

Interaction of morphological and phonological markedness in Russian genitive plural allomorphy

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Abstract This paper incorporates morphological markedness constraints into a framework in which morphology and phonology directly interact, modeled with interleaving of morphological and phonological constraints in serial OT (Wolf 2008, 2009). Morphological markedness constraints are constraints against realization (or spell-out) of morphologically marked feature sets. The empirical data motivating this proposal mainly come from the case-study of Russian genitive plural allomorphy, which is analyzed as involving tradeoffs between morphological markedness and other constraints in the grammar, including the purely phonological ones. This proposal explains the otherwise apparently arbitrary and unnatural transderivational dependency between the nominative singular and the genitive plural in Russian. Additionally, this account of the genitive plural allomorphy provides a unified explanation for several seemingly exceptional sub-generalizations which upon examining lexical statistics turn out to be regular. Implications and predictions of an interleaved model with morphological markedness constraints are discussed throughout the article.

Keywords Morpho-phonology · Suppletive allomorphy · Morphological markedness · Optimal interleaving · Serial OT · Homophony avoidance · Russian

1 Introduction

Theories of morpho-phonology disagree about the extent and the mechanisms of interaction between morphology and phonology. This paper presents an example of allomorphy that supports the view that morphological and phonological realization happen in the same component of grammar, as opposed to fully modular approaches

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in which morphology precedes phonology or vice versa. The evidence comes from Russian genitive plural (Gen-Pl) allomorphy, which I argue is best analyzed in an OT-type framework with some of the constraints being morphosemantic in nature (e.g., the ban against cumulative realization of marked feature sets), some being morpho-lexical (e.g., maintenance of uniformity and contrast within an inflectional paradigm), and others—purely phonological.

To account for the data presented here, I propose that morphological markedness constraints against cumulative realization of morpho-syntactically marked combinations of features can lead to simplifications of morphological structure, either morpheme deletions (zero-realization) or syncretisms that can be viewed as “retreat to the more general case.” These constraints are violable and can interact with other constraints in the grammar, such that deletion (or non-realization) can be blocked if it creates a phonologically marked structure. Alternative accounts of the Russian data presented here, such as accounts based on inflectional classes or subcategorization restrictions on lexical items, cannot capture the same range of phenomena without positing complex disjunctive restrictions or classes. Many of the arguments in this paper rest on minority patterns that nevertheless turn out to be regular as confirmed by lexical statistics.

2 Background

Russian nouns appear with three different Gen-Pl allomorphs, which (at least synchronically) cannot be derived from a single underlying representation. They are:

- (1) Genitive Plural Allomorphs¹
 - a. *-ov/* (realized as [of] when stressed or [ɔf] when unstressed)
Example: ‘table’ [stol-ø] (nom.sg.) – [stal-óf] (gen.pl.)
 - b. *-ej/* (realized as [ej] when stressed or [ɪj] when unstressed)
Example: ‘horse’ [kón^j-ø] (nom.sg.) – [kan^j-éj] (gen.pl)
 - c. *-ø/*
Example: ‘book’ [kníg-a] (nom.sg.) – [kník-ø] (gen.pl)

The distribution of these allomorphs cannot be straightforwardly related to singular inflectional classes (shown in Table 1) as will be argued in more detail in Sect. 8.1. Here is the gist of this argument. First, inflectional class differences are neutralized in all other plural cases.² Second, an account based on noun classes would create a highly marked pattern of inter-class syncretism, and would still have to reference a

¹Vowel and consonant alternations seen in these and other examples are due to the processes of vowel reduction and final consonant devoicing. For a discussion of these alternations see Jones and Ward (1969).

²While an exceptional behavior (lack of neutralization) in a single cell in a paradigm is not ruled out by any theory that I know of, it is considered to be a deviation from the norm. For example, in the paper “Canonical Inflectional Classes” Corbett puts forth a number of principles that a canonical, unmarked system of inflectional classes must follow (Corbett 2009). Among them is a principle dictating that “forms differ as consistently as possible across inflectional classes, cell by cell,” and that “the existence of shared or default cells gives reduced canonicity” (p. 5). So, the plural paradigm in which five out of six inflectional class distinctions were neutralized (or shared) would be highly marked or non-canonical.

Table 1 Inflectional Classes of Russian nouns

Case	Class I		Class II fem.	Class III fem.	Plural
	(a) masc.	(b) neut.			
Nom./Acc.(inanim.)	Ø	-o	-a	-Ø	-i/-a
Gen.	-a		-i	-i	-ov/-ej/-Ø
Dat.	-u		-e	-i	-am
Instr.	-om		oj	-ju	-ax
Loc.	-e		-e	-i	-ami

Inflectional class differences are neutralized in the plural. Gender is correlated with inflectional class but neither can be perfectly predicted from the other.

phonological property of the stem to explain the choice between the two overt allomorphs. In addition, such an account would not be able to capture several minority patterns discussed later in this paper including pluralia-tantum nouns (nouns with no singular forms) which do not belong to any inflectional class.

The Russian Gen-Pl allomorphs present an example of so-called suppletive allomorphy (when allomorphs cannot be derived from the same underlying representation). Many known examples of phonologically conditioned suppletive allomorphy are optimizing in the sense that the distribution of allomorphs is driven by avoiding configurations that are known to be phonologically marked. For example, in Hungarian, 2nd person present singular agreement suffixes on verbs taking indefinite objects are realized either as *-s/* or *-Vl/* (where V is a mid vowel harmonizing with the stem). The latter allomorph appears after stems ending in sibilants, while *-s/* appears elsewhere. This distribution can be said to be optimizing in so far as it is motivated by avoidance of adjacent sibilant consonants. Such cases have contributed to a debate in the literature about the nature of the phonology-morphology interface.

