

# Exceptional segments in Polish

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**Abstract** In a recent paper “Unexceptional Segments” (2012), published in this journal, Gouskova proposes a new analysis of Russian yers, the renowned Slavic vowels that show an alternation with zero. This paper investigates the question of whether Gouskova’s analysis can be extended to Polish yers. Section 1 introduces the basic data. Section 2 analyzes Polish yers in terms of the framework proposed by Gouskova (2012) and argues that the analysis falls short of accounting for the full range of the attested facts. The conclusion is that it is segments rather than morphemes that need to be treated as special or exceptional.

**Keywords** Phonology · Lexical exceptions · Indexed constraints · Yers · Slavic languages · Polish

## 1 Basic data

Polish exhibits a pattern of vowel–zero alternations, as in *ošet* ‘thistle’ (nom.sg.) – *ost+u* (gen.sg.), where *e* occurs in the nominative singular but not in the genitive

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singular. Vowels participating in this pattern are known as ‘yers’.<sup>1</sup> Representative examples of alternations in simplex forms, i.e., forms that do not contain derivational suffixes, are shown in (1).

(1) a. masculine nouns

<i>nom.sg.</i>	<i>gen.sg.</i>	<i>gloss</i>
oset [ɔsɛt]	ost+u [ɔst+u]	‘thistle’
ocet [ɔtɛt]	oct+u [ɔtst+u]	‘vinegar’
korek [kɔrɛk]	kork+a [kɔrk+a]	‘cork’
kuter [kutɛr]	ku <tr>+a [kutr+a]</tr>	‘cutter’
zydel [zidɛl]	zydł+a [zidl+a]	‘stool’

b. feminine and neuter nouns

<i>nom.sg.</i>	<i>gen.pl.</i>	<i>gloss</i>
mask+a [mask+a]	masek [masɛk]	‘mask’
taczka+a [tatʃk+a]	taczek [tatʃɛk]	‘wheelbarrow’
torb+a [tɔrb+a]	toreb [tɔrɛp] <sup>2</sup>	‘bag’
halk+a [xalk+a]	halek [xalɛk]	‘underskirt’
futr+o [futɾ+ɔ]	futer [futɛr]	‘fur coat’

c. kocioł [kɔtɕɔł] <sup>3</sup>	kołł+a [kɔłł+a]	‘cauldron’
osioł [ɔɕɔł]	osł+a [ɔsł+a]	‘donkey’
koziół [kɔzɔł]	kozłł+a [kɔzłł+a]	‘goat’ <sup>4</sup>

Alternations such as those in (1) are commonplace in derivational morphology, where they can constitute yer chains, that is, chains involving multiple occurrences of the *e*–zero alternation, as shown in (2).

<sup>1</sup>The name ‘yer’, spelled with *y*, is used by Rubach (1984) to distinguish the alternating vowels of Modern Polish from the historical ‘jers’ of Old Polish. The modern reflexes of the historical ‘jers’ exhibit a pattern of vowel–zero alternations, but the point is that the pool of words showing this pattern far exceeds the original ‘jers’. The alternation has been extended to many borrowings. For example, the number of loanwords exhibiting ‘jer’ behavior in Polish is probably just as large as the number of native words. To cite one example, the English word *sweater* has been borrowed into Polish as *sweter* and has developed an alternation between *e* and zero, which characterizes the historical ‘jers’: *sweter* (nom.sg.) – *swetr+a* (gen.sg.).

<sup>2</sup>Polish has active processes of Final Devoicing and Voice Assimilation, as indicated by this and some other examples cited later.

<sup>3</sup>The letter *ł* stands for velarized *l* in Eastern Polish: [ɫ]. Other dialects have a process of Lateral Vocalization, which turns [ɫ] into [w] in contexts that do not warrant Palatalization. Here and below, I will use the transcription [ɫ], which is correct for Eastern Polish. Also, I transcribe soft labials without [j], hence *Piotr* ‘Peter’ is transcribed [pʲɔtr] rather than [pʲjɔtr]. The former transcription is correct for Eastern Polish, the latter for other dialects of Polish.

<sup>4</sup>The alternation between *o* and zero is limited to the three morphemes enumerated here. The inclusion of these morphemes in the data set is relevant for the analysis in Sect. 2 because Gouskova’s (2012) theory that I discuss in that section treats all yer morphemes as exceptions and hence should be able to account for all cases, including those that do not constitute the majority pattern.

A reviewer asks whether the word *koziół* ‘goat’ (masc.) could not be analyzed as bimorphemic *koz* + *ioł* [kɔz+ɔł] because Polish has the word *koz+a* [kɔz+a] ‘she-goat’. The answer is negative. Originally, the *-oł* fragment of *koziół* (but not of *osioł* ‘donkey’ and *kocioł* ‘cauldron’) was the morpheme *el* [ɛł], but

- (2) skobel [skɔbɛl] ‘staple’ (masc. nom.sg.) – skobl+a [skɔbl+a] (gen.sg.)  
 skobel+ek [skɔbɛl+ɛk] (diminutive nom.sg.) – skobel+k+a [skɔbɛl+k+a]  
 (gen.sg.)  
 sokobel+ecz+ek [skɔbɛl+ɛtʃ+ɛk] (double diminutive nom.sg.) – skobel+  
 ecz+k+a [skɔbɛl+ɛtʃ+k+a] (gen.sg.)

Looking at the data in (1), it appears that the pattern of *e*-zero alternations could be analyzed in terms of *e*-insertion, but this analysis is invalidated by the contrasts in (3).

- (3) oset [ɔsɛt] ‘thistle’ (nom.sg.) – ost+u [ɔst+u] (gen.sg.)  
*versus*  
 most [mɔst] ‘bridge’ (nom.sg.) – most+u [mɔst+u] (gen.sg.)  
 korek [kɔrɛk] ‘cork’ (nom.sg.) – kork+a [kɔrk+a] (gen.sg.)  
*versus*  
 bark [bark] ‘shoulder’ (nom.sg.) – bark+u [bark+u] (gen.sg.)  
 sweter [sfɛtɛr] ‘sweater’ (nom.sg.) – swetr+a [sfɛtr+a] (gen.sg.)  
*versus*  
 Piotr [pʲɔtr] ‘Peter’ (nom.sg.) – Piotr+a [pʲɔtr+a] (gen.sg.)

The insertion rule cannot be stated because the context in which insertion should occur and the context in which it should not occur are identical. For instance, if the alternation in *oset* ‘thistle’ (nom.sg.) – *ost+u* (gen.sg.) is due to insertion, then the underlying representation of *oset* is /ɔst/ and *e* is derived by an *e*-insertion rule: /ɔst/ → [ɔsɛt]. This cannot be correct because *most* ‘bridge’ (nom.sg.) – *most+u* shows no *e*-insertion, hence /mɔst/ → \*[mɔsɛt] is wrong.

Analyzing the yer alternation in terms of *e*-deletion is comparably problematic. This is documented by the examples in (4) that are minimal or near minimal pairs, where *e*'s alternate with zero in some words but not in others.<sup>5</sup> The pattern of alternations is unpredictable.

- (4) oset [ɔsɛt] ‘thistle’ (nom.sg.) – ost+y [ɔst+i] (nom.pl.)  
*versus*  
 kaset [kaset] ‘cassette’ (gen.pl.) – kaset+y [kaset+i] (nom.pl.)  
 ocet [ɔtɛt] ‘vinegar’ (nom.sg.) – oct+y [ɔtst+i] (nom.pl.)  
*versus*  
 facet [fatsɛt] ‘guy’ (nom.sg.) – facet+y [fatsɛt+i] (nom.pl.)  
 kuter [kutɛr] ‘cutter’ (nom.sg.) – kutr+y [kutɛr+i] (nom.pl.)  
*versus*  
 krater [kratɛr] ‘crater’ (nom.sg.) – krater+y [kratɛr+i] (nom.pl.)

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historical change altered the vowel from [ɛ] to [ɔ] and the resultant [ɔt] is no longer perceived by native speakers as a suffix. The obliteration of the morpheme boundary is strengthened by the fact that the [z] of *koziol* [kɔzɔl] is no longer derivable from underlying /z/ since Palatalization cannot apply before a back vowel. The relatedness between the [z] of *koz+a* and the [z] of *koziol* has thus been lost.

<sup>5</sup>The same pattern is true for the alternation between *o* and zero in (1c).

