical point of difference to be noted here. The proposal had been made before the moraic theory of the skeleton became the default theory. Consequently, yers were analyzed as floaters lacking an X-slot rather than a mora.

[17] Polish or, more generally, Slavic languages are not alone in admitting vocalic segments that lack a mora in the underlying representation. A representation that corresponds exactly to the Slavic yers has recently been postulated for Yine by Zimmermann (2013). Scheer (2011) points out that similar representations are necessary for vowel–zero alternations in French, German and Dutch.

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yers and full vowels. Fourth, counter to the established tradition, Yer Deletion is a context-sensitive rather than a context-free process. Fifth, Yer Deletion precedes Yer Vocalization. Sixth, the so-called zero endings of the NOM.SG AND the GEN.PL are zeros rather than inflectional yers that delete context-freely after they have triggered Yer Vocalization (see Szpyra 1992).

The line of reasoning that Yer Vocalization is connected to syllable structure was introduced originally by Gorecka (1988). It was developed further in Szpyra (1992) and adapted by OT researchers working on Russian and Polish (Yearley 1995;[18] Jarosz 2005, 2008; Gouskova 2012). The problem is that the empirical material exemplifying the operation of Yer Vocalization and Yer Deletion in Polish does not support this hypothesis. Even though Yer Vocalization improves syllable structure, it does so in a trivial way. Yer Deletion, on the other hand, wreaks havoc, worsening syllable structure in dramatic ways.

Polish is well-known for its complex consonant clusters, both in size (29a) and in concatenations (29b). The latter observation refers to the fact that consonant clusters exhibit rampant violations of the Sonority Sequencing Generalization (see footnote 9). The words in (29) do not contain yers.

(29) *Consonant clusters in Polish*

(a)	*pstr*y [pstr] 'gaudy'	łga*rstw* [rstf] 'lie' (GEN.PL)
	bzdura [bzd] 'nonsense'	przest*ępstw* [mpstf] 'crime' (GEN.PL)
(b)	*rtęć* [rt] 'mercury'	my*śl* [ɕl] 'thought'
	*lśn*ić [lɕŋ] 'shine'	umy*sł* [sɫ] 'mind'
	*msz*a [mʃ] 'mass'	mechani*zm* [sm] 'mechanism'
	*krt*ań [krt] 'larynx'	*krnąbrny* [krnɔmbrnɨ] 'unruly'

[18] Yearley (1995) is the first study of yers in the framework of Optimality Theory and deserves credit for opening a new perspective on yers and related issues. Even though Yearley investigates Russian rather than Polish, she adopts the proposal of Rubach (1986) and Kenstowicz & Rubach (1987) to represent yers as moraless vowels. She borrows from Lexical Phonology (Kiparsky 1982, Booij & Rubach 1987) the idea that morphemes go through cycles, which makes her analysis derivational. The analysis developed in this article in Section 5, like Yearley's analysis, is inspired by Lexical Phonology but its assumptions are different. Morphemes are not subject to cyclic evaluation. As I explain in Section 5, derivational evaluation is limited to four levels corresponding to fully derived stems, words, clitic phrases, and sentences.

Further, Yearley's analysis claims that Yer Vocalization is driven by the optimization of syllable structure. The analysis developed in this article makes the opposite claim: syllable structure has nothing to do with Yer Vocalization. However, it should be noted that the facts of Russian and the facts of Polish are different in many regards. For example, in Russian but not in Polish, the yer of the adjectival morpheme //En// is vocalized in order to avoid an extrasyllabic consonant:

Russian //misʲlʲ+En+ij// → [miˈsʲlʲɛnij], not *[miˈsʲɛlʲnij] 'mental'
Polish //pɔ+miɕl+En+i// → [pɔmiɕlni] 'successful', not *[pɔmiɕlɛni]

Yearley's analysis of the Russian [miˈsʲlʲɛnij] in terms of syllable structure is therefore correct, but this analysis cannot be extended to Polish because the facts are different: the attested surface form has an extrasyllabic *l* in [pɔmiɕlni].

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It is implausible that a language with such wild clusters could treat syllable structure as relevant for the purposes of Yer Vocalization and Yer Deletion. The data in (30) and (31) strengthen this concern. Consider what would happen if the yers were not vocalized in (30).

(30) *Consonant clusters and Yer Deletion*
oset //ɔsEt// 'thistle' → [ɔsɛt], but why not [ɔst]?
masek //masEk// 'mask' (GEN.PL) → [masɛk], but why not [mask]?
korek //kɔrEk// 'cork' → [kɔrɛk], but why not [kɔrk]?
palec //palEts// 'finger' → [palɛts], but why not [palts]?
koniec //kɔɲEts// 'end' → [kɔɲɛts], but why not [kɔɲts]?

The unattested forms on the right that would arise if the yer failed to vocalize are perfectly well-formed from the point of view of syllable structure and are paralleled by words that do not contain yers. For example, the non-existing *[ɔst] is paralleled by *most* [mɔst] 'bridge', *[mask] by *kask* [kask] 'helmet', *[kɔrk] by *bark* [bark] 'shoulder', *[palts] by *walc* [valts] 'waltz', and *[kɔɲts] by *potańc* [pɔtaɲts] 'dance'.

In spite of the fact that the complex codas in (30) resulting from the absence of Yer Vocalization would be perfectly well-formed, the standard line of analysis in OT initiated by Yearley (1995) for Russian and pursued by Jarosz (2005) for Polish is to ascribe Yer Vocalization to the *COMPLEX-Coda constraint. Looking at *oset* //ɔsEt// → [ɔsɛt] 'thistle' in (30), the analysis is to rank *COMPLEX-Coda above the constraint banning *E* → ɛ, that is, Yer Vocalization. The relevant candidates are [ɔst] and [ɔsɛt]. The candidate [ɔst] violates *COMPLEX-Coda, leaving [ɔsɛt] as the winner, the correct result.

The analysis based on *COMPLEX-Coda as the driver for Yer Vocalization cannot be correct. This is shown by the fact that Yer Vocalization occurs with perfect regularity in open syllables, so in the context in which *COMPLEX-Coda is mute. A comparison of the nominative and the genitive forms in (31) documents the yer because we witness a vowel–zero alternation. The forms in the lower lines exhibit Yer Vocalization in an open syllable.

(31) *Syllable structure and Yer Vocalization*

(a) pies [pʲɛs] 'dog' (NOM.SG) – ps+a [psa] (GEN.SG)
pies+ek //pʲEs+Ek// → [pʲɛ.sɛk] (DIMIN NOM.SG)
pies+k+a //pʲEs+Ek+a// → [pʲɛ.ska] (GEN.SG)

(b) zamek [za.mɛk] 'lock' (NOM.SG) – zamk+a [zam.ka] (GEN.SG)
zamecz+ek //zamek// → [za.mɛ.ʧɛk] (DIMIN NOM.SG)
zamecz+k+a //zamEk+Ek+a// → [za.mɛ.ʧka] (GEN.SG)

(c) klamk+a [klam.ka] 'knob' (NOM.SG) – klamek [kla.mɛk] (GEN.PL)
klamecz+ek //klamek// → [kla.mɛ.ʧɛk] (DIMIN GEN.PL)
klamecz+k+a //klamek+Ek+a// [kla.mɛ.ʧka] (NOM.SG)

(d) krew [krɛw] 'blood' (NOM.SG) – krw+i [krfʲi] (GEN.SG)
krew+n+y //krEv+En+ɨ// → [krɛ.vnɨ] 'relative'

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While the syllabification of *VCV* as *V.CV*, as in [pʲɛ.sɛk] in (31a), is entirely uncontroversial, the syllabification of *VCCV* requires a comment. A reviewer draws attention to the fact that *VCCV* may be syllabified not only as *V.CCV* but also as *VC.CV*, as in [pʲɛ.ska] or [pʲɛs.ka]. Indeed, such variation has been reported in Rubach & Booij (1990a). However, the dominant pattern is that of onset maximization: *VCCV* → *V.CCV* (Rubach & Booij1990a).

Paradoxically, the existence of variation strengthens rather than weakes the claim made in this article that Yer Vocalization is not driven by syllable structure. The point is that variation in syllabification does not correlate with the pattern of Yer Vocalization. Unlike syllabification, the vocalization of yers is absolutely stable and admits no variation, which leads to the conclusion that syllable structure and Yer Vocalization are not dependent on each other.