One position is that all phonologically conditioned suppletive allomorphy (PCSA, using the term of Paster 2005) should be described with subcategorization restrictions on lexical entries whether they are optimizing or truly arbitrary (Paster 2005; Bye 2007; Embick 2010). Among other things, proponents of this position point out that since subcategorization is needed anyway (to capture non-optimizing allomorphy), it would be more economical to assume that all allomorphy is handled by the same mechanism.³ On the other extreme is a proposal by Wolf (2008) who assumes all allomorphy to take place in an OT-style component of grammar that is responsible for both selection of lexical items and their phonological realization (also see Blumenfeld 2012 for a proposal within Stratal OT in which the difference between optimizing and non-optimizing PCSA is explained in terms of different levels inherent to Stratal OT). In the latter proposal morphological and phonological constraints are allowed to interact with each other. The existence of such interactions has been assumed implicitly in OT analyses that invoke Realize-Morpheme constraints (Urbanczyk 1999; Kurisu 2001; Walker and Feng 2004, and others). And, as discussed in Wolf (2008), some form of direct interaction between phonology and morphology is assumed by researchers who aim to account for cases of phonology “trumping” morphology, such

³Another stance (similar to a suggestion in Booij 1998) is to handle optimizing allomorphy within OT and non-optimizing allomorphy as subcategorization restrictions.

as phonologically determined affix-ordering where the regular order of morphemes is altered for phonological reasons (Kim 2010), cases in which phonology leads to insertion of empty dummy affixes (Heath 1984) or even morphemes that do not match the input syntactic features. For example, in French morphemes that are specified for different genders, such as *mon* ‘my, masc.’ and *ma* ‘my, fem.’ appear to be in competition, and the choice is sometimes determined by morphology (the gender matching form is chosen), and sometimes—by phonology: in prevocalic contexts a masculine form can be used in a feminine context apparently to avoid a violation of ONSET (e.g., *mon épée* ‘my sword, fem.’) (Teeples 2008; Steriade 1999).

I argue that Russian Gen-Pl allomorphy is also an example of the direct interaction and competition between morphological and phonological factors. One such factor is morphological markedness, which can lead to non-realization of morphological contrasts. Other factors include paradigm uniformity and paradigm contrast, as well as certain phonological markedness restrictions.

2.1 Theoretical assumptions

The model I assume here builds on the proposal by Wolf (2008) who uses serial OT with “Optimal Interleaving” of phonological and morphological constraints. This model assumes that lexical insertion and UR selection happen in the same component as phonology, which provides a natural way of accounting for optimizing cases of PCSA. In addition, due to its serial nature this model is capable of excluding certain undesirable cases of allomorphic lookahead,⁴ and of dealing with several cases of opacity that plague standard OT (such as non-derived environment blocking effects or cyclic overapplication and underapplication in a morphologically derived environment).

Here are the basic assumptions that I share with Optimal-Interleaving. The input to the morpho-phonological grammar consists of syntactic representations (for similar assumptions see Teeples 2008; Walker and Feng 2004; Grimshaw 2000). In this sense, the model is “top-down”: syntactic structures are computed first using abstract feature bundles and the lexical material is inserted later. The spell-out of syntactic structures involves vocabulary insertion and phonological adjustment of the inserted URs, all of which is governed by a grammar consisting of interacting violable constraints. Given a syntactic input, the grammar selects appropriate lexical entries for insertion into the syntactic representation. A lexical entry has two components, a phonological one (a “morph”) and a morpho-semantic one, a set of features or meanings associated with that morph. Thus, lexical insertion depends on two factors: making sure that the morphological features match the syntactic features as best as possible, and making sure that the strings resulting from concatenation of selected morphs are phonologically optimal.

I assume that the grammar includes three different types of constraints: regular phonological and phonotactic constraints, lexical Output-Output Correspondence constraints (Benua 1997; Burzio 2005), and purely morphological constraints of two

⁴This term refers to a situation in which a conditioning factor for some allomorph x appears in a morpheme that is derivationally more peripheral to x .

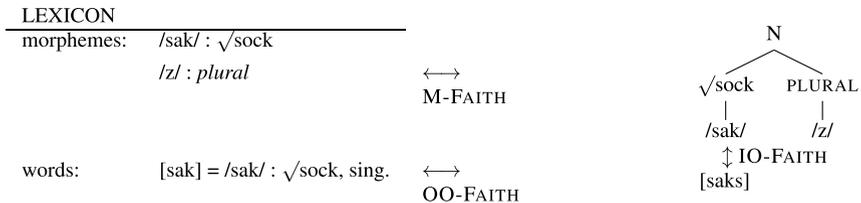


Fig. 1 Derivation of the English word socks

kinds: (i) faithfulness-type constraints on the correspondence of features between syntactic representations and lexical items, and (ii) morphological markedness constraints, a new type of constraint I introduce in Sect. 4.1. Figure 1 provides an example input and output for an English plural noun.

In the graph above the input consists of a syntactic tree in which the abstract root (√sock) is merged with an inflectional node PLURAL. The candidates consist not just of surface forms, but of derivational structures that include the syntactic tree, inserted lexical items, and their surface realization—all connected by the correspondence relations: the syntactic nodes are connected to lexical entries by M-FAITH and phonological URs of the lexical entries are connected to surface forms by IO-FAITH. The winning candidate, shown in the graph, faithfully (in the sense of M-FAITH introduced below) realizes the two syntactic nodes using the morphemes /sak/ and /z/, which are concatenated and pronounced as [saks] in accordance with phonological constraints.

A family of morphological faithfulness constraints (M-FAITH) insures correspondence between syntactic structures and lexical items as follows: M-MAX(F) is violated when a syntactic feature *F* present in the input is not part of any lexical item in the output. For instance, a candidate such as (/sak/:√sock) + (/∅/:sing.) ↔ [sak-∅]:(√sock ∪ sing) for the input tree above violates M-MAX(PL). Similarly, M-DEP(F) is violated when the output contains a morpheme specified for *F*, but there is no correspondent of *F* in the syntactic input. For instance, an output in which a morpheme other than the plural /z/ was used to realize the plural node would violate M-DEP. To summarize, non-maximal spell-out of syntactic features creates violations of M-MAX constraints, and insertion of morphemes or use of morphemes that do not match syntactic features lead to violations of M-DEP constraints. Such non-faithful mappings are in fact attested (some such cases were mentioned at the end of the previous section as examples of phonology “trumping” morphology). We will see shortly that the Russian Gen-Pl allomorphy also presents an example of an unfaithful mapping, because M-MAX(GEN) and M-MAX(PL) constraints can be violated leading to morpheme omission or what looks like null exponence.