The pattern of yer surfacing and yer deletion in Polish and in other Slavic languages has been the subject of much debate in the past fifty years. The amassed literature has an impressive volume, including, *inter alia*, Lightner (1963, 1965, 1972); Steele (1973); Laskowski (1975); Pesetsky (1979); Gussmann (1980, 2007); Rubach (1984, 1986, 1993, 2011); Kenstowicz and Rubach (1987); Spencer (1985); Gorecka (1988); Czaykowska-Higgins (1988); Zec (1988, 2002); Szypra (1989, 1992); Melvold (1990); Piotrowski et al. (1992); Bethin (1992, 1998); Yearley (1995); Rowicka (1999); Hermans (1999, 2002); Jarosz (2005, 2008); Halle and Matushansky (2006); Blumenfeld (2006); Kraska-Szlenk (2007); Steriopolo (2007); Gribanova (2008, 2009); Baković and Pająk (2010), and, most recently, Gouskova (2012). In general, there is agreement among researchers that the yer pattern in Polish, like the yer pattern in Russian (for instance, Gouskova 2012), should be analyzed as deletion rather than as insertion.<sup>6</sup> The implementation of this idea varies considerably from one account to another. The shared assumption is that the distinction between yer vowels and non-yer vowels, called ‘full vowels’, is encoded in the underlying representation<sup>7</sup> because it is unpredictable which *e*’s are yers, and hence alternate with zero, and which *e*’s are full vowels and hence do not exhibit such alternation. The surface representation of both *e* as a yer and *e* as a full vowel is exactly the same: [ɛ].

A further assumption is that yers are in some way deficient vowels in the underlying representation. Depending on the author, the deficiency is encoded either featurally or structurally. In a featural account, yers carry an arbitrary feature that distinguishes them from other underlying vowels. For example, in Gussmann (1980) and Rubach (1984), Polish yers are high [-tense] vowels and in this way contrast with other high vowels, which are [+tense]. In a structural account, the difference between yers and full vowels is a matter of the skeletal representation. In particular, yers but not full vowels lack an X-slot or a mora in the underlying representation (for instance, Kenstowicz and Rubach 1987; Rubach 1986, and Yearley 1995). The common denominator for both accounts is that yers are arbitrary or, to use Gouskova’s (2012) description, “exceptional” segments. This generalization is challenged by Gouskova (2012), who proposes that it is not segments but whole morphemes containing yers that are exceptional. The hypothesis is cited in (5).

(5) Whole Morpheme Exception Hypothesis:

There are no lexically exceptional segments—only lexically exceptional morphemes. (Gouskova 2012:81)

In what follows, I investigate the question of whether Gouskova’s (2012) analysis proposed for Russian can be extended to Polish. I retain the name ‘yer’ for the alter-

<sup>6</sup>The literature (notably Rubach 1977, 1985 and most recently Baković and Pająk 2010) has identified one context in which insertion is possible in Polish: the morphemes *z* ‘from’ and *w* ‘in’ occurring as prefixes or prepositions before a stem that begins with an identical or near identical consonant, as in *ze+znać* [zɛznatɕ] ‘make a statement’, *ze Stanów* [zɛ stanuf] ‘from the States’ and *we wrotach* [vɛ vrɔtax] ‘in the gate’. The stem initial identical or near identical consonant must occur in a consonant cluster because otherwise the process is inactive, as shown by *z zamku* [z zamku] ‘from the castle’ and *w wagonie* [v vagonɛ] ‘in the carriage’.

<sup>7</sup>Not only Gouskova (2012) but also Jarosz (2008) does not recognize this distinction. See Footnote 8 below.

nating vowel, even though, technically, there are no yers in Gouskova's framework because the traditional yers are analyzed as full vowels whose featural and structural composition is exactly the same in the underlying representation and in the surface representation.<sup>8</sup>

## 2 Exceptional morphemes

This section addresses the question of how the Whole Morpheme Exception Hypothesis fares with Polish yers. In particular, it investigates the claim that yer deletion (that is, *e*-deletion) is a process that applies in designated morphemes.

According to Gouskova (2012), the driver for yer deletion is the segment inventory constraint \*MID that penalizes the occurrence of [ɛ] and [ɔ] in the surface representation. This constraint, proposed for Russian, is directly applicable to Polish because both [ɛ] and [ɔ] exhibit yer behavior, as in *ošet* [ɔʂɛt] 'thistle' (nom.sg.) – *ošt+y* [ɔʂt+i] (nom.pl.) and *kociot* [kɔtɕɔt] 'cauldron' – *kott+y* [kɔt+i] (nom.pl.).<sup>9</sup>

\*MID cannot be allowed to act freely as it would, incorrectly, delete all mid vowels, for example, *kaset+a* [kasɛta] 'cassette' and *pora+a* [pɔra] 'season' would surface as \**kasta* and \**pra*. Consequently, \*MID (no mid vowels) as the driver for deletion must be limited to yer morphemes, but yer morphemes are now represented with full vowels and hence are non-distinct from non-yer morphemes. Thus, *ošet*, a yer

<sup>8</sup>Prior to Gouskova's (2012) paper on Russian yers, a full vowel analysis was proposed for Polish yers by Jarosz (2008). Jarosz's idea is that *e*-deletion, i.e. the deletion accounting for yer alternations, is governed by the need to optimize inflectional and derivational paradigms with regard to stress placement, a process that assigns stress to the penultimate vowel. In particular, stress must be kept on the same vowel within the paradigm. Thus, *ošt+y* 'thistle' (nom.pl.), underlying /ɔʂɛt+i/, deletes /ɛ/ in order for stress to fall on [ɔ], as found in the nom.sg. form *ošet* [ɔʂɛt]. (Stressed vowels are bolded.) The candidate [ɔʂɛti] is excluded by OP STRESS, an Optimal Paradigms constraint (McCarthy 2005) that requires the placement of stress on the same vowel within the paradigm. OP STRESS is ranked above MAX-ε, a constraint that bans the deletion of /ɛ/. Morphemes that do not have yers, such as *kaset* [kasɛt] 'cassette' (gen.pl.) – *kaset+y* [kasɛti], rank OP Stress and MAX-ε in a reversed way: MAX-ε ≫ OP STRESS, so it is better to violate stress uniformity than to delete the /ɛ/.

This analysis cannot be correct because yers need to delete in contexts that have nothing to do with stress. Such contexts are found in both derivational and inflectional morphology. For instance, *chaber* [xaber] 'cornflower', a yer morpheme, deletes the [ɛ] not only in *chabr+y* (nom.pl.), /xaber+i/ → [xabri], but also in *chabr+ow+y* /xaber+ɔv+i/ → [xabrɔvi], an adjective derived from *chaber* /xaber/. The adjective has stress on *o* (since *o* is the penultimate vowel), regardless of whether the yer has deleted or not, so the analysis cannot distinguish between the candidate [xabrɔvi], where the yer has been deleted, and the candidate [xaberɔvi], where the yer has been preserved. With stress playing no role, nothing can compel *e*-deletion, so the analysis predicts \*[xabrɔvi] as the optimal output, the wrong result.

Similarly, it is predicted incorrectly that yers should be retained in the inflectional forms when the ending is disyllabic and hence stress falls on the vowel of the ending. Thus, *chabr+owi* /xaber+ɔvi/ and *chabr+ami* /xaber+ami/, the dat.sg. and the instr.pl. of *chaber*, respectively, should have the surface forms [xaberɔvʲi] and [xaberamʲi] because OP STRESS cannot compel *e*-deletion. The problem is that the attested forms are [xabrɔvʲi] and [xabramʲi].

In general, stress and yers are unrelated generalizations not only because of the analytical difficulties presented in the preceding paragraphs. In the Highlands dialect of Polish, stress is word-initial rather than penultimate. Consequently, the addition of suffixes, both inflectional and derivational, does not influence stress. Yet, the pattern of yer deletion in the Highlands dialect is exactly the same as in Standard Polish.

<sup>9</sup>A different process depalatalizes prepalatal /tɕ/ to [t] before [i].

stem, is /ɔsɛt/ and *gorset* ‘corset’, a non-yer morpheme, is /gɔrsɛt/. The solution is to mark the morphemes containing yers, but not other morphemes, as visible to \*MID. Technically, this marking is expressed as lexical indexing.