Not only Yer Vocalization but also Yer Deletion is not guided by syllable structure. The point is illustrated in (32).

(32) *Syllable structure and Yer Deletion*

NOM.SG	GEN.SG	GLOSS
lew [lɛf]	lw+a [lva]	'lion'
mech [mɛx]	mch+u [mxu]	'moss'
płeć [płɛʨ]	płc+i [płʨi]	'sex'
brew [brɛf]	brw+i [brvʲi]	'eyebrow'
czosnek [ʧɔsnɛk]	czosnk+u [ʧɔsnku]	'garlic'
mędrek [mɛndrɛk]	mędrk+a [mɛntrka]	'arrogant person'

The deletion of yers in (32) wreaks havoc in syllable structure, leading to outrageous sonority violations with liquids and nasals occurring further away from the vowel than obstruents.

Pulling together the observations made in the preceding discussion, we obtain the following picture:

(i) Yers are vocalized where they need not be vocalized from the point of view of syllable structure (30), as in //ɔsEt// → [ɔsɛt] 'thistle' (NOM.SG), even though the non-existing *[ɔst] would be a perfectly well-formed coda.

(ii) The reverse is also true: yers are not vocalized where they need to be vocalized in order to avoid sonority violations (32), as in //ʧɔsnEk+u// → [ʧɔsnku] rather than *[ʧɔsnɛku] 'garlic' (GEN.SG).

(iii) Yer Vocalization occurs in both closed syllables and in open syllables (31), as in //zamEk// → [za.*mɛk*] 'lock' (NOM.SG) and //pʲEs+Ek// → [*pʲɛ*.sɛk] 'dog' (DIMIN NOM.SG).

(iv) The pattern of syllabification and the pattern of Yer Vocalization do not correlate (31), as in [pʲɛ.ska] or [pʲɛs.ka].

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I conclude that Yer Vocalization and Yer Deletion, on the one hand, and syllable structure, on the other hand, are unrelated. This conclusion takes the discussion back to the initial question: how do we account for Yer Vocalization and Yer Deletion?

Reviving Lightner's (1963) generalization that yers vocalize before yers and delete elsewhere (see (6) in Section 1 above) is not an option. First, this generalization cannot be implemented in OT. Second, the generalization is actually incorrect, as the following data show:

(33) *Yer Vocalization and syllable structure*

krew [krɛf] 'blood' (NOM.SG) – krw+i [krfʲi] (GEN.SG) – krew+k+i [krɛfkʲi] 'strong' (literally: 'full-blooded')

magister [magʲistɛr] 'MA' (NOM.SG) – magistr+a [magʲistra] (GEN.SG) – magister+ium [magʲistɛrʲjum] 'MA degree'

minister [mʲiɲistɛr] 'minister' (NOM.SG) – ministr+a [mʲiɲistra] (GEN.SG) – minister+ialny [mʲiɲistɛrʲjalnɨ] 'ministerial'

cześć [ʧɛɕʨ] 'honor' (NOM.SG) – czc+i [ʧʨi] (GEN.SG) – bez+cześć+ić[19] [bɛsʧɛɕʨiʨ] 'profane'

chrzest [xʃɛst] 'baptism' (NOM.SG) – chrzt+u [xʃtu] (GEN.SG) – chrześc+ijanin [xʃɛɕʨijaɲin] 'Christian'

The observation is that yers vocalize before suffixes that do not contain a yer, so Lightner's (1963) rule is inapplicable.

The patterns of Yer Vocalization and Yer Deletion emerge from the inspection of phonotactics. Defining the context for Yer Vocalization is not feasible because yers vocalize when followed by one consonant or by more consonants, as in //pʲEs+Ek// → [pʲɛsɛk] 'dog' (DIMIN NOM.SG) and //pʲEs+Ek+a// → [pʲɛska] (GEN.SG). In contrast, defining the context for Yer Deletion is straightforward: yers delete when followed by a single consonant and a full vowel,[20] as in //pʲEs+a// → [psa] 'dog' (GEN.SG) and//pʲEs+Ek+a// → [pʲɛska] (GEN.SG). In the latter form, the yer of //Ek// is followed by a single consonant *k* and a full vowel *a* and hence deletes. The first yer in //pʲEs+Ek+a// cannot delete because it is not followed by a single consonant and a full vowel. The situation does not change when the yer of //Ek// is deleted because the deletion creates a consonant cluster: //pʲEs+Ek+a// → /pʲEska/.

[19] This example and the one below come from Piotrowski et al. (1992), who cite them as exceptions to their analysis.

[20] This is inspired by Ruszkiewicz (1989). Examining / — C_0 yer, the traditional context for Yer Vocalization, Ruszkiewicz (1989) concludes that C_0 is in fact a single consonant rather than any number of consonants. He notes that the word *cześć* //ʧEstɕ// → [ʧɛɕʨ] 'honor' (in fact, also *chrzest* 'baptism') is an exception to this generalization. The analysis proposed below uses the single consonant conditioning for Yer Deletion, not for Yer Vocalization, so the vocalization of the yers in *cześć* and *chrzest* 'baptism' is regular. See the discussion below.

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There is independent evidence that consonant clusters block Yer Deletion. This is what we see in (33). In *krew+k+i* 'strong', the yer of *krew* //krEv// cannot delete because it is followed by two consonants. Yers that cannot delete vocalize context-freely: //krEv+k+i// →[krɛfkʲi] 'strong' and //pʲEs+Ek+a// → /pʲEska/ (Yer Deletion) →[pʲɛska] (Yer Vocalization).

In terms of OT, Yer Deletion is formalized as follows.

(34) *ECV: No floater before a consonant and a full vowel.

*ECV expresses a phonotactic generalization and has nothing to do with syllable structure. On the contrary, *ECV applies blindly, causing havoc in syllable structure. This is documented by the fact that *ECV deletes yers not only in well-behaved ECV strings such as *ost+u* 'thistle' (GEN.SG): //ɔsEt+u// → [ɔ.stu]. (The deletion here is well-behaved in the sense that it results in minimal worsening of syllable structure: the creation of a complex onset.) *ECV affects all strings where a yer is followed by a consonant and a full vowel, with no regard to the consequences for syllable structure. This is amply illustrated by the examples in (32) cited earlier, such as *lew* 'lion' (NOM.SG) – *lw+a* [lva] (GEN.SG) and *czosnek* 'garlic' (NOM.SG) – *czosnk+u* [ʧɔsnku] (GEN.SG).

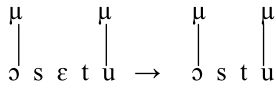
A reviewer expresses concern that *ECV is an arbitrary constraint. This is true but many phonotactic constraints are arbitrary. For example, English admits [h] only in onsets and [ŋ] only in codas. Stausland Johnsen (2012) shows that phonotactically-based constraints, with not phonetically grounded motivation, exist in synchronic grammars and are productive. They are the effects of diachronic processes that may no longer be active. One of his examples is the process of postalveolarization in Norwegian that changes alveolars into postalveolars in the context of uvular [ʁ]. Even though the process makes no sense from the phonetic point of view, it is entirely productive. Today the generalization is purely phonotactic since the original motivation – the presence of postalveolar [ɽ] – was lost at the historical stage at which postalveolar [ɽ] changed to uvular [ʁ]. Stausland Johnsen argues further that there is no evidence from learning experiments that would show that arbitrary generalizations, motivated solely by phonotactics, are harder to learn than phonetically natural generalizations.

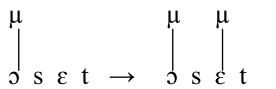
The situation described by Stausland Johnsen (2012) fits Yer Deletion and Yer Vocalization. The pattern that, historically, might have been motivated by rhythm, with even yers in a string vocalizing and odd yers deleting, is no longer true today. All that we see is a phonotactic pattern expressed by *ECV. The pattern is absolutely regular as there is not a single case on record where the yer would not delete when followed by a single consonant and a full vowel.