It should be noted that the above formulation of morphological faithfulness allows one to capture similar restrictions on lexical insertion as those assumed in other realization theories. For example, in Distributed Morphology (DM) such a restriction takes the form of a “Subset Principle” (Halle and Marantz 1993). This principle dictates that a syntactic feature bundles *X* should be realized by a lexical item whose listed features correspond to the largest possible subset of *X*. That is, given two entries whose features are a subset of *X*, the most specific entry (the largest subset)

must be chosen. In Wolf's theory this restriction is captured exactly when M-DEP constraints outrank the relevant M-MAX constraints.⁵

Another important feature of the model is that the process of morpho-phonological realization proceeds serially. Harmonic Serialism (Prince and Smolensky 1993; McCarthy 2010) is one serial OT-model that can be used with Optimal Interleaving. In Harmonic Serialism, the output is constructed step by step through a series of string-changing operations. After each step, candidates are (re)evaluated against the full constraint ranking. For the simple English example above, suppose that the root is selected first and evaluated by EVAL, then the output of this step becomes the input to the next operation, such as insertion of another morpheme. Following Wolf, I assume that addition of each morpheme triggers a new cycle of EVAL.

I remain agnostic at this point about the order in which the serial operations are applied. It is possible that the order of morpheme-insertion is dictated by syntax in some fashion that relates syntactic phases (in the theory of Minimalism) to the spell-out cycles (as in some morpho-syntactic theories such as Embick 2010), but the spell-out itself is accomplished through a cyclic application of EVAL.

I propose that the above model should include another family of purely morphological constraints, namely morphological markedness constraints. These constraints militate against realization of marked feature sets by a single morpheme (sometimes in a specific context, such as in presence of other marked morphemes). For example, a morphological constraint like *[F1 F2] assigns a violation to any structure in which the two morpho-syntactic features F1 and F2 are linked up through M-Correspondence to some lexical entry realizing these features. In general, I assume that there is something like a universal markedness hierarchy for such constraints so that the more marked the combination of features, the higher a constraint against cumulative realization of these features is in this hierarchy. At the bottom of the hierarchy are constraints against the realization of individual features, like *[F], which may also be ordered based on their markedness. These ideas will be developed more fully in Sect. 4.1.

One general worry about the above model is that it is not restrictive enough to explain why the normal state of affairs is for syntax/morphology to override phonology. That is, selection of lexical items seems to be determined mostly by morpho-syntax

⁵Given the reverse ranking, only part of the restriction is captured, and the grammar predicts that it is possible for a morpheme containing extra features (those that are not in the input) to beat a morpheme that does not contain such extra-features. For example, suppose that the input includes a node with features [NOM. MASC. PL.], and suppose that the lexicon contains two entries, one specified for *Nominative Plural*, and one specified for *Masculine Singular*. The Subset Principle predicts that the first entry should always win. However, if M-MAX(MASC.) outranked M-DEP(SG.), M-MAX(NOM), and M-MAX(PL), the second entry would win. This might be viewed as problematic because it predicts the existence of languages in which a morpheme specified for *Masculine Singular* would occur in the *Nominative Masculine Plural* context. However, the implausibility of such languages can perhaps be explained by implausibility of such competing lexical entries as those assumed above. If, in fact, the same morpheme was used in the nominative masculine plural and a number of masculine singular contexts (as predicted by the above ranking), it is not clear why a learner would ever specify a lexical entry for this morpheme as *Masculine Singular*. That is, why would a learner decide that a morpheme known to be used in a plural context must be specified as singular? Of course to make this argument more convincing, one would have to work out precisely what the learner does when it learns feature specifications given that the distribution of morphs can depend not only on the lexical items but also on the constraint ranking.

rather than phonology. One idea for how to restrict this model is to assume that during the learning process the grammar starts out with faithfulness to morpho-syntactic representations (M-FAITH) ranked at the top, corresponding to the idea that preservation of one-to-one mappings between form and meaning are a top priority (see Teeple 2008 for this kind of suggestion). I leave an exploration of this idea to future research. The emphasis in this paper is on showing that interactions between morphology and phonology exist, and are hard to account for in a fully modular grammar in which morphology precedes or follows phonology.

3 An apparent inter-paradigmatic dependency between Nom-Sg and Gen-Pl

First, I discuss a key generalization about the distribution of Gen-Pl allomorphs in Russian, and show how it can be explained in terms of a tradeoff between morphological markedness and other constraints in the grammar.

Most descriptive accounts of Gen-Pl allomorphy in linguistic and pedagogical texts rely on an observation made by Jakobson (1957) who noticed that the overt-ness of the Gen-Pl inflection depends on the overt-ness of the Nom-Sg inflection as follows:

- (2) If the Nom-Sg suffix is null, the Gen-Pl suffix is overt, and vice versa.

This generalization is illustrated by the following examples.

- (3) Nom-Sg – Gen-Pl dependency
- a. [ról- \emptyset] – [ra^l-éj] ‘role’
[stól- \emptyset] – [stal-**ó**f] ‘table’
 - b. [l^ént-**a**] – [l^ént- \emptyset] ‘ribbon’
[v^lin-**ó**] – [v^lín- \emptyset] ‘wine’

The choice between *-ej/* and *-ov/* depends on the palatalization of the last consonant of the stem, a fact that we will ignore for now. To evaluate the regularity of Jakobson’s generalization (and other patterns discussed later in the paper), I compiled a lexical sample of 1153 nouns from a frequency list of Russian nouns (Sharoff 1998). The sample was constructed to have a frequency distribution roughly similar to that found in natural language data. Namely, it is known that natural language texts have the property that the same relatively small number of words account for more than half of the text (i.e., the frequent words are super-frequent) (Zipf 1932). Accordingly, most words in my sample are high-frequency words which speakers are more likely to have experience with than the low-frequency words. This type of distribution also provides more opportunities to witness irregular or exceptional patterns which tend to occur among more frequent lexical items (Bybee 1998). To create the sample, I selected the first 900 most frequent nouns from Sharoff’s frequency list, 200 nouns with mean frequency of 25 ipm (instances per million), and 110 nouns with mean frequency of 5 ipm. I removed nouns that do not have plural or singular forms, those that are indeclinable, have paradigm gaps in the genitive plural (discussed later), and those that have suppletive singular and plural stems.