Now the difference between *ošet* and *gorset* is clear. The morpheme *ošet* carries the diacritic index Lex while the morpheme *gorset* does not: /ɔsɛt<sub>Lex</sub>/ vs. /gɔrsɛt/. More generally, morphemes indexed Lex have the status of exceptions to some generalization, so yer stems are exceptions because they allow for their vowels to be deleted. The analysis is not complete yet. We must make sure that /ɔsɛt<sub>Lex</sub>/ but not /gɔrsɛt/ is visible to the \*MID constraint. To achieve this end, not only /ɔsɛt<sub>Lex</sub>/ but also \*MID must carry the diacritic Lex, so the actual constraint is \*MID<sub>Lex</sub> (no mid vowels in lexically indexed morphemes). \*MID<sub>Lex</sub> cannot simply replace \*MID because we need \*MID to generate segment inventories and hence evaluate all mid vowels, not just the mid vowels in the lexically indexed morphemes. Consequently, \*MID<sub>Lex</sub> is a new constraint, a clone of the generic \*MID, now added to the grammar. The analysis is clear now.

\*MID<sub>Lex</sub> is ranked above MAX-V (don’t delete vowels), and MAX-V is ranked above the generic \*MID: \*MID<sub>Lex</sub> ≫ MAX-V ≫ \*MID. The effect is that the deletion of mid vowels is limited to the morphemes that carry the index Lex, such as *ošet*, because violating \*MID<sub>Lex</sub> is a greater offence than violating the faithfulness constraint MAX-V. The morphemes that have not been indexed Lex in the lexicon, such as *gorset*, are not within the jurisdiction of \*MID<sub>Lex</sub>. They could lose their vowels only by the generic \*MID, but \*MID has no force because it is ranked below MAX-V. The tableaux in (6), evaluating the nom.pl. forms *ost+y* and *gorset+y*, focus on *e* and ignore *o*, so the violations incurred by [ɔ] are not noted in (6). They are discussed in tableau (7) below. Dots mark syllable boundaries.<sup>10</sup>

(6) i. /ɔsɛt<sub>Lex</sub>+i/ → [ɔ.sti]

	*MID <sub>Lex</sub>	MAX-V	*MID
a. ɔ.se.ti	*!		*
☞ b. ɔ.sti		*	

ii. /gɔrsɛt+i/ → [gɔr.se.ti]

	*MID <sub>Lex</sub>	MAX-V	*MID
☞ a. gɔr.se.ti			*
b. gɔr.sti		*!	

The morpheme *gorset* is not indexed Lex and hence is invisible to \*MID<sub>Lex</sub>. The optimal output is the faithful form without vowel deletion because MAX-V outranks

<sup>10</sup>Words exhibiting the *CeCeC* structure, such as *mebel* ‘piece of furniture’, are discussed in (17) below.

\*MID. Unindexed morphemes are unproblematic, so in the remainder of this section I focus on indexed morphemes.

The evaluation in (6) ignores *o*, but this is an oversimplification. Since the fundamental claim of Gouskova (2012) is that indexing refers to morphemes and not segments, it is not only *e* but also *o* that is within the purview of \*MID<sub>Lex</sub> because both vowels belong to the same morpheme. The ranking \*MID<sub>Lex</sub> >> MAX-V predicts that *ost+y* /ɔsɛt+i/ should surface as \**sty* because \**sty* has no mid vowels at all, the wrong prediction. The analysis is repaired by introducing a new constraint, MAX-RT-INITIAL, which prohibits the deletion of root-initial segments.<sup>11</sup> Ranked above \*MID<sub>Lex</sub>, MAX-RT-INITIAL blocks the deletion of *o* in *osty*, as shown in (7). This tableau and the subsequent tableaux ignore the generic constraint \*MID because it plays no role in the evaluation of Lex morphemes.

(7) /ɔsɛt<sub>Lex</sub>+i/ → [ɔ.sti]

	MAX-RT-INITIAL	*MID <sub>Lex</sub>	MAX-V
a. ɔ.se.ti		**!	
☞ b. ɔ.sti		*	*
c. sti	*!		**

The analysis thus far does not answer the question of why *e* is not deleted in *ošet*, yielding *ost*. The candidate *ost* fares better than *ošet* on \*MID<sub>Lex</sub> because it has one rather than two mid vowels. To outlaw the undesired winner \**ost*, Gouskova (2012) follows Yearley (1995) and assumes that \*COMPLEX-Coda (no complex codas) is ranked above the yer deletion constraint \*MID<sub>Lex</sub>.

(8) /ɔsɛt<sub>Lex</sub>/ → [ɔ.sɛt]

	MAX-RT-INITIAL	*COMPLEX-Coda	*MID <sub>Lex</sub>	MAX-V
☞ a. ɔ.sɛt			**	
b. ɔst		*!	*	*
c. sɛt	*!		*	*

<sup>11</sup>MAX-RT-INITIAL, a positional faithfulness constraint (Trubetzkoy 1939; Beckman 1997; Casali 1997), refers to the initial segment of the root. A reviewer asks whether a constraint along the lines of MAX-RT-INITIAL could be postulated to cover the first syllable of the root and whether such a constraint could take care of the non-alternating mid vowels. The answer is negative. On the one hand, non-alternating mid vowels may occur in medial syllables of the root, as in *paznokieć* [paznɔkʲɛtɕ] ‘fingernail’ (nom.sg.) – *paznokc+ia* [paznɔktɕ+a] (gen.sg.) and *pantofel* [pantɔfɛl] ‘slipper’ – *pantofl+a* [pantɔfl+a]. On the other hand, alternating mid vowels may occur in the first syllable of the root, as in *sen* [sɛn] ‘dream’ (nom.sg.) – *sn+u* [sn+u] (gen.sg.) and *bez* [bɛs] ‘lilac’ (nom.sg.) – *bz+u* [bz+u] (gen.sg.). Furthermore, Gouskova (2012) notes that constraints of this type are impossible to implement in OT because a deleted vowel does not have syllable affiliation.

The conclusion is that the deletion of mid vowels is blocked by syllable structure constraints. Since, given this analysis, syllable structure is relevant, I review briefly the most important generalizations referring to Polish.

The well-formedness of onsets and codas in Polish is governed by the universal Sonority Sequencing Generalization (Jespersen 1904; Selkirk 1982; SSG, henceforth), which mandates that the sonority of segments should rise in onsets and fall in codas, with more sonorous segments being closer to the nucleus than less sonorous segments.<sup>12</sup>

(9) Sonority Sequencing Generalization (SSG)

Stop Fricative Nasal Liquid Glide Vowel Glide Liquid Nasal Fricative  
Stop

Assign a violation mark for every sequence of consonants in the same syllable in which sonority falls toward the syllable nucleus.

As documented in the literature (Rubach and Booij 1990a, 1990b and Bethin 1992), Polish maximizes onsets (10a)<sup>13</sup> and obeys SSG with regard to the sequencing of obstruents and sonorants (10b) but not with regard to the sequencing inside the class of obstruents, that is, stops, affricates and fricatives can combine with themselves or occur in clusters in any order (10c).<sup>14</sup>

- (10) a. kadra [ka.dra] ‘staff’  
pasma [pa.sma] ‘streak’  
bitwa [bʲi.tfa] ‘battle’  
czeremcha [tʃɛ.rɛm.xa] ‘black cherry’
- b. bulwa [bul.va] ‘bulb’  
polny [pɔl.ni] ‘field’ (Adj.)
- c. kto [ktɔ] ‘who’ doktor [dɔ.ktɔr] ‘doctor’  
czkać [tʃkatɕ] ‘have a hiccup’ paczka [pa.tʃka] ‘packet’  
czcionka [tʃtɕɔn.ka] ‘font’ poczciwy [pɔ.tʃtɕi.vi] ‘worthy’  
wszelki [fʃɛl.kʲi] ‘any’ zawsze [za.fʃɛ] ‘always’  
szkoda [ʃkɔ.da] ‘pity’ puszka [pu.ʃka] ‘can’

The syllabifications in (10b), showing obedience to SSG, raise the question of how the initial clusters in words such as those in (11) should be treated.

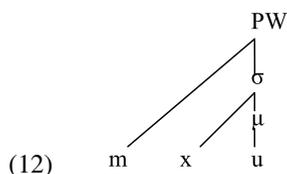
<sup>12</sup>In OT, this generalization is implemented by means of constraints on permissible margins (Prince and Smolensky 2004).