The observation that *ECV is fully regular is true even for morphemes that otherwise are irregular and exhibit unpredictable allomorphy. This is what we find in the last two examples in (33): *czc+i* [ʧʨi] 'honor' (GEN.SG) and *chrzt+u* [xʃtu] 'baptism' (GEN.SG). The irregularity is that the //s// of *cześć* //ʧEsʨ// 'honor' (NOM.SG) and *chrzest* //xʃEst/ 'baptism' (NOM.SG) is not present in the GEN.SG forms [ʧʨi] and [xʃtu], and there is no phonological process of Polish that

could delete the *s*, since, for instance, we have [ʃ] in the word *trzcin+a* [ʧʃtɕina] 'reed'. Consequently, [ʧtɕi] and [xʃtu] are derived from the allomorphs without /s/ and their underlying representations are //ʧEtɕ+i// and //xʃEt+u//, respectively. These representations meet the environment of *ECV, so the deletion of the yer is predicted, which is exactly what happens: //ʧEtɕ+i// → [ʧtɕi] and //xʃEt+u// → [xʃtu].[21]

The question is how Yer Deletion and Yer Vocalization can be implemented formally in Optimality Theory. To see what constraints might be needed, let us look at the changes that occur in order to derive the surface representation. This is illustrated in (35) by *ost+u* 'thistle' (GEN.SG), exemplifying Yer Deletion, and *oset* (NOM.SG), depicting Yer Vocalization.

(35) (a) 

(b) 

Yer Deletion (35a) violates MAX-V (don't delete a vowel) while Yer Vocalization (35b) violates DEP-μ (don't insert a mora).[22] Further, we need a constraint that bans the faithful candidates [ɔsEtu] and [ɔsEt], where *E* is a floater and has no mora. Yearley (1995) postulates that the desired effect is delivered by PARSE-V.

(36) PARSE-V: Vowels must be parsed into prosodic structure.

[21] There are two suffixes containing yers that are problematic for both the traditional analysis and the analysis espoused in this article. Interestingly, however, the problem lies not with *ECV but with Yer Vocalization. The suffixes in question are the adjectival *-sk* //Esk// and the nominal *-stw* //EstEv// (see, for example, Gussmann 1980 and Rubach 1984). The initial yers in these suffixes are motivated by the occurrence of Palatalization, as in *pan* 'lord' – *pań+sk+i* (ADJ) – *pań+stw+o* 'state': *n* → *ɲ*. They are not supported by vowel–zero alternations becuse the yers of these suffixes never surface as [ɛ]. The explanation for //Esk// is that the suffix is always followed by a full vowel, so the traditional Yer Vocalization rule, *E* → ɛ before a yer, has no chance to apply. This reasoning does not explain, however, why the initial //E// in //EstEv// never surfaces phonetically. After all, it is followed by a yer, and the non-initial //E// is supported by alternations; compare *pań+stw+o* 'state' – *pań+stew+k+o* (DIMIN). This being the case, the analyses in the past literature have always treated //EstEv// as an exception to Yer Vocalization.

The current analysis does not fare much better in this regard. If *-sk* and *-stw* have initial yers in the underlying representation in order to account for Palatalization, the yers must be exceptions to Yer Vocalization because they would be expected to surface before a consonant cluster. An alternative analysis would be to posit //j// as the initial segment in *-sk* and *-stw* or to postulate a floating [–back] feature, which would obviate the need for listing *–sk* and *-stw* as exceptions to Yer Vocalization.

[22] For a formal statement of these constraints, see McCarthy & Prince (1995).

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The evaluation of *ost+u* (35a) is now as follows:

(37) //ɔsEt+u// → [ɔstu]

	DEP-μ	*ECV	MAX-V	PARSE-V
(a) ɔsEt+u		*!		*
☞ (b) ɔst+u			*	
(c) ɔsɛt+u	*!			

As (37) shows, DEP-μ and *ECV must outrank MAX-V, yielding the ranking: DEP-μ, *ECV >> MAX-V. The problem is that this ranking makes the wrong prediction in the derivation of *oset*.

(38) //ɔsEt// → [ɔsɛt] (failed evaluation)

	DEP-μ	*ECV	MAX-V	PARSE-V
☜ (a) ɔsEt				*
☜ (b) ɔst			*	
☹ (c) ɔsɛt	*!			

Disentangling the tie between (38a) and (38b) by ranking MAX-V and PARSE-V *vis-à-vis* each other is pointless because neither of these candidates is the desired output.

To derive the correct surface form [ɔsɛt], we need to rank DEP-μ below both MAX-V and PARSE-V.

(39) //ɔsEt// → [ɔsɛt]

	*ECV	MAX-V	PARSE-V	DEP-μ
(a) ɔsEt			*!	
(b) ɔst		*!		
☞ (c) ɔsɛt				*

The problem is that the ranking in (39) derives the wrong result in *ost+u*.

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(40) //ɔsEt+ut// → [ɔstu]

	*ECV	MAX-V	PARSE-V	DEP-μ
(a) ɔsEtu	*!		*	
☹ (b) ɔstu		*!		
☜ (c) ɔsɛtu				*

To summarize, the evaluations of *oset+u* and *ost* run into a ranking paradox. In order to derive the correct form [ɔstu], DEP-μ must be ranked above MAX-V, as in (37), but to obtain the attested output [ɔsɛt], the ranking must be reversed, as in (39). The ordering paradox is easily resolved in Derivational Optimality Theory, as the next section shows.

5. DOT ANALYSIS

This section looks at the problem of Yer Vocalization and Yer Deletion from the perspective of Derivational Optimality Theory (DOT, henceforth).[23] This derivational variant of OT, developed by Kiparsky (1997, 2000), Rubach (1997, 2000a, b) and Bermúdez-Otero (1999, forthcoming), *inter alia*, rejects the principle of strict parallelism.[24] The assumption is that evaluation proceeds in steps called levels and hence is inherently derivational. The standard tenet that there are three levels of evaluation (Kiparsky 2000) has recently been revised by Rubach (2011). The revised model includes four derivational levels, each associated with a morphological domain. Level 1 is the stem level that comprises roots plus level 1 affixes, much as in Lexical Phonology (Kiparsky 1982). An associated assumption is that languages are free to define which affixes belong to which level.[25] Level 2 is the word level, operating in the domain of words (stems plus level 2 affixes). Level 3 is the clitic level (Rubach 2011) and, finally, level 4 is postlexical and works on structures derived by syntax. All levels use the same constraints but their ranking can be different because constraints may be reranked between levels. The optimal output from an earlier level constitutes the input to a later level, the consequence being that faithfulness constraints define

[23] The name Derivational Optimality Theory was introduced by Rubach (1997). Kiparsky (1997, 2000) uses the name LPM-OT (Lexical Phonology and Morphology in Optimality Theory) while McCarthy (1999) and Bermúdez-Otero (forthcoming) call the theory Stratal OT.

[24] There are also other differences between Standard OT and DOT. For example, according to Rubach (2003b), DOT assumes underspecification rather than the Richness of the Base as a tool to account for predictable properties of representations.

[25] However, unlike Lexical Phonology, DOT does not extend the concept of level ordering to word formation rules. All word formation is done before phonology. DOT levels are therefore assertions about the order in which morphological structures become available for phonological processing.

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their operation by comparing this input with the output candidates. That is, the winner from level 1 is the input representation to level 2, the winner from level 2 is the input representation to level 3, and the winner from level 3 is the input representation to level 4. In effect then, levels constitute miniphonologies with their own inputs and constraint ranking.

A prominent phonological process of level 1 in Polish is Palatalization. Relevant to the discussion here is the interaction between Palatalization and Yer Deletion.

The data in (41a) show transparent examples of Palatalization. The alternation in (41b) clarifies that the adjectivizing suffix contains an underlying yer. The examples in (41c) illustrate the interaction between Palatalization and Yer Deletion.

(41) *Palatalization in Polish*

(a) luz [lus] 'looseness' (NOM.SG) – luz+ie [luʑ+ɛ] (LOC.SG)
głos [głɔs] 'voice' (NOM.SG) – głos+ie [głɔɕ+ɛ] (LOC.SG)
skład [skłat] 'storage space' (NOM.SG) – składz+ie [składʑ+ɛ] (LOC.SG)
brat [brat] 'brother' (NOM.SG) – brac+ie [braʦ+ɛ] (VOC.SG)
tron [trɔn] 'throne' (NOM.SG) – tron+ie [trɔɲ+ɛ] (LOC.SG)

(b) win+a [v'in+a] 'guilt' – win+ien [vʲiɲ+ɛn] 'guilty' (SHORT FORM)

(c) luz [lus] 'looseness' – luź+n+y [luʑ+n+ɨ] 'loose' (MASC NOM.SG)
bok [bɔk] 'side' – bocz+n+y [bɔʧ+n+ɨ] 'lateral' (MASC NOM.SG)

The details of Palatalization need not concern us.[26] Suffice it to say, that PAL-*e*, a constraint requiring agreement in [–back] between the consonant and the vowel, turns //s z t d n// into /sʲ zʲ tʲ dʲ nʲ/[27] in (41a).[28] In the case of velar inputs, PAL-*e* in conjunction with various segment inventory constraints derives postalveolar stridents; here //k// →/ʧʲ/.