Table 2 Dependency between Nom-Sg and Gen-Pl in the sample of 1153 nouns

Nominative singular	Genitive plural	
	Null	Overt
Null	9.5	632.5
Overt	495.5	15.5

The dependency between Nom-Sg and Gen-Pl in this sample is shown in Table 2. The nouns that can appear with two different allomorphs were split between the two categories contributing 0.5 of the count to each. One can see with a naked eye that Jakobson's generalization is very reliable: it is violated by only 2 % of the nouns in the sample (Chi-Square test, $\chi^2 = 1054$, $p < 0.0001$).

However, such an inter-paradigmatic dependency appears to be linguistically unnatural (as discussed in the next section), and one wonders whether it is directly represented in the speaker's mental grammar, or whether it results from some other factors.

3.1 The synchronic plausibility of an inter-paradigmatic dependency

Despite the impressive regularity of the dependency between the Gen-Pl and the Nom-Sg, several considerations cast doubt on the idea that it is directly encoded in the speaker's grammar. This idea has been previously challenged by Bailyn and Nevins in their 2008 paper "Russian Genitive Plurals are Impostors." The authors point out that there are two standard ways of capturing transderivational dependencies of this sort: either through a cyclic-type derivation in which the base is embedded inside the derived form, or with help of something like OT's Output-Output Correspondence. Bailyn and Nevins argue that both of these options are problematic. Gen-Pl cannot be assumed to be derived from the Nom-Sg without going through an intermediate stage of the Nom-Pl or Gen-Sg, but neither of those forms appear to be intermediate stages for the Gen-Pl. Similarly, on a restrictive version of Correspondence Theory such as (Kager 1999), forms related by Output-Output correspondence can differ by at most one morpho-syntactic feature (which cannot be said of the Nom-Sg and the Gen-Pl).

Even if one does not share these theoretical commitments, there are other reasons to doubt the direct link between the Nom-Sg and the Gen-Pl in speakers' grammar. One such reason is the fact that arbitrary relations between two inflectional forms are difficult to learn. In order to notice that /Ø/s in the Nom-Sg and the Gen-Pl are in complementary distribution, speakers would have to monitor all possible pairs of paradigmatic exponents looking for potential patterns. In a language with many inflectional forms, this type of computation would be very costly. There is some empirical evidence from artificial language learning experiments with both children and adults that such non-local dependencies partitioning vocabulary into something like arbitrary word-classes are difficult to learn (Brooks et al. 1993; Frigo and McDonald 1998; Weinert 2009).

Finally, in a wug-test I previously carried out with 10 native speakers of Russian, I found that subjects were not always good at predicting the Gen-Pl given the Nom-Sg form (Pertsova 2004). While the results of my experiment may be questioned given

a relatively small number of participants, and the fact that most of them were to various extents bilingual speakers of English living in the United States, a similar pattern of Gen-Pl allomorph distribution emerges when one examines pluralia-tantum nouns for which Jakobson's generalization is irrelevant (since they do not have Nom-Sg forms, see Sect. 6.2). These nouns, along with a number of other minority patterns, reveal a set of regularities that point to an alternative explanation of Jakobson's generalization. In particular, they show a series of interactions between phonological and morphological factors which I begin to describe in the next sections.

4 A competition-based explanation of the dependency between the Nom-Sg and the Gen-Pl

If the generalization in (2) is not directly encoded in the speakers' grammar, how can we explain the complementary distribution of \emptyset 's in the Nom-Sg and Gen-Pl? My proposal takes as a starting point Jakobson's own thoughts on the dependency between the Nom-Sg and Gen-Pl. Jakobson suggested that Nom-Sg and Gen-Pl are at the two poles of a markedness scale with respect to the domain of quantity. Namely, Nom-Sg is completely unmarked for quantity, while Gen-Pl is doubly marked: once for plurality, and once for something like partitivity. Jakobson discusses how the semantic contribution of the genitive case is to limit "the referent's involvement in the content of the utterance," and how in particular in its adnominal use the genitive usually signals that not the whole entity, but only some of its parts, properties, or its action or state are under the discussion. He then suggests that there is a special relationship between a fully unmarked form (Nom-Sg) and the doubly marked form (Gen-Pl) so that one of them must be morphologically expressed as \emptyset to be distinguished from the other (so homophony between the two is ruled out, but one of them must be zero-marked).

While the assumption that \emptyset must be associated with the most unmarked form in a paradigm (Nom-Sg) is natural, it is less clear why the most marked form must also be distinguished by \emptyset . One possible explanation is that there is a threshold on the amount of morphological markedness/complexity that a single morpheme in a language can bear, and once such a threshold is reached, the most marked contexts undergo simplification. This idea has independent support and features prominently in the framework of Distributed Morphology to account for both syncretism and null exponence. In a nutshell, I propose that cumulative realization of the features GEN and PL is marked in Russian, which leads to preference for non-realization. However, non-realization itself can be blocked by higher ranked constraints violated by the bare stem. As a result of this interranging, zero-realization of the Gen-Pl is the default option, but overt allomorphs appear when \emptyset leads to problems elsewhere. For example, \emptyset is avoided when it leads to paradigmatic conflation of Gen-Pl with the citation form, Nom-Sg (the evidence for this homophony avoidance effect is presented in Sect. 5), and in a few other cases, for example when it leads to phonotactically illegal coda clusters, or when it forces a stress-shift and at the same time causes a palatalized consonant to appear word-finally. Further support for morphological markedness comes from the fact that non-realization of the Gen-Pl is particularly likely for the

most marked feminine and neuter nouns, while masculine nouns and non-gendered nouns (i.e., pluralia-tantum nouns) better tolerate the overt allomorphs. This will be discussed in more detail in the analysis portion of this paper.

The main difference between this proposal and positing a direct link between the Nom-Sg and the Gen-Pl is that the former view is more explanatory: the Nom-Sg has a zero because it is the least marked context, and the Gen-Pl has a zero as a result of morphological omission in the most marked context. The complementary distribution of zeros arises as the result of homophony avoidance and, as we will see later, when there is no danger of homophony, zeros can occur in both the Nom-Sg and the Gen-Pl in the same paradigm.