<sup>13</sup>Even though onset maximization is the dominant pattern, the tests reported in Rubach and Booij (1990a) as well as in Bethin (1992) indicate the possibility of variation in the speech of some informants, so, for example, VCCV is sometimes syllabified as VC.CV rather than as V.CCV. The point of importance is that there is no correlation between this variation and yer deletion. The deletion pattern is exactly the same for all native speakers and does not show any variability.

<sup>14</sup>The generalization that Polish does not differentiate obstruents from each other in sonority is in agreement with the sonority scales proposed by Jespersen (1904) and Clements (1990).

- (11) mech [mɛx] ‘moss’ (nom.sg.) – mch+u [mxu] (gen.sg.)  
 lew [lɛf] ‘lion’ (nom.sg.) – lw+a [lva] (gen.sg.)  
 len [lɛn] ‘linen’ (nom.sg.) – ln+u [lnu] (gen.sg.)

Analyzing parallel examples in Russian, Gouskova (2012) adopts the proposal of Rubach and Booij (1990b) and Yearley (1995) that SSG offenders are parsed under PW, the phonological word node, hence *mch+u*, the gen.sg. of *mech* ‘moss’ in (11), has the following representation.<sup>15</sup>



The adjunction of [m] to PW has the desired effect of avoiding SSG violations in the onset, but the structure is not as optimal as that for words such as *sen* [sɛn] ‘sleep’ (nom.sg.) – *sn+u* [snu] (gen.sg.), where the onset exhibits a perfect sonority slope, with the sonorant being closer to the nucleus than the obstruent.

In order to distinguish between words such as *sn+u* ‘sleep’ (gen.sg.) and *mch+u* ‘moss’ (gen.sg.), Gouskova introduces a new type of constraint called APPENDIX. In fact, APPENDIX is a family of constraints that penalize the adjunction to PW of segments occurring in various consonant clusters. There are three such constraints. I adopt the convention of enclosing in parentheses the consonants that are adjoined to PW, that is, unsyllabified consonants.

- (13) a. Simple APPENDIX  
 \*(C)C: Assign a violation mark for every unsyllabified consonant followed by a consonant.<sup>16</sup>
- b. APPENDIX/COMPLEX  
 \*(C)CC: Assign a violation mark for every unsyllabified consonant followed by a tautosyllabic consonant cluster.  
 (Gouskova 2012:101)
- c. Branching APPENDIX  
 \*(CC)C: Assign a violation mark for every sequence of unsyllabified consonants.  
 (Gouskova 2012:101)

In the remainder of this section, I will assume the APPENDIX constraints in (13) and explore the question of how they fare with the Polish data.

<sup>15</sup>Rubach (1997) revises the analysis of Rubach and Booij (1990b) and claims that word-initial SSG offenders must be adjoined to the onset rather than to PW, the reason being that these consonants are not transparent to the process of Voice Assimilation. I ignore this problem here.

<sup>16</sup>Gouskova (2012) uses this constraint but does not state it. The constraints in (13b) and (13c) are cited from Gouskova (2012).

The main tenets and claims of Gouskova’s (2012) analysis of yers can be summarized as follows.

- (i) Yers are full vowels in the underlying representation, so there is no representational distinction between yers and other vowels.
- (ii) In accordance with the Whole Morpheme Exception Hypothesis, yer deletion occurs in lexically designated morphemes.
- (iii) The designation of yer morphemes is expressed as lexical indexing to a constraint.
- (iv) Constraints can be lexically indexed to specified morphemes, which means that such constraints evaluate only these morphemes which have been indexed to them (Pater 2000, 2006, 2008). An example here is \*MID<sub>Lex</sub>, which evaluates the morphemes indexed as Lex, for instance, /ɔsɛt<sub>Lex</sub>/ ‘thistle’.
- (v) Lexically indexed constraints are clones of the existing constraints. Thus, \*MID<sub>Lex</sub> is a possible constraint because \*MID is an existing constraint.
- (vi) There is no limit on how many lexically indexed constraints can be posited.
- (vii) A morpheme can be indexed to any number of lexically indexed constraints. Since every indexing is an exception feature, a morpheme can be an exception to the general system of the language in as many ways as is required by the analysis.
- (viii) The process of yer deletion is driven by \*MID<sub>Lex</sub>.
- (ix) The full satisfaction of \*MID<sub>Lex</sub> is blocked by \*COMPLEX-Coda. Specifically, the deletion of mid vowels does not occur if it were to create a complex coda.
- (x) OT is extended to include a new family of constraints called APPENDIX constraints. Their job is to penalize various configurations of unsyllabified consonants (i.e., consonants parsed under PW) with other consonants. APPENDIX constraints that are ranked above \*MID<sub>Lex</sub> have the effect of blocking the deletion of mid vowels since offending such constraints is a more serious violation than offending \*MID<sub>Lex</sub> by preserving a mid vowel.

The remainder of this section explores the consequences for Polish of Gouskova’s (2012) proposal that I will refer to as Lexical Indexing Theory.

The word *mch+u* ‘moss’ (gen.sg.), underlying /mɛx<sub>Lex</sub>+u/, violates Simple APPENDIX \*(C)C because [m] is parsed under PW, as in (12) above. Since this violation does not block the deletion of /ɛ/, \*(C)C must be ranked below \*MID<sub>Lex</sub>. Recall that parentheses mean that a segment is unsyllabified, i.e., is parsed under PW.

(14) /mɛx<sub>Lex</sub>+u/ → [(m)xu]

	SSG	*COMPLEX-Coda	*MID <sub>Lex</sub>	MAX-V	*(C)C
a. mɛ.xu			*!		
b. mxu	*!			*	
☞ c. (m)xu				*	*

To clarify, candidate (14b) has syllabified [m] into the onset, thereby violating SSG because the sonorant [m] is further away from the nucleus than the obstruent [x]. Candidate (14c) wins, the correct result, because the adjunction of [m] under PW is a lesser offence than the retention of the mid vowel:  $*MID_{Lex} \gg * (C)C$ . The problem is that this ranking makes the wrong prediction for words such as those in (15). A comparison of the forms in the nom.sg. and the gen.sg. shows that these are yer morphemes (hence indexed Lex) because we see an alternation between *e* and zero.

- (15) mebel [mɛbɛl] → \*mbel ‘piece of furniture’  
       mebel [mɛbɛl] (nom.sg.) – mebl+a [mɛbla] (gen.sg.)
- Nobel [nɔbɛl] → \*Nbel ‘Nobel’  
       Nobel [nɔbɛl] (nom.sg.) – Nobl+a [nɔbla] (gen.sg.)
- rober [rɔbɛr] → \*rber ‘rubber’  
       rober [rɔbɛr] (nom.sg.) – robr+a [rɔbra] (gen.sg.)
- łokieć [łɔkʲɛtɕ] → \*łkieć ‘elbow’  
       łokieć [łɔkʲɛtɕ] (nom.sg.) – łokc+ia [łɔktɕa] (gen.sg.)

Word-initial sonorant-obstruent clusters are attested in Polish, as shown by *mdłości* ‘nausea’, *rdza* ‘rust’ and *łkać* ‘sob’. The outputs in (15) have exactly the same structure as *mch+u* in (12), analyzed in (14), so the prediction is that they should be the attested surface forms, but they are not. The actual forms are *mebel*, *Nobel*, *rober*, and *łokieć*.

Evidently, we are looking at a ranking paradox. In order to derive *mch+u*,  $*MID_{Lex}$  must outrank  $* (C)C$ , but in order to derive *mebel*, the ranking must be reversed:  $* (C)C \gg *MID_{Lex}$ , so that it is worse to delete the mid vowel in the first syllable than to violate  $* (C)C$ . While a ranking paradox is an argument in standard OT, it is not in Lexical Indexing Theory. In fact, by definition, ranking paradoxes do not exist in Lexical Indexing Theory because they are obviated by introducing a new indexing to a new lexically indexed constraint. The relevant constraint here is  $* (C)C$ . A cloned version of it,  $* (C)C_{Lex}$  evaluates the morphemes marked Lex for  $* (C)C_{Lex}$ , that is, morphemes such as those in (15).

- (16) Simple APPENDIX-Lex  
        $* (C)C_{Lex}$ : Assign a violation mark for every unsyllabified consonant followed by a consonant in morphemes lexically indexed as Lex.