Essential for the present purposes is the observation that the examples in (41c) contain underlying yers, that is, *luź+n+y* 'loose' and *bocz+n+y* 'lateral' derive from underlying //luz+En+ɨ// and //bɔk+En+ɨ//, respectively. The yer of the adjectivizing suffix //En// surfaces as [ɛ] in *win+ien* [vʲiɲ+ɛn] 'guilty' (41b) but deletes when the next syllable has a full vowel in //luz+En+ɨ// → [luʑ+n+ɨ] 'loose' and //bɔk+En+ɨ// → [bɔʧ+n+ɨ] 'lateral'. The deletion is an expected result of

[26] The full range of the facts as well as the analysis are highly complex and cannot be discussed here. See Rubach (2003a) for a detailed coverage of the issues. The fragment of Palatalization presented here is based on Rubach (2003a).

[27] Recall from footnote 4 that single slashes enclose intermediate outputs; here the outputs of level 1.

[28] Spell-out constraints complete the change: /sʲ zʲ tʲ dʲ nʲ/ → [ɕ ʑ ʨ ʥ ɲ]. See below.

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*ECV. At level 1, where PAL-*e* takes effect, the yer must be present in the output or else there would be no way of enforcing PAL-*e*. This observation is documented by the following evaluations of *luź+n+y* 'loose' and *bocz+n+y* 'lateral'.

(42) (i) Level 1: //luz+En+ɨ// → /luzʲ+En+ɨ/

	DEP-μ	MAX-V	PAL-*e*	*ECV	PARSE-V
(a) luzEnɨ			*!	*	*
☞ (b) luzʲEnɨ				*	*
(c) luzʲɛnɨ	*!				
(d) luznɨ		*!			

(ii) Level 1: //bɔk+En+ɨ// → /bɔʧʲ+En+ɨ/

	DEP-μ	MAX-V	PAL-*e*	*ECV	PARSE-V
(a) bɔkEnɨ			*!	*	*
☞ (b) bɔʧʲEnɨ				*	*
(c) bɔʧʲɛnɨ	*!				
(d) bɔknɨ		*!			

If yers were permitted to delete at level 1, the winning candidates would be (42i-d) and (42ii-d). They do not violate PAL-*e* since there is no front vowel in the output. However, the attested surface forms, [luʑnɨ] and [bɔʧnɨ], testify to the operation of PAL-*e*, so candidates (42i-d) and (42ii-d) must be excluded. To achieve this goal, MAX-V must outrank *ECV and PARSE-V, as shown in (42). Further, yers cannot vocalize to [ɛ] at level 1 because they would turn into full vowels and become immune to Yer Deletion at level 2. To block Yer Vocalization, DEP-μ must outrank *ECV and PARSE-V at level 1.

Level 2 evaluations complete the derivation of the surface forms. The inputs are the winning candidates from level 1: /luzʲ+En+ɨ/ and /bɔʧʲ+En+ɨ/. The level 2 grammar executes three actions. First, yers are deleted through the operation of *ECV. Second, SPELL-OUT constraints enforce the change from palatalized dentals to prepalatals, accompanied by the affrication of stops: /sʲ zʲ tʲ dʲ nʲ/ → [ɕ ʑ tɕ dʑ ɲ]. Third, the [–back] feature on postalveolar stridents /ʧʲ ʤʲ ʃʲ ʒʲ/

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turns into [+back], a change that is mandated by HARD.[29] In (43), I omit PAL-*e* because it is not active at level 2.

(43) (i) Level 2: /luzʲ+En+ɨ/ → [luzɲɨ]

	DEP-μ	*ECV	SPELL-OUT	MAX-V	PARSE-V
(a) luzʲEnɨ		*!	*		*
(b) luzɛEnɨ		*!			*
(c) luzɛnɨ	*!				
☞ (d) luzɲɨ				*	
(e) luzʲnɨ			*!	*	

(ii) Level 2: /bɔʧʲ+En+ɨ/ → [bɔʧɲɨ]

	DEP-μ	*ECV	HARD	MAX-V	PARSE-V
(a) bɔʧʲEnɨ		*!	*		*
(b) bɔʧEnɨ		*!			*
(c) bɔʧɛnɨ	*!				
☞ (d) bɔʧɲɨ				*	
(e) bɔʧʲnɨ			*!	*	

The winners are the attested surface forms, so the result is correct. The ranking of DEP-μ and PARSE-V is inherited from level 1, but the ranking *ECV >> MAX-V is new. This ranking is necessary in order for *ECV to have an effect and implement Yer Deletion.

(44) *Reranking at level 2*
Level 1: MAX-V >> *ECV
Level 2: *ECV >> MAX-V

[29] HARD affects both underlying and derived segments and is motivated independently as a constraint by typological differences between stridents in various Slavic languages. It is also supported by Retraction, a process that retracts /i/ to [ɨ] after [+back] coronals, including postalveolar stridents. For discussion, see Rubach (2003a).

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Now we are ready to return to the analysis *oset* 'thistle' (NOM.SG) – *ost+u* (GEN.SG) that collapsed in Section 4 due to a ranking paradox. The underlying representations are //ɔsEt// and //ɔsEt+u//, respectively. Nothing much happens at level 1 because PAL-*e* is sensitive to derived environments and cannot look inside morphemes (Rubach 2003a).

(45) (i) Level 1: //ɔsEt// → /ɔsEt/ (no change)

	DEP-μ	MAX-V	*ECV	PARSE-V
☞ (a) ɔsEt				*
(b) ɔst		*!		
(c) ɔsɛt	*!			

(ii) Level 1: //ɔsEt+u// → /ɔsEt+u/ (no change)

	DEP-μ	MAX-V	*ECV	PARSE-V
☞ (a) ɔsEtu			*	*
b. (ɔstu)		*!		
(c) ɔsɛtu	*!			

The winners in (45) and hence the inputs to level 2 are the faithful candidates (45i-a) and (45ii-a). The evaluation at level 2 witnesses Yer Deletion in the case of /ɔsEtu/ because *ECV is reranked above MAX-V at level 2.

(46) (i) Level 2: /ɔsEt/ → /ɔsEt/ (no change)

	DEP-μ	*ECV	MAX-V	PARSE-V
☞ (a) ɔsEt				*
(b) ɔst			*!	
(c) ɔsɛt	*!			

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(ii) Level 2: /ɔsEt+u/ → [ɔstu]

	DEP-μ	*ECV	MAX-V	PARSE-V
(a) ɔsEtu		*!		*
☞ (b) ɔstu			*	
(c) ɔsɛtu	*!			

The evaluation in (46i) unveils a new ranking: MAX-V >> PARSE-V. This ranking can also be true at level 1, but there is no argument for it. That is, the constraint ranking at level 2 is as follows.

(47) *Level 2 ranking*
DEP-μ, *ECV >> MAX-V >> PARSE-V

The GEN.SG form /ɔstu/ is the attested surface form, and it goes unscathed through level 3. Faithfulness constraints make sure that the winner is the faithful candidate [ɔstu]. The NOM.SG /ɔsEt/, on the other hand, undergoes Yer Vocalization at level 3, which means that PARSE-V must be reranked above DEP-μ.

(48) Level 3: /ɔsEt/ → /ɔsɛt/

	PARSE-V	*ECV	MAX-V	DEP-μ
(a) ɔsEt	*!			
(b) ɔst			*!	
☞ (c) ɔsɛt				*

The winner [ɔsɛt] is the attested surface form, so the evaluation is correct. The level 3 ranking is as follows.

(49) *Level 3 ranking*
PARSE-V, *ECV >> MAX-V >> DEP-μ

Notice that DEP-μ and PARSE-V have literally switched places: PARSE-V goes where DEP-μ is at level 2 and DEP-μ fills the space vacated by PARSE-V. This reshuffling yields the desired effect: Yer Vocalization is more important than Yer Deletion. In sum, we have the following rerankings.