4.1 Morphological markedness constraints

Morphological markedness can manifest itself in several ways. For instance, marked categories tend to be cross-linguistically rare, realized by more phonologically complex (e.g., longer) exponents, be optional, follow more idiosyncratic processes, and so on. For example, the category “dual” is more marked than “plural” which is reflected in Greenberg’s universal 34 stating that “no language has a dual unless it has plural” (Greenberg 1963). Correspondingly, dual forms are typically phonologically longer or at least of the same length as the plural forms (likewise, plural forms are longer or of the same length as singular forms as reported in a typological study by Brunner 2010). Additionally, marked morphological categories are often realized syncretically, that is, by a morph that already appears in another portion of the paradigm, frequently in a less marked context. An extreme case of such syncretism is complete conflation, or eventual neutralization and loss of a marked morphological contrast.

In Distributed Morphology, morphological markedness has been proposed to account for some of the above facts through two different mechanisms that affect phonological spell-out. First, lexical entries can undergo deletion of marked features, called “Impoverishment,” which then leads to syncretism (Bonet 1991; Noyer 1998). Calabrese (2011) also proposes that morphological markedness can trigger “obliteration,” deletion of a morphologically marked node in syntax (also see Arregi and Nevins 2006), leading to zero exponence. Calabrese’s account is intended to explain why the distribution of zeros often mirrors the distribution of syncretic morphemes in related paradigms. So, according to Calabrese (*ibid.*), there are two types of systematic zeros: those that are due to phonologically empty exponents realizing fully unmarked feature combinations,⁶ or those resulting from obliteration of morphologically marked structures in syntax. (Some zeros may of course also result from phonological deletions.) While phonological markedness is grounded in acoustic, articulatory and perceptual properties of the speech system, morphological markedness has at its roots universal conceptual biases. Calabrese says: “Categories that are more basic, obvious, and easily connected to our everyday experience can be expected to serve as a conceptual background.” The background categories correspond to the unmarked categories.

⁶This is consistent with the Jakobsonian assumption that a phonetic \emptyset can only be an exponent of an unmarked morphological category (Calabrese 2011).

Like Calabrese, I assume that grammars contain what he calls “marking statements,” except I view them as violable morphological constraints that can interact with other morphological and phonological constraints (for other instances of morphological markedness constraints see Grimshaw 2000 working in the framework of Optimality Theoretic Syntax). Each such constraint penalizes cumulative realization of some particular combination of syntactic features. This family of constraints forms a markedness hierarchy assumed to be universal. For example, suppose the following fairly uncontroversial ranking: Nominative is less morphologically marked than Genitive and Singular number is less marked than Plural. The combination of these two features results in four categories, with Gen-Pl being the most marked:

(4) Markedness of the genitive plural (Jakobson 1957)

	– Pl	+ Pl
– Gen	[–, –] nom.sg.	[–, +] nom.pl.
+ Gen	[+, –] gen.sg.	[+, +] gen.pl.

Therefore, we can assume the following markedness scale: GEN-PL >> NOM-PL, GEN-SG >> NOM-SG corresponding to a hierarchy of markedness constraints with a fixed ranking: *GEN-PL >> *NOM-PL, *GEN-SG >> *NOM-SG.⁷

In order for the theory connecting zero-realization to markedness to be predictive, there need to be restrictions on what can be zero-marked in the lexicon, otherwise morphological markedness constraints are meaningless. One possibility is to assume that only unmarked categories can be lexically specified as zero (as Calabrese does). It is possible that at least some zeros in unmarked cells of the paradigm are also best thought of as non-realization of features rather than phonological zeros. Since the features that are less marked correspond to more basic, “default” values which can be more easily recovered from context, such features better tolerate not being overtly realized. Evidence for this view comes from Iscrulescu (2006) who examines several cases in which zero realization becomes possible in a morphologically *unmarked* environment in circumstances when it also helps to avoid some phonological violation. The cases he discusses are in a sense a mirror image of the Russian case discussed here.

For example, in Old Saxon the direct case (Nominative-Accusative) and the oblique (Dative-Instrumental) are marked by the *-u* suffix for some nouns. This suffix can delete when its realization leads to uneven (HL) trochees, but such deletions (or non-realizations) occur only in the unmarked direct but not in the marked oblique cases as shown below.

(5) Nom-Acc /-u/ deletion in Old-Saxon (from Iscrulescu 2006)

- a. /her-u_{Nom}/ → [(hé.ru)]_{Nom} ‘sword’
- b. /luft-u_{Nom}/ → [(lúft)]_{Nom} *[luftu] ‘air’
- c. /her-u_{Obl}/ → [(hé.ru)]_{Obl} ‘sword’
- d. /luft-u_{Obl}/ → [(lúf.tu)]_{Obl} *[luft] ‘air’

⁷It is possible that the ranking between the two constraints *NOM-PL and *GEN-SG may be determined on a language specific basis, or according to a feature prominence hierarchy in which CASE is considered more important than NUMBER or vice-versa (as suggested in Noyer 1992).

One could account for these facts within phonology as cases of Positional Markedness or Positional Faithfulness, assuming that morphologically marked positions are privileged. This privilege could be restated as the general tendency for morphologically marked contexts to be overtly realized (as long as they are not too marked). Thus, it is possible that the Old Saxon pattern is due to phonology interacting with morphological markedness constraints, just like in the Russian case described here. The difference is that in Old Saxon, morphological markedness constraints must be ranked low, while morphological faithfulness (to marked features) must be ranked high, corresponding to a more typical state of affairs. That is, we could say that the constraint against uneven trochees is ranked higher than the realization of the feature *DirectCase*, but lower than realization of the feature *ObliqueCase*.⁸ The ranking of Oblique > Direct is in accord with the established morphological prominence scales. In fact, existence of such scales suggests that morphological faithfulness constraints are also ordered according to markedness so that the realization of more marked contrasts is favored. For example, it is known that in a number of languages, such as Menominee (Bloomfield 1962) or Turkana (Dimmendaal 1983), subject and object agreement markers compete for realization (the verb can only agree with one of them), and which argument is realized depends on a person markedness scale such that the argument ranked higher on the scale is overtly realized (that is, realization of more marked contrasts is favored). The typical person hierarchy is assumed to be 2nd > 1st > 3rd (or 1st, 2nd > 3rd) (Silverstein 1976; Aissen 1999).