Since now there is more than one lexical indexing in the grammar, it is necessary to introduce integers to distinguish different tokens of lexical indexing. Consequently,  $*MID_{Lex}$  is changed to  $*MID_{Lex-1}$  and the same change is made for the morphemes that are subject to it, hence /ɔsɛt<sub>Lex</sub>/ is represented as /ɔsɛt<sub>Lex-1</sub>/.  $* (C)C_{Lex}$  is replaced by  $* (C)C_{Lex-2}$ , and hence the morphemes that it affects such as /mɛbɛl<sub>Lex-1</sub>/ are represented as /mɛbɛl<sub>Lex-1, Lex-2</sub>/ because they are subject to both  $*MID_{Lex-1}$  and  $* (C)C_{Lex-2}$ .

Given this extension of the theoretical apparatus, the morphemes in (15) are not problematic any longer. All that needs to be done is to rank  $*(C)C_{Lex-2}$  above  $*MID_{Lex-1}$ , as (17) shows.

(17) /mɛbɛl<sub>Lex-1, Lex-2</sub>/ → [mɛ.bɛl] (no change)

	SSG	*COMPLEX-Coda	*(C)C <sub>Lex-2</sub>	*MID <sub>Lex-1</sub>	MAX-V	*(C)C
☞ a. mɛ.bɛl				**		
b. mbɛl	*!			*	*	
c. (m)bɛl			*!	*	*	*

A further question is what excludes the candidate  $*[mɛbl]$  from /mɛbɛl<sub>Lex-1, Lex-2</sub>/. It is not COMPLEX-Coda because the final sonorant violates SSG, so it is not in the coda.<sup>17</sup> We need a new APPENDIX constraint.

(18) Postconsonantal Simple APPENDIX

\*C(C): Assign a violation mark for every unsyllabified consonant preceded by a consonant.

\*C(C) cannot be collapsed with \*(C)C because the constraints have different effects and hence different rankings. \*C(C) induces the retention of the vowel while \*(C)C does not: /mɛbɛl<sub>Lex-1, Lex-2</sub>/ → [mɛbɛl] rather than  $*[mɛb(l)]$  versus /mɛx<sub>Lex-1</sub>+u/ → [(m)xu] rather than  $*[mɛxu]$ . The correct ranking is  $*C(C) \gg *MID_{Lex-1} \gg *(C)C$ . The evaluation of *mebel* now extended to include additional candidates runs as follows.

(19) /mɛbɛl<sub>Lex-1, Lex-2</sub>/ → [mɛ.bɛl] (no change)

	SSG	*COMPLEX-Coda	*(C)C <sub>Lex-2</sub>	*C(C)	*MID <sub>Lex-1</sub>	MAX-V	*(C)C
☞ a. mɛ.bɛl					**		
b. mbɛl	*!				*	*	
c. (m)bɛl			*!		*	*	*
d. mɛbl	*!				*	*	
e. mɛb(l)				*!	*	*	

<sup>17</sup>A different argument against placing sonorants in the coda derives from the so-called transparency effects. For discussion, see Rubach and Booij (1990b) and Rubach (1997).

The morpheme ‘fog’, *mgł+a* [mgła] (nom.sg.) – *mgieł* [mgʲɛł] (gen.pl.), has a simple analysis. The underlying representation of *mgł+a* is /mgʲɛł<sub>Lex-1</sub>+a/, and the /ɛ/ must be deleted by MID<sub>Lex-1</sub>. The resulting output [mgła] violates APPENDIX/COMPLEX \*(C)CC stated in (13b), so this constraint must be ranked below MID<sub>Lex-1</sub>. To save space in (20) and the later tableaux, I omit \*COMPLEX-Coda, which is irrelevant anyway because we evaluate onsets.

(20) /mgʲɛł<sub>Lex-1</sub>+a/ → [(m)gła]

	SSG	*(C)C <sub>Lex-2</sub>	*C(C)	*MID <sub>Lex-1</sub>	MAX-V	*(C)C	*(C)CC
a. (m)gʲɛ.ɫa				*!		*	
b. mgʲɛ.ɫa	*!			*			
c. mgła	*!				*		
☞ d. (m)gła					*		*

Equally unproblematic are the morphemes in (21).

- (21) brew [brɛf] ‘eyebrow’ (nom.sg.) – brw+i [brvʲi] (gen.sg.)  
 krew [krɛf] ‘blood’ (nom.sg.) – krw+i [krfʲi] (gen.sg.)  
 płéc [płɛtɕ] ‘sex’ (nom.sg.) – płc+i [płtɕi] (gen.sg.)

Looking at the first example in (21), the desired winner [brvʲi] ‘eyebrow’ (gen.sg.), from underlying /brɛv<sub>Lex-1</sub>+i/, deletes the /ɛ/ and hence violates Branching APPENDIX \*(CC)C stated in (13c), so this constraint must be ranked below \*MID<sub>Lex-1</sub>.

(22) /brɛv<sub>Lex-1</sub>+i/ → [(br)vʲi]

	SSG	*(C)C <sub>Lex-2</sub>	*C(C)	*MID <sub>Lex-1</sub>	MAX-V	*(C)C	*(C)CC	*(CC)C
a. brɛ.vʲi				*!				
b. brvʲi	*!				*			
☞ c. (br)vʲi					*			*

While the ranking in (22) derives the correct surface forms for the words in (21), it selects the wrong output as the winner in a large class of words exemplified in (23). The rightmost columns show that these are yer morphemes (hence indexed Lex-1) because we see an alternation between *e* and zero.

- (23) a. feminine and neuter nouns
- | <i>undesired change in nom.sg.</i>                       | <i>nom.sg.</i> | <i>gen.pl.</i> |
|--|----------------|----------------|
| <i>derk</i> +a [dɛrka] <sup>18</sup> → *(dr)ka ‘blanket’ | <i>derk</i> +a | <i>derek</i>   |
| <i>kolk</i> +a [kɔlka] → *(kl)ka ‘colic’                 | <i>kolk</i> +a | <i>kolek</i>   |
| <i>perł</i> +a [pɛrła] → *(pr)ła ‘pearl’                 | <i>perł</i> +a | <i>perel</i>   |
| <i>berł</i> +o [bɛrłɔ] → *(br)ło ‘scepter’               | <i>berł</i> +o | <i>berel</i>   |
- b. masculine nouns
- | <i>undesired change in nom.sg.</i>                   | <i>nom.sg.</i> | <i>gen.sg.</i>  |
|--|----------------|-----------------|
| <i>belfer</i> [bɛlfɛr] → *(bl)fer ‘teacher’ (pejor.) | <i>belfer</i>  | <i>belfr</i> +a |
| <i>precel</i> [prɛtsɛl] → *(pr)cel ‘pretzel’         | <i>precel</i>  | <i>precl</i> +a |
| <i>knebel</i> [knɛbɛl] → *(kn)bel ‘gag’              | <i>knebel</i>  | <i>knebl</i> +a |
- | <i>undesired change in gen.sg.</i>                  | <i>nom.sg.</i> | <i>gen.sg.</i> |
|---|----------------|----------------|
| <i>berk</i> +a [bɛrka] → *(br)ka ‘tag’              | <i>berk</i>    | <i>berk</i> +a |
| <i>kork</i> +a [kɔrka] → *(kr)ka ‘cork’             | <i>kork</i>    | <i>kork</i> +a |
| <i>mebel</i> [mɛbla] → *(mb)la ‘piece of furniture’ | <i>mebel</i>   | <i>mebl</i> +a |

Standard OT is in trouble dealing with the contradiction between the deletion of *e* in (21) and the retention of *e* in (23) in what is ostensibly the same context. We witness a ranking paradox between \*(CC)C and \*MID<sub>Lex-1</sub>. In order to derive the data in (21), *brwi* → *(br)wi*, the ranking must be \*MID<sub>Lex-1</sub> >> \*(CC)C, but, in order to exclude the undesired forms in (23), *derka* → \*(dr)ka, the ranking must be reversed: \*(CC)C >> \*MID<sub>Lex-1</sub>. In contrast to standard OT, Lexical Indexing Theory has no difficulty dealing with this contradiction. All that is needed is a new constraint cloned from Branching APPENDIX \*(CC)C and the lexical indexing of the troublesome morphemes.

(24) Branching APPENDIX-Lex-3

\*(CC)C<sub>Lex-3</sub>: Assign a violation mark for every sequence of unsyllabified consonants in morphemes lexically indexed as Lex-3.