(50) *Rerankings at level 3*
(a) Level 2: DEP-μ >> PARSE-V
Level 3: PARSE-V >> DEP-μ

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(b) Level 2: DEP-μ >> MAX-V
Level 3: MAX-V >> DEP-μ

The ranking paradox noted in (40) in Section 4 regarding the evaluation of *oset* – *ost+u* is eliminated in Derivational Optimality Theory in a straightforward way, as (46) and (48) have shown.

An outstanding question is how DOT can deal with yer chains, that is, with multiple yers in a word. The example in (51) clarifies the issue of how underlying representations look.[30]

(51) *Yer chains*

(a) kabel 'cable' (NOM.SG) – kabl+a (GEN.SG)
Observation: *e*–zero alternation, so *kabel* has a yer. Consequently, the underlying representations are //kabEl// in the NOM.SG and //kabEl+a// in the GEN.SG

(b) kabel+ek (DIMIN NOM.SG) – kabel+k+a (GEN.SG)
Observation: The diminutive suffix exhibits an *e*–zero alternation and hence must have a yer. Therefore the underlying representations are //kabEl+Ek// in the NOM.SG and //kabEL+Ek+a// in the GEN.SG.

(c) kabel+ecz+ek (DOUBLE DIMIN NOM.SG) –
kabel+ecz+k+a (GEN.SG)
Observation: Two occurrences of the diminutive suffix //Ek//. Therefore the underlying representations are //kabEl+Ek+Ek// in the NOM.SG and //kabEl+Ek+Ek+a// in the GEN.SG.

To check whether DOT can handle yer chains, we look at the most complex example in (51c): the NOM.SG (52i) and the GEN.SG (52ii). The goal at level 1 is to derive Palatalization: //k// → /ʧʲ/.[31]

(52) (i) Level 1: //kabEl+Ek+Ek// → /kabEl+Eʧʲ+Ek/

	DEP-μ	MAX-V	PAL-*e*	*ECV	PARSE-V
(a) kabElEkEk			*!		***
☞ (b) kabElEʧʲEk					***
(c) kablEʧʲEK		*!			**
(d) kabɛlɛʧʲɛk	***!				

[30] Recall the examples in Section 1.

[31] The details of how Palatalization works in Polish are more complex than presented below. For discussion, see Rubach (1984, 2003a).

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(ii) Level 1: //kabEl+Ek+Ek+a// → /kabEl+Eʧʲ+Ek+a/

	DEP-μ	MAX-V	PAL-*e*	*ECV	PARSE-V
(a) kabElEkEka			*!	*	***
☞ (b) kabElEʧʲEka				*	***
(c) kablEʧʲEKa		*!		*	**
(d) kabɛlɛʧʲka	**!				

The winners from level 1 are the inputs to level 2, where, in the case of (52ii-b), Yer Deletion takes effect due to the reranking of *ECV above MAX-V.

(53) (i) Level 2: /kabEl+Eʧʲ+Ek/ → /kabEl+Eʧ+Ek/

	DEP-μ	*ECV	HARD	MAX-V	PARSE-V
(a) kabElEʧʲEk			*!		***
☞ (b) kabElEʧEk					***
(c) kablEʧEk				*!	**
(d) kabɛlɛʧɛk	***!				

(ii) Level 2: /kabEl+Eʧʲ+Ek/ → [kabEl+Eʧ+k+a]

	DEP-μ	*ECV	HARD	MAX-V	PARSE-V
(a) kabElEʧʲEka		*!	*		***
☞ (b) kabElEʧka					**
(c) kabElEʧʲka			*!		**
(d) kablEʧEka		*!		*	**
(e) kabɛlɛʧɛka	***!				

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Importantly, the power of *ECV to delete yers is limited to strings with a single C. Consequently, *ECV is not violated by [kabElEʧka], candidate (53ii-b), and *ECV is blocked from eating its way through the yer string until a full vowel is reached.

The derivation of the surface forms is completed at level 3, where Yer Vocalization takes its toll, an effect of the reranking of DEP-μ and PARSE-V, as spelled out in (50). *ECV plays no role at level 3 and hence is not depicted in (54).

(54) (i) Level 3: /kabEl+Eʧ+Ek/ → [kabɛlɛʧɛk]

	PARSE-V	MAX-V	DEP-μ
(a) kabElEʧEk	***!		
(b) kablɛʧɛk		*!	**
(c) kabɛlʧɛk		*!	**
☞ (d) kabɛlɛʧɛk			***

(ii) Level 3: /kabEl+Eʧ+k+a/ → [kabɛlɛʧka]

	PARSE-V	MAX-V	DEP-μ
(a) kabElEʧka	**!		
(b) kablɛʧka		*!	*
(c) kabɛlʧka		*!	*
☞ (d) kabɛlɛʧka			**

The evaluations deliver the correct results as (54i-d) and (54ii-d) are the attested surface forms.

The fact that yers are vocalized at level 3 predicts that Stress Assignment must be active at that level since prior to vocalization yers have no moras and cannot assume stress. This is exactly the desired prediction.

As noted at the beginning of this section, level 3 is a clitic level while level 4 is postlexical. The implementation of this distinction in Polish is complicated by the fact that the language has two types of clitics: word-level clitics that are stress-sensitive and phrase-level clitics that are stress-neutral. The former are analyzed at level 3. The latter are considered at level 4.

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Essential for the purposes of this article is the observation that prefixes are word-level clitics. Historically, they come from prepositions, a fact that is still visible when we compare prefixed words with their corresponding phrases.

(55) *Prefixes and prepositions in Polish*
nad+morski 'coastal' – nad morzem 'on the coast'
pod+morski 'submarine' – pod morzem 'under the sea'
za+morski 'overseas' – za morzem 'over the sea'

Unsurprisingly, prefixes behave as if they were independent words that are invisible to stem and word phonological generalizations (see Booij & Rubach 1984 and Rubach & Booij 1990b). Since stem phonology and word phonology correspond to levels 1 and 2 in the DOT framework, the conclusion is that prefixes become first available for analysis at level 3. This conclusion fits well with the DOT architecture: prefixes are clitics (more exactly – proclitics), so they properly belong to the clitic level.

From the point of view of level 3 phonology, prefixes act as if they were regular affixes. In particular, they count for word stress. The generalization in Polish is that stress is assigned to the penultimate syllable (56a) and that syllable can be part of a prefix (56b). Stressed vowels are bolded.

(56) *Polish stress*
(a) ceb**u**l+a 'onion' (NOM.SG) – c**e**bul (GEN.PL) –
cebul+**a**mi (INSTR.PL) – cebul+**o**w+y (ADJ, NOM.SG)
(b) za+l**e**wać 'to flood' (IMPERFECTIVE) – z**a**+lać (PERFECTIVE)
wy+p**a**sać 'graze' (IMPERFECTIVE) – w**y**+paść (PERFECTIVE)

Not just prefixed words but also special phrases take stress as if they were single words (see, for example, Dłuska 1974 and Rubach & Booij 1985).

(57) *Stress and prepositional phrases*
(a) koł**o** nas 'near us', koł**o** nich 'near them'
(b) preposition plus monosyllabic pronoun: n**a** was 'on you', d**o** niej 'to her'
(c) lexicalized phrases:
Zostanę *na noc* 'I will stay for the night' *versus*
Na noc składa się . . . 'the night (literally: "for night") consists of . . . '

The phrase in (57c) appears to behave in a contradictory way because *noc* 'night' is unstressed in the first sentence but stressed in the second sentence. The observation is that *noc* can either denote an abstract concept and then it means 'sleeping' or it can refer to the physical world and then it means 'a night'. The meaning of *noc* has consequences for stress, which raises the question of how 'night = sleeping' can be distinguished from 'a night'. DOT has no trouble making this distinction. The clitic phrase 'for the night = sleeping' is lexicalized and hence

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available at level 3. On the other hand, the clitic phrase 'for the night' is derived by syntax and hence is processed at level 4, the postlexical level.

To summarize, yers, regardless of whether they are ultimately deleted or vocalized, trigger phonological processes at level 1, a fact that is exemplified by Palatalization. Consequently, Yer Deletion is held off until level 2, an effect of the ranking MAX-V >> *ECV. Level 2 exhibits Yer Deletion, which is implemented by the reranking of *ECV above MAX-V. The yers that have not been deleted at level 2 are all vocalized at level 3, where PARSE-V outranks DEP-μ, so it is better to insert a mora (Yer Vocalization) than to leave the yer unparsed.