Thus, on the one hand, there is pressure to realize morphological structure, especially the marked structure, since it's less predictable; on the other hand, when several marked features are combined within the same structure, there is pressure to simplify it by not realizing some or all such features. Both forces exist in languages and both can interact with phonological factors.

4.2 Predictions of morphological markedness

Depending on the ranking and the set of available lexical entries, morphological markedness can lead either to syncretism or to non-realization of morphemes. For example, suppose we assume that the constraint *[GEN.PL] (defined below) is ranked higher than the M-MAX faithfulness constraints.

- (6) *[GEN.PL.]: assign a violation to an output which realizes the features GEN and PL in a single morpheme.

Here are possible outcomes of such a ranking:

- (7) Predictions of M-Markedness > M-Faithfulness
- a. The Gen-Pl morpheme is never realized overtly (no lexical entry is inserted into the syntactic node containing these features)

⁸This analysis assumes that the morphological markedness constraints are violated whenever a morphologically marked morpheme (in the syntactic representation) is morphologically realized in the process of lexical insertion. Thus, even if *-u* is underspecified for case, an output structure in which *-u* was connected by M-Correspondence to the node *ObliqueCase* would violate a *OBLCASE constraint.

- b. The Gen-Pl morpheme is usually not realized overtly, but this preference can be overridden by higher ranked constraints that are violated by the bare stem.
- c. The Gen-Pl morpheme is realized syncretically with another morpheme due to existence of a lexical entry that realizes a subset of the features of [Gen.Pl.]⁹

The scenario in (1) above describes a situation in which more marked morphemes within a particular subparadigm are realized as \emptyset due to high ranking of a morphological markedness constraint. Cases of this sort are unusual, though attested. The English verbal agreement pattern is often given as an example of such a markedness reversal: the most unmarked feature combination, 3p.sg.pres., is realized overtly, while all other combinations of features in the present are zero-marked. In Muisca tense on the verbs is marked by overt suffixes in the unmarked non-past tenses, but as \emptyset in the past tense (López García 1995). In many Italian dialects there are no overt pronominal clitics for the most marked person and number combinations of features (e.g., 2p.pl.) (Manzini and Savoia 2005; Calabrese 2011). However, such cases are exceptions rather than the rule: it is the unmarked morphemes that are usually phonologically null. This fact could follow from the assumption that morphological faithfulness constraints are typically ranked high in a language (since it's very important to preserve the intended meaning). This is the same assumption that may be responsible for the general appearance of morphology “preceding” phonology I mentioned earlier.

The situation we observe in Russian is the one described in (7-b) above. Namely, the default option is not to realize the Gen-Pl; however, it can be overridden in several circumstances. Most prominently, it is overridden when it leads to homophony with the Nom-Sg. For a smaller group of nouns, additional phonological factors can override the preference for \emptyset (for instance, avoidance of illegal or sonority-rising coda clusters). Together these cases demonstrate the interleaving of morphological constraints with other constraints in the grammar that I will describe shortly.

English Gen-Pl is a possible example of a scenario in (7-c) above. In English when the features [Pl] and [Gen] are marked on the head noun, they are realized as [s] instead of the expected [səz] (e.g., *the ducks' feathers*), while in general the genitive -s is realized as [əz] after sibilants (e.g., *geese's feathers*). Bermúdez-Otero and Payne (2011) argue against a purely phonological account of the above pattern proposed in Anderson (2008). Instead, Payne (2009), who analyzes English possessive -s as an edge affix, suggests that English has a cumulative morph for Gen-Pl which happens to be homophonous with the plural morph (while phrasal genitives are treated as a type of *Suffixhäufung*). Assuming Payne's syntactic analysis is correct, an alternative explanation for the syncretism between [Gen Pl] and [Pl] in English could be due to the markedness of the cumulative Gen-Pl morpheme. The following ranking would predict the syncretism: *[GEN.PL] > MAX-M[PL]. According to this ranking, the form with the underlying string /z-z/ realizing the fused possessive plural morpheme

⁹Gen-Pl can also be realized syncretically with another cumulative case-number morpheme due to feature underspecification of lexical entries which I do not discuss here.

is less optimal than /z/ which realizes a subset of the input-features, but does not violate the morphological markedness constraint. (It's possible that the phonological markedness contributes to the badness of /z-z/ as well, although it cannot be the sole reason for its non-existence.) Zero-realization is less faithful to the morpho-syntactic input and, therefore, less optimal. On the other hand, in Russian there is no option for partial realization of features since all nominal inflections are cumulative, specified for both case and number (as well as gender or inflectional class). So in Russian, zero-realization emerges as the optimal solution for avoiding morphological markedness, while in English a better option exists—using a morpheme that realizes just one of the features. While there is not enough evidence to decide between Payne's proposal and the markedness proposal, it is reasonable to prefer an analysis that does not posit accidental homophony between [Gen Pl] and [Pl].

The overall claim that Gen-Pl is marked can be further tested by checking whether this morpheme shows signs of markedness in other languages either by being one of the most phonologically complex forms (as in many Latin nouns) or by undergoing simplification in one of the three ways outlined above.

5 Homophony avoidance

Returning to the Russian facts, recall my suggestion that the default non-realization of Gen-Pl due to its markedness is blocked when it leads to homophony with the Nom-Sg. Therefore, the overt allomorphs typically surface when the Nom-Sg inflection is -Ø. This hypothesis is empirically distinguishable from positing a direct or indirect correspondence between the Nom-Sg and Gen-Pl suffixes as will be shown below. In particular, this proposal allows both Nom-Sg and Gen-Pl morphemes to be null as long as the two forms are not homophonous.