The morphemes in (23) are lexically indexed to \*(CC)C<sub>Lex-3</sub>, so the lexical representation of *derk*+a ‘blanket’ is /dɛrɛk<sub>Lex-1, Lex-3</sub>+a/. The undesired winner \*(dr)ka is excluded if \*(CC)C<sub>Lex-3</sub> is ranked above \*MID<sub>Lex-1</sub>.

<sup>18</sup>These examples are different from those cited in (15), such as *mebel* ‘piece of furniture’, because what needs to be banned is two rather than one consonant in the appendix. The number of consonants can be distinctive since, for instance, in the regular case, both Polish and Russian permit \*(C)C of the *mech* ‘moss’ (nom.sg.) – *mch*+u (gen.sg.) type, but only Polish admits \*(CC)C, as in *brew* ‘eyebrow’ (nom.sg.) – *brw*+i (gen.sg.). The general principle is that indexed constraints are cloned from the existing constraints and the existing constraints at hand are \*(C)C and \*(CC)C.

(25) /dɛrɛk<sub>Lex-1, Lex-3</sub>+a/ → [dɛr.k+a]

	SSG	*(C)C <sub>Lex-2</sub>	*C(C)	*(CC)C <sub>Lex-3</sub>	*MID <sub>Lex-1</sub>	MAX-V	*(C)C	*(C)CC	*(CC)C
a. dɛ.re.ka					**!				
b. drka	*!					**			
c. (dr)ka				*!		**			*
☞ d. der.ka					*	*			*

The tableau in (25) has not considered yet another important candidate: \*[drɛ.ka]. I return to this problem in (32) and (34) below.

\*MID<sub>Lex-1</sub> predicts, incorrectly, that roots such as those in (26) should lose their mid vowels. A comparison of the forms in the nom.sg. and the gen.pl. or the gen.sg. shows that these are yer morphemes because we see an alternation between *e* and zero.

- (26) tresk+a [trɛska] (nom.sg.) → \*(tr)ska ‘hair piece’  
 tresk+a [trɛska] (nom.sg.) – tresek [trɛsɛk] (gen.pl.)  
 broszk+a [brɔʃka] (nom.sg.) → \*(br)szka ‘brooch’  
 broszk+a [brɔʃka] (nom.sg.) – broszek [brɔʃɛk] (gen.pl.)  
 mendl+a [mɛndla] (gen.sg.) → \*(mn)dla ‘unit of fifteen’  
 mendel [mɛndɛl] (nom.sg.) – mendl+a [mɛndla] (gen.sg.)  
 rondl+a [rɔndla] (gen.sg.) → \*(rn)dla ‘pot’  
 rondel [rɔndɛl] (nom.sg.) – rondl+a [rɔndla] (gen.sg.)

The undesired winners in (26) are excluded if we postulate yet another APPENDIX constraint and rank it above \*MID<sub>Lex-1</sub>.

- (27) Branching APPENDIX/COMPLEX  
 \*(CC)CC: Assign a violation mark for every sequence of unsyllabified consonants followed by a tautosyllabic consonant cluster.

Notice that this constraint cannot be subsumed under Branching APPENDIX \*(CC)C because the functions of the two constraints are contradictory: \*(CC)C must permit the loss of *e* in *brw + i* analyzed in (22), /brɛv<sub>Lex-1</sub>+i/ → [(br)v<sup>j</sup>i], while \*(CC)CC must prohibit the loss of *e* in *tresk+a* ‘hair piece’, /trɛsɛk<sub>Lex-1</sub>+a/ → \*[(tr)ska], as shown in (28) below. The family of APPENDIX constraints has grown so large that it is hard to display all the constraints in a single tableau. Consequently, the evaluation in (28) mentions only \*(CC)CC and ignores the other APPENDIX constraints.

(28) /trɛsɛk<sub>Lex-1</sub>+a/ → [trɛ.ska]

	SSG	*(CC)CC	*MID <sub>Lex-1</sub>	MAX-V
a. trɛ.sɛ.ka			**!	
b. trsɛ.ka	*!		*	*
c. (tr)ska		*!		**
 d. trɛ.ska			*	*

The result is correct as [trɛ.ska] is the attested surface form.

An interesting challenge to \*MID<sub>Lex-1</sub> comes from morphemes in which mid vowels are flanked by obstruents. Some representative examples are shown in (29). The rightmost column documents the alternation.

(29) *nom.sg.* *gen.sg.*  
 poczet ‘retinue’: /pɔtʃɛt/ → \*[ptʃɛt] poczt+u  
 dekiel ‘lid’: /dɛkʲɛl/ → \*[tkʲɛl] dekl+a  
 ceber ‘pail’: /tsɛbɛr/ → \*[dzbɛr] cebr+a  
 kocioł ‘cauldron’: /kɔtɕɔł/ → \*[ktɕɔł] kotł+a

Since Polish suspends SSG in the class of obstruents, the undesired winners in (29) contain well-formed onsets. This is confirmed by the independently attested onsets in *depcze* [dɛ.ptʃɛ] ‘he treads’, *tkać* [tkatɛ] ‘weave’, *dzban* [dzban] ‘jar’, and *kciuk* [ktɕuk] ‘thumb’. The evaluation fails, as shown in (30). To save space, (30) mentions only those APPENDIX constraints which are ranked above \*MID<sub>Lex-1</sub> and hence have a chance of blocking the deletion. The constraints \*(C)C<sub>Lex-2</sub> and \*(CC)C<sub>Lex-3</sub> are also omitted because *poczet* ‘retinue’, the input under evaluation, is not indexed to these constraints. On the other hand, \*COMPLEX-Coda is reinstalled as it has a role to play. The icon ☹ marks the desired winner and the pointer  identifies the undesired winner.

(30) /pɔtʃɛt<sub>Lex-1</sub>/ → [pɔ.tʃɛt] (no change; failed evaluation)

	SSG	*COMPLEX-Coda	*(CC)CC	*C(C)	*MID <sub>Lex-1</sub>	MAX-V
☹ a. pɔ.tʃɛt					**!	
b. pɔtʃt		*!			*	*
 c. ptʃɛt					*	*

The result is incorrect, but this is unlikely to be a problem. Given that cloned constraints can be multiplied at will and that there is no limit on how much lexical indexing a grammar can bear, there is surely a way of repairing the evaluation in (30). The solution suggests itself when we consider the data in (31). As before, the problematic candidate appears after the arrow and the rightmost column documents the alternation.

- (31)    *berek* [bɛrɛk] → \**brek* ‘tag’ (nom.sg.)                      *berk*+a (gen.sg.)
- korek* [kɔrɛk] → \**krek* ‘cork’ (nom.sg.)                      *kork*+a (gen.sg.)
- derk*+a [dɛrka] → \**dreka* ‘blanket’ (nom.sg.)                *derek* (gen.pl.)
- perł*+a [pɛrła] → \**preła* ‘pearl’ (nom.sg.)                      *perel* (gen.pl.)
- szełk*+a [ʃɛlka] → \**szleka* ‘suspender’ (nom.sg.)            *szelek* (gen.pl.)
- berł*+o [bɛrłɔ] → \**breł*o ‘scepter’ (nom.sg.)                *berel* (gen.pl.)

The current system of the constraints is unable to eliminate the undesired winners in (31), as shown by the evaluation of *berek* ‘tag’ in (32). The APPENDIX constraints are omitted as none is applicable. The morpheme *berek* is indexed in two ways. First, it carries Lex-1 in order to be within the purview of \*MID<sub>Lex-1</sub> that accounts for the *e*-zero alternation. Second, it carries Lex-3 because it belongs to the class of words in (23) that are within the purview of \*(CC)C<sub>Lex-3</sub>.

- (32)    /bɛrɛk<sub>Lex-1, Lex-3</sub>/ → [bɛ.rɛk] (no change; failed evaluation)

	SSG	*COMPLEX-Coda	*MID <sub>Lex-1</sub>	MAX-V
⊗ a. <i>bɛ.rɛk</i>			**!	
b. <i>berk</i>		*!	*	*
☞ c. <i>brek</i>			*	*

The winner \*[brɛk] is a perfectly well-formed syllable, with an ideal sonority slope in the onset, and yet it is the incorrect output. The only possibility to exclude \*[brɛk] is to bring in \*COMPLEX-Onset. Clearly, this cannot be the generic \*COMPLEX-Onset as not only onsets such as *br-* but also more complex onsets such as *pstr-* [pstr] in *pstry* ‘gaudy’ and *brzd-* [bʒd] in *brzdɔc* ‘kid’ abound in Polish. The solution is to clone a lexically indexed version of \*COMPLEX-Onset.