Yer Vocalization is driven by PARSE-V, not by syllable structure. It is true that the vocalization of yers creates new syllable nuclei and hence additional opportunities for consonants to be associated with these nuclei. The result is that syllable structure is improved, a trivial consequence of Yer Vocalization.

6. Diacritic representation

This section looks at the consequences of the assumption that yers are distinguished from other vowels by diacritic features (see Section 3). It is argued that the diacritic approach is inferior to the phonological approach in two ways. First, it makes virtually no predictions. Second, it runs into empirical difficulties.

Diacritic features are entirely arbitrary and are not anchored in phonetics in terms of correlates. For example, yers can be identified as vowels that are [blue]. However, to make the representations mnemonically easier, I will simply use the feature [yer].

As explained in Section 2, yer alternations require that the diacritic feature must go on specific segments, not on whole morphemes (Rubach 2013). The example in (58) makes this point clear.

(58) *Yers and full vowels*

(a) szaber [ʃabɛr] 'stealing' (NOM.SG) – szabr+u [ʃabru] (GEN.SG)

(b) szabr+unek [ʃabrunɛk] 'act of stealing' (NOM.SG) – szabr+unk+u [ʃabrunku] (GEN.SG)

The *e*–zero alternation in (58a) shows that *szaber* contains a yer. The suffix *-unek* in (58b) also contains a yer since *e* is deleted in the GEN.SG form. If the feature [yer] were a property of morphemes, *szabr+unek* 'act of stealing' would have a chain of yers: {ʃabɛr$^{[yer]}$ + {unɛk}$^{[yer]}$. The descriptive generalization that yers vocalize before yers, as in *kabel* 'cable' – *kabel+ek* (DIMIN), would predict that *szaber* should appear as [ʃabɛr] before *–unek*, but this is not true. The *e* of *szaber* deletes rather than vocalizes when *–unek* is appended: *szabr+unek* [ʃabrunɛk], not **szaber+unek* *[ʃabɛr+unɛk].

The surface form, [ʃabrunɛk], is derived correctly if the feature [yer] is the property of segments, here the property of //ɛ//. The underlying representations of *szaber* and *-unek* are then //ʃabɛ$^{[yer]}$r// and //unɛ$^{[yer]}$k//, yielding //ʃabɛr$^{[yer]}$r+unɛ$^{[yer]}$k// as the representation of the whole word. The yer //ɛ$^{[yer]}$//

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of //ʃabɛ[yer]r// is followed in the next syllable by //u// rather than a yer, so we witness Yer Deletion, as expected: //ʃabɛr[yer]r+unɛ[yer]k// → [ʃabrunɛ[yer]k].

As proposed in the preceding sections, the constraint responsible for Yer Deletion is *ECV: a yer deletes if it is followed by a consonant and a full vowel. The rendering of this constraint in a diacritic analysis requires explanation.

In a diacritic analysis, all vowels, including yers, are full vowels, so they all carry moras. The special property of yers is that they are equipped with the feature [yer]. Thus the representations of the NOM.SG, the NOM.PL and the DIMIN NOM.SG of *kabel* 'cable' are as follows.

(59) *Representations in diacritic theory*

(a) NOM.SG: *kabel* //kabɛ[yer]l// → [kabɛ[yer]l]

(b) NOM.PL: *kabl+e* //kabɛ[yer]l+ɛ// → [kablɛ]

(c) DIMINUTIVE NOM.SG: *kabel+ek* //kabɛ[yer]l+ɛ[yer]k// → [kabɛ[yer]lɛ[yer]k]

A comparison of (59b) and (59c) shows that Yer Vocalization occurs only before the *e* that carries the diacritic [yer] (59c). The non-yer *e* in (59b) causes Yer Deletion. Consequently, in order to apply correctly, the *ECV constraint (Yer Deletion) must know not only that the *E* in the *ECV* string is a yer but also that the *V* is not a yer. The underlying representation of *kabl+e* (59b) must therefore be //kabɛ[+yer]l+ɛ[–yer]// rather than //kabɛ[yer]l+ɛ//. This is not the end of the complications. Yer Deletion applies before any non-yer vowel, not just before non-yer *e* //ɛ[–yer]//, as the following examples illustrate.

(60) *Yer Deletion before vowels*

kabel (NOM.SG) – kabl+a (GEN.SG) – kabl+owi (DAT.SG) – kabl+u (LOC.SG) – kabl+e (NOM.PL) – kabl+i (GEN.PL)

All the vowels of the endings in (60) cause Yer Deletion, so we need not only //ɛ[–yer]// but also //a[–yer]//, //ɔ[–yer]//, //u[–yer]//, and //i[–yer]//. Further, *osioł* [ɔɕɔɫ] 'donkey' (NOM.SG) – *osł +y* [ɔsɫ+ɨ] (NOM.PL) shows two other facts. First, *o* is a yer. Second, since Yer Deletion occurs before -*y*, also *y* must be marked diacritically as [–yer]: //ɨ[–yer]//. The conclusion is that all vowels carry a diacritic feature. This is exemplified in (61) by *oset* 'thistle' (NOM.SG) – *ost+y* (NOM.PL), a yer stem, and *gorset* 'corset' – *gorset+y* (NOM.PL), a non-yer stem.

(61) (a) //ɔ[–yer]sɛ[+yer]t// = [ɔ[–yer]sɛ[+yer]t]
//ɔ[–yer]sɛ[+yer]t+ɨ[–yer]// → [ɔ[–yer]stɨ[–yer]]

(b) //gɔ[–yer]rsɛ[–yer]t// = [gɔ[–yer]rsɛ[–yer]t]
//gɔ[–yer]rsɛ[–yer]t+ɨ[–yer]// = [gɔ[–yer]rsɛ[–yer]tɨ[–yer]]

Restated in terms of the diacritic representation, the *ECV constraint is formulated as follows.

(62) Diacritic *ECV: *E[+yer]CV[–yer]

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Given this statement of *ECV, the derivation of yers will proceed much as illustrated in Section 5. However, it is troubling that a diacritic feature has binary values: [±yer]. This is a significant extension of the theory because diacritics function exactly like phonological features and yet are not constrained by the requirement that they have phonetic correlates.

In what follows, I look at various consequences of the diacritic theory. I use the same criteria as in Section 4 but I discuss them in a different order: (i) melody–skeleton independence, (ii) length predictions, (iii) phonological interaction, (iv) plausible inventories, and (v) syllabification effects. I add one more criterion: restructuring of underlying representations.

(i) Melody–skeleton independence

The data in (28) in Section 3 make the point that the property of being a yer is independent of the melodic representation. An example here is the word *osieł* [ɔɕɛɬ] 'donkey' (NOM.SG) – *osł +a* (GEN.SG) that developed an *o*-yer, yielding *osioł* [ɔɕɔɬ]. The melodic representation changed from [ɛ] to [ɔ] but the vowel did not stop being a yer, as the alternation in *osioł* [ɔɕɔɬ] (NOM.SG) – *osł +a* [ɔsła] (GEN.SG) documents. Such developments are readily accommodated in the floater theory because the change from //ɛ// to //ɔ// has nothing to do with the skeletal representation: being a yer, the //ɛ// did not have a mora, so it is unsurprising that the new vowel //ɔ// does not have a mora either and hence is a yer.

With regard to *osieł* → *osioł*, the diacritic theory fares just as well as the floater theory. The new vowel //ɔ$^{[+yer]}$// can be reasonably analyzed as derived from the earlier vowel //ɛ$^{[+yer]}$// because diacritics are independent of the phonological make-up of segments that host them. That is, diacritics are never erased or lost unless the host segment has been deleted, which is not the case here.

(ii) Length predictions

Since yers are moraless vowels in the floater theory, it is predicted that they can never be long in the underlying representation. The reason is that length is expressed at the skeletal tier and yers have no representation at that tier. This prediction is not made in the diacritic theory. Yers are full vowels and, consequently, carry a mora. It is an accident then that languages such as Slovak that contrast short and long vowels in the underlying representation never represent yers as long vowels.