There are several proposals in the literature that invoke homophony avoidance either as an active grammatical force or as a factor in historical change (Crosswhite 1999; Ichimura 2006; Blevins and Wedel 2009; Baerman 2011, among others). The proposals that invoke homophony avoidance in synchronic grammar often frame it as a principle of paradigmatic contrast: that is, a principle requiring inflectionally related forms to be distinct (see for instance Crosswhite 1999; Rebrus and Törkenczy 2005; Kenstowicz 2005; Ito and Mester 2004; Lubowicz 2007). These proposals are similar in spirit to proposals about maintenance of phonemic contrasts in phonology as a way of maintaining a maximally distinct inventory for different categories (Ní Chiosáin and Padgett 2001; Flemming 2002). However, the role of homophony in grammar is highly controversial, and proposals involving homophony avoidance are often met with skepticism. The main reasons for skepticism is that homophony is ubiquitous in languages, so an account appealing to paradigmatic contrast must also explain when homophony is tolerated and when it is not, and why. With respect to the specific problem at hand, one must explain why homophony is allowed elsewhere in the nominal paradigm of Russian.

5.1 Possible reasons for homophony avoidance in the Gen-Pl

Although inflectional identity abounds in the Russian nominal paradigm, many such instances can be analyzed as syncretism which on most accounts does not involve

positing distinct, phonologically homophonous lexical entries (for one account of syncretism in the Russian paradigm see Müller 2005). Nevertheless, several instances of inflectional identity in Russian could not be attributed to syncretism. Most problematic for us is the identity between the genitive singular and the nominative plural of many feminine nouns, which raises the question: why should homophony between Nom-Sg and Gen-Pl be avoided, but homophony between Gen-Sg and Nom-Pl allowed?

One reason might be the privileged status of the Nom-Sg as the semantically unmarked form and the citation form. If Nom-Sg indeed has a special status in the paradigm, we would expect that other inflectional forms besides the Gen-Pl should also avoid homophony with the Nom-Sg. This prediction is borne out. The only other form that is sometimes homophonous with the Nom-Sg is Acc-Sg due to a general syncretism between Nominative and Accusative. But even this syncretism displays a pattern of homophony avoidance: namely, Nominative is only homophonous with Accusative for inanimate nouns, that is nouns which are used in the Accusative more frequently than in the Nominative. This is abstractly summarized as follows:

(8)		anim	inanim
	Nom.	X	X
	Acc.	Y	X

This pattern is an example of differential object marking common in many languages, and some accounts of this phenomena link it to ambiguity avoidance: languages are more likely to overtly and uniquely mark direct objects on nouns that are more typically used as subjects (Comrie 1975). To state it somewhat differently, since inanimate nouns are more likely to be objects rather than subjects, they will not frequently occur in the nominative and, so there is little chance to confuse the accusative and nominative forms of these nouns (the reverse is true for animate nouns).

In the rest of this section, I will present some empirical facts supporting existence of homophony avoidance between the Nom-Sg and Gen-Pl in Russian.

5.2 A historical note

It is likely that homophony avoidance played a role in the evolution of the Gen-Pl inflection for a very long time. The Gen-Pl allomorph *-ov/* is a descendant of the genitive plural suffix of the so-called *-ŭ* stems, a declensional class in Proto-Slavic that consisted of merely 6 to 12 nouns. This declension class was already in the early stages of disappearing through a merger with the *o*-stem class by the time of the first records of Slavic (Kuznetsov 1953). Due to previous phonological changes, the *o*-class had identical Nom-Sg and Gen-Pl suffixes in contrast to other classes. However, as the result of the merger, this class adopted the genitive plural suffix *-ov/* of the *-ŭ* stems. The fact that *-ov/* was previously characteristic of so few nouns, but nevertheless spread relatively rapidly to a large class, is taken by several linguists as supporting the homophony avoidance hypothesis (Bulakhovskii 1952; Kuznetsov 1953; Janda 1996). For instance, Janda (1996) says "... the *o*-stems effectively acquired a second Gpl desinence that was longer (iconically matching plurality) and more distinctive (non-syncretic). It comes as no surprise that this variant was soon exploited as the Gpl ending of choice."

5.3 Nouns with different singular and plural stems

In this section I present some evidence that homophony avoidance still plays a role in the synchronic grammar of Russian. The homophony avoidance hypothesis makes predictions that distinguish it from other proposals based on the Nom-Sg form or inflectional/gender classes. In particular, nouns whose singular and plural stems are different from each other can avoid homophony even if they have identical Nom-Sg and Gen-Pl inflections. Any account which posits that nouns with the null Nom-Sg (or, alternatively, nouns ending in a consonant in the Nom-Sg or nouns of declensions I and III) should have an overt Gen-Pl, are not able to account for nouns with \emptyset in both Nom-Sg and Gen-Pl. There are several such sets of nouns in Russian. First, consider nouns with the *singulative* suffix *-in* in their singular stems (table (9)).

(9) **Nouns with the singulative suffix *-in* (in phonemic transcription)**

nom.sg.	gen.pl	gloss
grazdan-in- \emptyset	grazdan- \emptyset	citizen
dvorʲan-in- \emptyset	dvorʲan- \emptyset	aristocrat
selʲtʃan-in- \emptyset	selʲtʃan- \emptyset	villager
gospod-in- \emptyset	gospod- \emptyset	sir

Both the Nom-Sg and the Gen-Pl forms of these nouns have no overt inflection (and, so violate the generalization in (2)), but they are not identical and hence allowed. A prominent subclass of such nouns are certain nationality names such as *tatar-in* ‘Tatar,’ *bolgar-in* ‘Bulgarian,’ *moldavan-in* ‘Moldovan,’ *mogikan-in* ‘Mohican.’ All such nationality names have \emptyset in the Gen-Pl in contrast to other nationality names that do not contain *-in* in the singular (e.g., *amerikanets – amerikants-ov* ‘American,’ *tfuvaf – tfuvaf-ej* ‘Chuvash’). In this respect it is interesting to consider the behavior of a noun *gruzin* ‘Georgian.’ While this noun ends in a string *-in*, this string is not a singulative suffix but is part of the stem as it appears in all plural forms (cf. *gruzin-i* ‘Georgians, nom.pl.’). There is a strong analogical pull from other nationality names ending in *-in* that may lead speakers to choose the null Gen-Pl allomorph leading to *gruzin- \emptyset* . However, such a choice would create homophony with the Nom-Sg and is expected to be avoided. In fact, speakers feel uncertain about the Gen-Pl of this noun, and both forms, *gruzin-ov* and *gruzin*, are equally attested. Based on a Google search (in the summer of 2011), restricting the language to Russian and the phrase to “about Georgians” the number of hits for *pro gruzin* was 91,000 (56 %) and for *pro gruzin-ov* – 72,900 (44 %) (and many of the hits were discussions about what the “correct” Gen-Pl of this word is). Compare this with the distribution of “about Tatars”: *pro tatar* – 159,000 (97 %) vs. *pro tatar-ov* – 6,140 (3 %). The uncertainty that speakers experience with this noun supports the idea that they are sensitive to the homophony violation.