- (33)    COMPLEX-Onset<sub>Lex-4</sub>  
          No complex onsets in morphemes indexed Lex-4.

To complete the analysis, we need to make two further stipulations. First, morphemes of the class exemplified in (31) are lexically indexed to COMPLEX-Onset<sub>Lex-4</sub> and, second, COMPLEX-Onset<sub>Lex-4</sub> is ranked above \*MID<sub>Lex-1</sub>.

(34) /bɛrɛk<sub>Lex-1, Lex-3, Lex-4</sub>/ → [bɛ.rɛk] (no change)

	SSG	*COMPLEX-Coda	COMPLEX-Onset <sub>Lex-4</sub>	*MID <sub>Lex-1</sub>	MAX-V
☞ a. bɛ.rɛk				**	
b. berk		*!		*	*
c. brɛk			*!	*	*

The evaluation in (34) suggests a solution to the problematic data in (29). All that needs to be done is to assign the Lex-4 index to these morphemes. The input *poczɛt* ‘retinue’ in (30), now equipped with both Lex-1 and Lex-4, is within the purview of COMPLEX-Onset<sub>Lex-4</sub>, which eliminates the troublesome candidate \*[ptʃɛt], leaving [pɔtʃɛt] as the winner, the correct result.

Given the intricate system of the appendix constraints and lexical indexing, the question is whether Lexical Indexing Theory is falsifiable. The answer is positive. There are three morphemes in Polish that the theory cannot deal with:<sup>19</sup> *meander* ‘meander’, *poliester* ‘polyester’ and *oleander* ‘oleander’.<sup>20</sup> The morphemes belong to the Lex-1 class because they exhibit an *e*-zero alternation in *meander* (nom.sg.) – *meandr+a* (gen.sg.), *polyester* (nom.sg.) – *poliestr+u* and *oleander* (nom.sg.) – *oleandr+a* (gen.sg.).<sup>21</sup> Given the ranking \*MID<sub>Lex-1</sub> ≫ MAX-V, the theory predicts incorrectly that *meander*, *poliester* and *oleander* should surface as \**mander*, \**polister* and \**olander*, with the first *e* deleted by \*MID<sub>Lex-1</sub>. To exclude the candidates \*[mandɛr], \*[pɔɫʲɪstɛr] and \*[ɔlandɛr], we need to find a constraint from which to clone an exception constraint and rank this lexically indexed constraint above MAX-V, so that the first *e* in *meander*, *poliester* and *oleander*, lexically indexed to the exception constraint, can be retained. The problem is that there is no constraint that could be used for cloning. The *ea* and *ie* violate ONSET (syllables must have onsets), so we would need a constraint that mandates the violation of ONSET: \*ONSET (syllables cannot have onsets). The cloned version of this constraint, \*ONSET<sub>Lex-5</sub>, ranked above MAX-V, would avert the selection of \*[mandɛr], \*[pɔɫʲɪstɛr] and \*[ɔlandɛr] as the winners. But OT does not have the \*ONSET constraint, so the derivation of \*[mandɛr], \*[pɔɫʲɪstɛr] and \*[ɔlandɛr] cannot be blocked. This is a problem because, even though Lexical Indexing Theory is a theory of

<sup>19</sup>The situation just described refers to simplex words containing vowel clusters. As I point out below, Lexical Indexing Theory is not only violable but in fact does not work in both inflectional and derivational morphology.

<sup>20</sup>Thanks to a reviewer for drawing my attention to this example. The morpheme *polyester* ‘polyester’ is actually pronounced [pɔɫʲɪjɛstɛr], with *j*-insertion solving the [iɛ] hiatus. The insertion of [j] is entirely automatic if one of the vowels in a cluster is [i]. See Rubach (2007) for an analysis.

<sup>21</sup>A reviewer points out that these morphemes are borrowings. This, however, does not matter as many other yer morphemes are borrowings as well. Native speakers are unable to tell whether a given morpheme is a borrowing or not, particularly if the morpheme has developed a yer alternation pattern, a hallmark of assimilation to the native stock of the vocabulary.





The result is incorrect since (40a) is the attested surface form.<sup>22</sup> Notice that bringing in COMPLEX-Onset<sub>Lex-4</sub>, the failed constraint, would not salvage the analysis. While COMPLEX-Onset<sub>Lex-4</sub> would correctly exclude candidate (40c), it would also exclude the desired winner *ps+a* /pʲɛs<sub>Lex-1, Lex-4</sub>+a/, the gen.sg. of *pies* ‘dog’, analyzed in (41).

(41) /pʲɛs<sub>Lex-1, Lex-4</sub>+a/ → [psa] (failed evaluation)

	SSG	COMPLEX-Coda	COMPLEX-Onset <sub>Lex-4</sub>	*MID <sub>Lex-1</sub>	MAX-V
☞ a. pʲɛ.sa				*	
⊗ b. psa			*!		*

To conclude, Lexical Indexing Theory is problematic in two ways. First, it expands OT by introducing a battery of new constraints. These are listed in (42).

- (42) a. \*MID<sub>Lex-1</sub>
- b. Simple APPENDIX \*(C)C
- c. Simple APPENDIX<sub>Lex-2</sub> \*(C)C<sub>Lex-2</sub>
- d. APPENDIX/COMPLEX \*(C)CC
- e. Branching APPENDIX \*(CC)C
- f. Branching APPENDIX<sub>Lex-3</sub> \*(CC)C<sub>Lex-3</sub>
- g. Postconsonantal Simple APPENDIX \*(C)C
- h. Branching APPENDIX/COMPLEX \*(CC)CC
- i. COMPLEX-Onset<sub>Lex-4</sub>

Second, it is unable to account for the full range of the attested facts in Polish in both simplex words, such as *meander* ‘meander’ and *kartofl+a* ‘potato’ (gen.sg.), and complex words, such as *berecz+k+a* ‘tag’ (dimin. gen.sg.) and *pies+ek* ‘dog’ (dimin. nom.sg.). These problems call into question the claim of Lexical Indexing Theory that vowel–zero alternations involving yers can be analyzed in terms of the exception properties of whole morphemes rather than in terms of the special (or exceptional) properties of the yer segments themselves.

The Whole Morpheme Hypothesis predicts that all mid vowels of a morpheme should exhibit yer behavior and is in this sense more restrictive than the exceptional segment approach. However, neither in my data nor in Gouskova’s analysis of Modern Russian is there a single example supporting this prediction. On the contrary, there are many counterexamples. In order to account for these counterexamples, it is necessary to activate the MAX-RT-INITIAL constraint and introduce a host

<sup>22</sup>The candidate \*[psk], not considered in (40), is eliminated by \*PEAK (Consonant), a standard OT constraint that bans consonants from syllable nuclei (Prince and Smolensky 2004).

of exception-to-exception constraints. Paradoxically then, instead of reaping benefit from the Whole Morpheme Hypothesis, the analytical effort is spent on averting the negative consequences of this hypothesis, which puts the analysis on its head.

If the Whole Morpheme Hypothesis is abandoned, the question is how segment exceptionality should be implemented in phonological analysis: does the solution lie with diacritic marking of segments or with making exceptional segments representationally different from non-exceptional segments? The answer to this question awaits further research.