(iii) Phonological interaction

The floater theory predicts that phonological processes that are sensitive to skeletal representation such as stress and lengthening may take an effect only after yers have been vocalized. The interaction of Yer Vocalization with processes manipulating skeletal representation constrains the grammar and makes it more restrictive. No such predictions and restrictiveness are available in the diacritic theory. Like all vowels, yers have a representation at the skeleton, so operations that affect the skeleton and the property of being a yer are unrelated.

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(iv) Plausible inventories

Technically, the diacritic theory and the floater theory fare comparably well on the inventory criterion because both theories recruit the vowels that exist in the language to function as yers. In the floater theory, the recruitment is limited to short vowels and, in the extreme case scenario such as that in Slovak (see Section 3), all short vowels may be yers. In the diacritic theory, the pool of vowels that can be yers is incorrectly broadened to include long vowels, as noted earlier. The problem lies not so much with the number of vowels as with the number of diacritics.

The number of diacritics is entirely unlimited and escapes any control. This is problematic in two ways. First, nothing stands in the way of broadening the inventory by including not only //ɛ[+yer]// but also //ɛ[+blue]//, //ɛ[–blue]//, //ɛ[+green]//, //ɛ[–green]//, and so forth, *ad infinitum*. Second, there are no restrictions on concatenation of diacritics, hence *e* could in principle have all kinds of baroque representations, for example, //ɛ[+yer, -blue, +green . . .]//. These objections do not hold when phonological properties are used in a diacritic way, as is the case in the floater theory and the featural theory of yers discussed in Section 3.

Vowel inventories that are postulated to account for yers can be judged on their plausibility. For example, it was noted in Section 3 that inventories such as those in (63) are implausible and should be rejected.

(63) *Impluasible inventories*

i	ɨ	u
ɪ		
	ɘ	
ɛ		ɔ
	a	

i	ɨ	u
ɛ/œ		ɔ
	a	

An analysis that uses //ə//, a tense mid back unrounded vowel, or //œ//, a lax mid front rounded vowel, to represent yers in Polish can be criticized on typological grounds. In particular, languages do not have //ə// without having other mid tense vowels. Similarly, if //œ// is part of the vowel inventory, other front rounded vowels should be attested as well.

With regard to the co-occurrence of features, phonological theory of the past fifty years has discovered many generalizations making some co-occurrences possible and other co-occurrences impossible. An important post-*SPE* development here (Chomsky & Halle 1968) is the theory of feature geometry (Clements 1985, McCarthy 1988, and others). There is no corresponding theory of diacritics, so diacritic features can be multiplied and combined in their occurrences on segments with impunity.

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(v) Restructuring

There is evidence for the fact that yers may restructure as full vowels in the course of historical change. The contrast in (64) attested in contemporary Polish illustrates the point.

(64) *Restructuring*

(a) dech [dɛx] 'breath' (NOM.SG) – tch+u [txu] (GEN.SG)

(b) wy+dech [vɨdɛx] 'repiration' (NOM.SG) – wy+dech+u [vɨdɛxu], not [vɨtxu] (GEN.SG)

While it is not possible to predict whether restructuring will take place or not, the implementation of the process is straightforward in the floater theory: the surface form [vɨdɛx] (65b) has become the underlying form. Given that fact, the absence of *e*-deletion in *wy+dech+u* (GEN.SG) is predicted. Specifically, the underlying representation of *wydech* has a full vowel //ɛ// because it derives historically from the surface form [vɨdɛx] in which Yer Vocalization has taken place, as would be expected. Since vocalized yers are full vowels, it follows that the //ɛ// in *wydech* does not alternate with zero in *wydech+u* (GEN.SG).[32]

The diacritic theory is unable to offer a similar scenario. The output forms of *dech* and *wy+dech* (prior to restructuring) are [dɛ$^{[+yer]}$x] and [vɨdɛ$^{[+yer]}$x], respectively. The standard assumption that restructuring denotes establishing the surface representation as the underlying representation does not make sense in the diacritic theory. Taking the surface form [vɨdɛ$^{[+yer]}$x] to be a new underlying representation does not predict that the *e*-vowel will stop deleting in the GEN.SG *wydech+u*. On the contrary, the *e* should alternate with zero because it carries the feature [+yer]. In order to block deletion in *wydech+u*, the diacritic theory must assume that the diacritics have changed: *e* used to be [+yer] and now is [–yer], not an enlightening explanation.

(vi) Syllabification effects

Syllabification effects refer to the representation of unvocalized yers. In the floater theory, unvocalized yers do not carry a mora and hence cannot project syllable nuclei. As pointed out by a reviewer, the effect is that yers act as consonants from the point of view of syllabification. In the diacritic theory as well as in the featural theory (see Section 3), unvocalized yers are moraic like any other vowels, and, consequently, erect syllable nuclei. In sum, the floater theory, on the one hand, and the diacritic theory as well as the featural theory, on the other hand, make different predictions. Below I briefly outline how these predictions can be tested.

A reviewer draws attention to Raising, a process that changes underlying //ɔ// to [u] in closed syllables (Bethin 1992).

[32] As a result of the restructuring, *dech* //dEx// 'breath' and *wydech* //vɨ+dɛx// 'respiration' are not related any longer in terms of being derived from the same underlying representation.

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(65) *Raising*

NOM.SG	NOM.PL	DIMIN NOM.SG	GLOSS
wóz [vus]	woz+y [vɔ.zɨ]	wóz+ek [vu.zɛk]	'cart'
ogród [ɔ.grut]	ogrod+y [ɔ.grɔ.dɨ]	ogród+ek [ɔ.gru.dɛk]	'orchard'
kościół[kɔ.ɕtɕuł]	kościoł+y [kɔ.ɕtɕɔ.łɨ]	kościół+ek [kɔ.ɕtɕu.łɛk]	'church'

Relevant to the discussion are the diminutive forms because they contain the yer suffix //Ek//. The floater theory has no trouble with the analysis of these forms. All that needs to be assumed is that Raising operates at level 1. Since yers are unvocalized at level 1, they act as consonants and cannot erect syllables. The result is that the vowel of the root morpheme is in a closed syllable, which triggers Raising, the desired effect: //vɔz+Ek// → /vuzEk/ 'cart' (DIMIN).

This analysis is not available in the diacritic theory. The underlying representation of *wóz+ek* 'cart' (DIMIN) is //vɔ$^{[-yer]}$z+ɛ$^{[+yer]}$k//. The yer ɛ is a full vowel and, consequently, creates a syllable, so the word is syllabified /vɔ$^{[-yer]}$.zɛ$^{[+yer]}$k/. This is a problem because /ɔ/ is in an open syllable, which makes Raising inapplicable. The grammar generates *[vɔzɛk] instead of [vuzɛk], the wrong result.

Similar evidence against the diacritic theory can be drawn from the formation of the comparative degree of adjectives. As the past literature has shown (Rubach & Booij 1990a, Bethin 1992), the comparative morpheme has two underlying allomorphs: //ʃ// and //ɛjʃ//.[33]

(66) *Comparative degree allomorphy in adjectives*

	MASC NOM.SG	COMPARATIVE DEGREE NOM.SG	GLOSS
(a)	grub+y [grub+ʃɨ]	grub+sz+y [grup+ʃ+ɨ]	'fat'
	prost+y [prɔst+ɨ]	prost+szy [prɔst+ʃ+ɨ]	'simple'
	such+y [sux+ɨ]	such+sz+y [sux+ʃ+ɨ]	'dry'
	star+y [star+ɨ]	star+sz+y [star+ʃ+ɨ]	'old'
(b)	ładn+y [ładn+ɨ]	ładn+iejsz+y [ładɲ+ɛjʃ+ɨ]	'nice'
	jasn+y [jasn+ɨ]	jaśn+iejsz+y [jaɕɲ+ɛjʃ+ɨ]	'bright'
	podł+y [pɔdł+ɨ]	podl+ejsz+y [pɔdl+ɛjʃ+ɨ]	'mean'
	szczupł+y [ʃʧupł+ɨ]	szczupl+ejsz+y [ʃʧupl+ɛjʃ+ɨ]	'slim'

The distribution of the comparative degree allomorphs is governed by syllable structure: the allomorph //ɛjʃ// is selected to avoid extrasyllabic consonants while //ʃ// is the default allomorph. To see this generalization, let us assume for the moment that //ʃ// rather than //ɛjʃ// is added in (66b). The first example, *ładn+y* 'nice', would then have the representation /ładnʃɨ/, where [n] is unsyllabified because both /ład.nʃɨ/ and /ładn.ʃɨ/ constitute sonority violations. Consequently,

[33] I ignore the fact that //ʃ// is in fact soft //ʃʲ// that turns into hard [ʃ] through the action of HARD at level 2. See Rubach (2003a) for an analysis.