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## References

- Baković, Eric and Bożena Pająk. 2010. Assimilation, antigemination, and contingent optionality: The phonology of monoconsonantal proclitics in Polish. *Natural Language & Linguistic Theory* 28: 643–680.
- Beckman, Jill N. 1997. Positional faithfulness, positional neutralisation and Shona vowel harmony. *Phonology* 14: 1–46.
- Bethin, Christina Y. 1992. *Polish syllables. The role of prosody in phonology and morphology*. Columbus: Slavica Publishers.
- Bethin, Christina Y. 1998. *Slavic prosody: Language change and phonological theory*. Cambridge: Cambridge University Press.
- Blumenfeld, Lev A. 2006. Constraints on phonological interactions. Doctoral dissertation, Stanford University, Stanford CA.
- Casali, Roderic. 1997. Vowel elision in hiatus contexts: Which vowel goes? *Language* 73: 493–533.
- Clements, George N. 1990. The role of the sonority cycle in core syllabification. In *Papers in laboratory phonology. Between the grammar and the physics of speech*, eds. John Kingston and Mary Beckman, 283–333. Cambridge: Cambridge University Press.
- Czaykowska-Higgins, Ewa. 1988. Investigations into Polish morphology and phonology. Doctoral dissertation, MIT, Cambridge, MA.
- Gorecka, Alicja. 1988. Epenthesis and the coda constraints in Polish. Ms., MIT.
- Gouskova, Maria. 2012. Unexceptional segments. *Natural Language & Linguistic Theory* 30: 79–133.
- Gribanova, Vera. 2008. Russian prefixes, prepositions and palatalization in Stratal OT. In *Proceedings of the 26th West coast conference on formal linguistics*, eds. Charles B. Chang and Hannah J. Haynie, 217–225. Somerville: Cascadilla Proceedings Project.
- Gribanova, Vera. 2009. Phonological evidence for a distinction between Russian prepositions and prefixes. In *Studies in formal Slavic phonology, morphology, syntax, semantics and information structure: Proceedings of the 7th European conference on formal description of Slavic languages*, eds. Gerhild Zybatov, Uwe Junghanns, Denisa Lenartová, and Petr Biskup, 338–396. Frankfurt am Mein: Peter Lang.
- Gussmann, Edmund. 1980. *Studies in abstract phonology*. Cambridge: MIT Press.
- Gussmann, Edmund. 2007. *The phonology of Polish*. Oxford: Oxford University Press.
- Halle, Morris and Ora Matushansky. 2006. The morphophonology of Russian adjectival inflection. *Linguistic Inquiry* 37: 351–404.
- Hermans, Ben. 1999. Yer-triggered lengthening in Slovak. In *Linguistics in the Netherlands 1999*, ed. René Kager, 67–79. Amsterdam: John Benjamins.
- Hermans, Ben. 2002. Overapplication of yer vocalization in Russian. In *Linguistics in the Netherlands 2002*, eds. Hans Broekhuis and Paula Fikkert, 85–95. Amsterdam: John Benjamins.
- Jarosz, Gaja. 2005. Polish yers and the finer structure of output–output correspondence. *Proceedings of the Berkeley Linguistic Society* 31: 181–192.
- Jarosz, Gaja. 2008. Partial ranking and alternating vowels in Polish. *Proceedings of the Chicago Linguistic Society* 41: 193–206.

- Jespersen, Otto. 1904. *Lehrbuch der Phonetik*. Leipzig und Berlin: B.G. Teubner.
- Kenstowicz, Michael and Jerzy Rubach. 1987. The phonology of syllabic nuclei in Slovak. *Language* 63: 463–497.
- Kraska-Szlenk, Iwona. 2007. *Analogy. The relation between lexicon and grammar*. Munich: Lincom Europa.
- Laskowski, Roman. 1975. *Studia nad morfonologią współczesnego języka polskiego*. Wrocław: Ossolineum.
- Lightner, Theodore M. 1963. Preliminary remarks on the morphophonemic component of Polish. *Quarterly Progress Report* 71: 220–235.
- Lightner, Theodore M. 1972. *Problems in the theory of phonology*. Edmonton: Linguistic Research.
- Lightner, Theodore M. 1965. Segmental phonology of Modern Standard Russian. Doctoral dissertation, MIT, Cambridge, MA.
- McCarthy, John J. 2005. Optimal paradigms. In *Paradigms in phonological theory*, eds. Laura Downing, T. A. Hall, and Renate Raffelsiefen, 170–210. Oxford: Oxford University Press.
- Melvold, Janice. 1990. Structure and stress in the phonology of Russian. Doctoral dissertation, MIT, Cambridge MA.
- Pater, Joe. 2000. Non-uniformity in English secondary stress: The role of ranked and lexically specific constraints. *Phonology* 17: 237–274.
- Pater, Joe. 2006. The locus of exceptionality: Morpheme-specific phonology as constraint indexation. In *Papers in optimality theory III*, eds. Leah Bateman, Michael O'Keefe, Ehren Reilly, and Adam Werle, 259–296. Amherst: Graduate Linguistic Student Association.
- Pater, Joe. 2008. Morpheme-specific phonology: Constraint indexation and inconsistency resolution. In *Phonological argumentation: Essays on evidence and motivation*, ed. Steve Parker, 123–154. London: Equinox.
- Pesetsky, David. 1979. Russian morphology and lexical theory. Ms., MIT, Cambridge, MA.
- Piotrowski, Marek, Iggy Roca, and Andy Spencer. 1992. Polish yers and lexical syllabicity. *The Linguistic Review* 9: 27–67.
- Prince, Alan and Paul Smolensky. 2004. *Optimality theory: Constraint interaction in generative grammar*. Oxford: Blackwell. [Revision of 1993, technical report, Rutgers University Center for Cognitive, Sciences. Available on Rutgers Optimality Archive, ROA-537].
- Rowicka, Grażyna. 1999. *On ghost vowels. A strict CV approach*. The Hague: Holland Academic Graphics.
- Rubach, Jerzy. 1977. *Changes of consonants in English and Polish. A generative account*. Wrocław: Zakład Narodowy im. Ossolińskich.
- Rubach, Jerzy. 1984. *Cyclic and Lexical Phonology. The structure of Polish*. Dordrecht: Foris.
- Rubach, Jerzy. 1985. Lexical phonology: Lexical and postlexical derivations. *Phonology Yearbook* 2: 157–172.
- Rubach, Jerzy. 1986. Abstract vowels in three-dimensional phonology: The yers. *The Linguistic Review* 5: 247–280.
- Rubach, Jerzy. 1993. *The Lexical Phonology of Slovak*. Oxford: Oxford University Press.
- Rubach, Jerzy. 1997. Extrasyllabic consonants in Polish: Derivational Optimality Theory. In *Derivations and constraints in phonology*, ed. Iggy Roca, 551–581. Oxford: Oxford University Press.
- Rubach, Jerzy. 2007. A conspiracy of gliding processes in Polish. *Journal of Slavic Linguistics* 15: 325–357.
- Rubach, Jerzy. 2011. Syllabic repairs in Macedonian. *Lingua* 121: 237–268.
- Rubach, Jerzy and Geert E. Booij. 1990a. Syllable structure assignment in Polish. *Phonology* 7: 121–158.
- Rubach, Jerzy and Geert E. Booij. 1990b. Edge of constituent effects in Polish. *Natural Language & Linguistic Theory* 8: 427–463.
- Selkirk, Elizabeth O. 1982. On the major class features and syllable theory. In *Language sound structure*, eds. Mark Aronoff and Richard T. Oehrle, 107–136. Cambridge: MIT Press.
- Spencer, Andrew. 1985. A non-linear analysis of vowel-zero alternations in Polish. *Journal of Linguistics* 22: 249–280.
- Steele, Richard D. 1973. The segmental phonology of Contemporary Standard Polish. Doctoral dissertation, Harvard University, Cambridge, MA.
- Steriopolo, Olga. 2007. *Jer* vowels in Russian prepositions. In *Formal approaches to Slavic linguistics 15*, eds. Richard Compton, Magdalena Goledzinowska, and Ulyana Savchenko, 365–385. Ann Arbor: Michigan Slavic Publications.
- Szpyra, Jolanta. 1989. *The phonology–morphology interface: Cycles, levels, and words*. London: Routledge.

- Szpyra, Jolanta. 1992. Ghost segments in non-linear phonology: Polish yers. *Language* 68: 277–312.
- Trubetzkoy, Nikolai S. 1939. *Principles of phonology*. Berkeley: University of California. Translated by Christiane A. M. Baltaxe. Reprinted in 1969.
- Yearley, Jennifer. 1995. Jer vowels in Russian. In *Papers in Optimality Theory. University of Massachusetts occasional papers in linguistics 18*, eds. Jill N. Beckman, Laura W. Dickey, and Suzanne Urbanczyk, 249–384. Amherst: Graduate Linguistic Student Association.
- Zec, Draga. 1988. Sonority constraints on prosodic structure. Doctoral dissertation, Stanford University, Stanford, CA.
- Zec, Draga. 2002. The role of prosody in morphologically governed phonotactic regularities. *Working Papers of the Cornell Phonetics Laboratory* 14: 250–277.