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//ładn// selects //ɛjʃ// as its comparative allomorph, which makes all consonants syllabifiable: //ładn + ɛjʃ/ʃ + ɨ// → [ła.dɲɛj.ʃɨ].

With this background, we look at the behavior of yers *vis-á-vis* allomorph selection in the comparative degree.

(67) *Yers and allomorph selection*

(a) pewien [pɛvʲɛn] 'sure' (SHORT FORM) – pewn+y [pɛvn+ɨ] (NOM.SG) – pewn+iejsz+y [pɛvɲ+ɛjʃ+ɨ] 'surer' (NOM.SG)

(b) smak [smak] 'taste' – smacz+n+y [smaʧ+n+ɨ] 'tasty' (NOM.SG) – smacz+n+iejsz+y [smaʧ+ɲ+ɛjʃ+ɨ] 'more tasty' (NOM.SG)

(c) kwas [kfas] 'acid' – kwaś+n+y [kfaɕ+n+ɨ] 'sour' (NOM.SG) – kwaś+n+iejsz+y [kfaɕ+ɲ+ɛjʃ+ɨ] 'more sour' (NOM.SG)

(d) luz [lus] 'looseness' – luź+n+y [luʑ+n+ɨ] 'loose' (NOM.SG) – luź+n+iejsz+y [luʑ+ɲ+ɛjʃ+ɨ] 'more loose' (NOM.SG)

A few words of explanation are in order concerning the underlying representations in (67). The first example, *pewien* 'sure', is an inherent adjective. It exhibits an *e*–zero alternation and hence has a yer: //pɛvʲEn//. The other examples are denominal adjectives that have been derived by adding the adjectivizing suffix //En//, the one that we saw in (41b): *win+a* [vʲin+a] 'guilt' – *win+ien* [vʲiɲ+ɛn] 'guilty' (short form). In sum, the underlying representations of the comparative forms in (68) are as follows.

(68) *Underlying representations*

(a) pewn+iejsz+y //pɛvʲEn + ʃ/ɛjʃ + ɨ// 'surer'

(b) smacz+n+iejsz+y //smak + En + ʃ/ɛjʃ + ɨ// 'more tasty'

(c) kwaś+n+iejsz+y //kfas + En + ʃ/ɛjʃ + ɨ// 'more sour'

(d) luź+n+iejsz+y //luz + En + ʃ/ɛjʃ + ɨ// 'more loose'

A comparison of the underlying forms in (68) and the surface forms given earlier in (67) shows that adjectives containing yers select //ɛjʃ// as their comparative allomorph. In order to make this selection, the grammar must reject the default allomorph //ʃ// in the candidate /pɛvʲEn+ʃ+ɨ/. As shown in (66b), the rejection is driven by the need to avoid an extrasyllabic consonant, as in the candidate /(ład)n(ʃɨ)/ discussed earlier. (Parentheses enclose syllables.) By the same logic, in order to be rejected, the candidate /pɛvʲEn+ʃ+ɨ/ must have an extrasyllabic /n/. This is exactly what the floater theory predicts: the /n/ in /(pɛvʲ)En(ʃɨ)/ is extrasyllabic because the yer /E/ has no mora and cannot erect a syllable. The extrasyllabic /n/ is avoided in the candidate that has selected //ɛjʃ// as its comparative allomorph since /n/ syllabifies into the onset in /(pɛvʲ)E(nɛj)(ʃɨ)/. It is therefore /(pɛvʲ)E(nɛj)(ʃɨ)/ rather than /(pɛvʲ)En(ʃɨ)/ that is the winner at

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level 1. At level 2, the yer is deleted through the action of *ECV: /pɛvʲEnʲɛjʃɨ/ → [pɛvɲɛjʃɨ].[34]

The diacritic theory cannot offer a similar scenario. The reason is the yer //ɛ[+yer]// is a full vowel in this theory, so it erects a syllable. Consequently, the candidate /pɛ[–yer]vʲɛ[+yer]nʃɨ[–yer]/ containing the default allomorph //ʃ// is well-formed from the point of view of syllable structure and hence wins: //pɛ[–yer]vʲɛ[+yer]n + ʃɛ[–yer]jʃ + ɨ[–yer]// → /pɛ.vʲɛn.ʃɨ/.[35] The /n/ is not extrasyllabic, so there is no way of enforcing the selection of the allomorph /ɛ[+yer]jʃ/. The winner from level 1, the candidate /pɛ.vʲɛn.ʃɨ/, is evaluated further at level 2. The diacritic *ECV cannot delete the yer because the yer is followed by two consonants. Consequently, the faithful candidate [pɛ.vʲɛn.ʃɨ] wins. This is incorrect because [pɛvɲɛjʃɨ] and not *[pɛvʲɛnʃɨ] is the attested surface form. I conclude that the diacritic theory fails on empirical grounds.[36]

7. Conclusion

The special status of yers is reflected in the grammar in two ways. First, yers require a representation that is different from the representation of other vowels. Second, the operation of yers in the phonological system involves the interaction of a number of constraints, including the phonotactic constraint *ECV that governs Yer Deletion.

Yers are best represented as floaters, that is, as melodic segments that lack a mora. This representation makes a number of predictions. First, yers cannot be long vowels in the underlying representation. Skeleton-sensitive processes such as stress and vowel lengthening can operate only on vocalized yers. Once vocalized, that is, once assigned a mora, yers are non-distinct from other vowels. Consequently, when surface forms of morphemes restructure as underlying representations as a result of historical change, they predictably act as full vowels and hence do not alternate with zero, as in *wydech* 'respiration' shown in (64). Fourth, unvocalized yers cannot create syllables because they have no representation at the skeletal tier. This is exactly the property that is necessary for the operation of Raising and the selection of the correct allomorph in the comparative degree. Fifth, the definition of a yer as a floater predicts that languages may have multiple yers, in the extreme case, as many yers as there are vowels in the inventory of the language. This prediction is borne out in Slovak. Sixth, since the property of being a yer and the feature make-up of the vowel are unrelated, it is predicted that languages may develop 'new yers'. This prediction is supported by the development of an *o*-yer in words such as *osioł* 'donkey' (see Section 3).

[34] The //vʲ// depalatlizes to [v] before a consonant. See Rubach (2008).

[35] Here and below, I omit the diacritics to make the transcription less obtrusive to the eye.

[36] The Whole Morpheme Hypothesis (Section 2) and the featural theory (Section 3) share this problem with the diacritic theory.

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The predictions made by the floater theory do not carry over to the diacritic theory except for the yer development prediction of the *osieł* → *osioł* 'donkey' type. A further point of concern is that diacritics are associated with segments rather than with whole morphemes. This constitutes a significant extension of phonological theory and is not in concord with the understanding of how diacritics work in the grammar. It is also troubling that diacritic features need to be binary, a property that has so far been limited to phonological features, so we witness another extension of the theory. In this use, diacritics are much more powerful as tools than phonological features because they escape control through independent considerations such as plausibility evaluation based on the typology of existing phonological systems. A surprising result of this study is the fact that, in spite of its vast power, the diacritic theory fails empirically by being unable to derive the attested forms required by Raising and the comparative degree.

The analysis of yers in this article has departed from the assumptions made in the past literature in significant ways. First, it is Yer Deletion rather than Yer Vocalization that is a context-sensitive generalization. Second, the grammar has a phonotactic constraint, *ECV, that prohibits the occurrence of yers followed by full vowels. Third, the presence of a consonant cluster blocks Yer Deletion. Fourth, vowel–zero alternations are derived without the assumption that inflectional zero endings are yers. Fifth, Yer Deletion precedes Yer Vocalization, which is exactly the opposite of what has been postulated in the literature. Sixth, improving syllable structure by constraints such as *COMPLEX-Coda is not the driving force behind Yer Vocalization. The driver is PARSE-V. Yer Vocalization has nothing to do with syllable structure except for the trivial fact that the erection of syllable nuclei creates new opportunities for consonants to syllabify.

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