Another group of nouns with differences between singular and plural stems are some diminutives (mostly names for baby animals) that have the derivational suffix string *-on-ok* in the singular, and *-at-* in the plural stems. Just like the previous group of nouns, these nouns have no overt inflections in both Nom-Sg and Gen-Pl. But the two forms are not homophonous.

(10) **Nouns with different diminutive suffixes in the singular vs. plural**

nom.sg.	gen.pl.	gloss
ko ^{tʲ} -on-ok-∅	ko ^{tʲ} -at-∅	kitten
u ^{tʲ} -on-ok-∅	u ^{tʲ} -at-∅	duckling
te ^{lʲ} -on-ok-∅	te ^{lʲ} -at-∅	calf

A more complicated pattern of behavior is presented by nouns that have a collective suffix -j in the plural stems (see examples in (11)).

(11) **Masculine nouns with the collective suffix -j**

nom.sg.	nom.pl.	gen.pl	gloss
mu ^ʒ -∅	mu ^ʒ -j-á	mu ^ʒ é j-∅	'husband'
kn ^ʲ az ^ʲ -∅	kn ^ʲ az ^ʲ -j-á	kn ^ʲ az ^ʲ é j-∅	'prince'
drug-∅	druz ^ʲ -j-á	druz ^ʲ é j-∅	'friend'
brat-∅	brát ^ʲ -j-a	brát ^ʲ -j-ov	'brother'
stul-∅	stú ^{lʲ} -j-a	stú ^{lʲ} -j-ov	'chair'
kol-∅	kól ^ʲ -j-a	kól ^ʲ -j-ov	'stake'

Notice that the string /ej/ in the Gen-Pl forms of the first three nouns in (11) is technically not a Gen-Pl allomorph -ej/, but is part of the stem. This is apparent from the fact that the suffix -j appears in all plural cases, and so it must also be part of the stem in the Gen-Pl.¹⁰ The vowel 'e' that is shown in bold is the so-called "fleeting" vowel that alternates with zero in some morphemes (also known as the "yer" vowels in Russian). Yers are high lax vowels that were lost in most unstressed environments, but still surface in a restricted set of morphemes to break up complex codas or clusters that violate the Sonority Sequencing Principle (Yearley 1995; Gouskova 2012).

What is interesting about the examples above is that some of the nouns with the suffix -j take the overt allomorph -ov (unexpected under homophony hypothesis since -j already makes the Gen-Pl form distinct). I conjecture that the reason these nouns select the overt allomorph -ov is to avoid a coda cluster Cj which is illegal in Russian. Support for this claim comes from the fact that *brat* 'brother' used to have a vowel preceding the glide in the plural stem, *bratij-a* 'brothers.' Correspondingly, the genitive plural of this word was *bratij-∅* as we would expect (this form is still preserved in Modern Russian in reference to monks). The question now arises why in some Gen-Pl forms illegal word-final Cj clusters are repaired by fleeting vowels (the first three words in (11)), and in others by the selection of the overt Gen-Pl allomorph. The answer to this question may have something to do with stress. Note that there is a systematic difference between the two types of nouns: those that surface with a yer receive end-stress in the plural (i.e., stress on the suffix, or on the last vowel of the stem in the Gen-Pl), and those that do not—have stem stress. This observation requires further investigation as the connection between stress and yers is controversial. It is possible that yers were preserved in stressed environments, and later reanalyzed as part of the Gen-Pl suffix -ej/ (see footnote 10).

¹⁰However, it is entirely possible (and, perhaps, likely) that speakers analyze these nouns as containing the Gen-Pl suffix -ej/ as in nouns such as [noʒ] – [naʒ-ej] 'knife, nom.sg.-gen.pl.'

There are other nouns for which the selection of the overt Gen-Pl allomorph *-ov/* is motivated by the need to avoid an illegal Cj cluster. Recall, that nouns that have an overt Nom-Sg suffix are expected to have a null Gen-Pl. However, a few such nouns whose stem ends in a Cj cluster select the overt allomorph instead: /kril-ó/ – /kril-j-ov/, ‘wing’, /plátj-j-ó/ – /plátj-j-ov/ ‘dress’, /dérev-ó/ – /derévj-j-ov/ ‘tree’. The majority of such nouns, however, fix the illegal cluster with a fleeting (yer) vowel (e.g., /ozeréj-j-ó/ – /ozeréj-j-Ø/ ‘necklace’). Thus, there are two ways to avoid an illegal word-final cluster: realize a lexically-specific yer vowel (in morphemes that contain such a vowel), or choose an overt Gen-Pl allomorph. This is another example of a case in which the preference for Ø is overridden by a higher-ranked constraint. A few other such cases are discussed shortly.

5.4 Nouns frequent in the plural contexts

A final piece of evidence for homophony avoidance comes from another group of nouns that have Ø in both Nom-Sg and Gen-Pl. These are nouns that typically refer to certain military ranks (*soldat* ‘soldier,’ *dragun* ‘dragoon’),¹¹ objects that come in pairs (*glaz* ‘eye,’ *nosok* ‘sock,’ *botinok* ‘boot’), names of measurements (*gramm* ‘gramm,’ *voljt* ‘volt’), and in colloquial speech names of some fruit and vegetables (e.g., *pomidor* ‘tomato,’ *baklazhan* ‘eggplant’). In other words, these are nouns that in some or all of their uses have a collective meaning or occur more frequently in plural rather than singular contexts.¹²

A plausible hypothesis is that because the singular forms of these nouns are infrequent, homophony with the Nom-Sg poses less of a threat. Perhaps there is some threshold frequency that the Nom-Sg form must possess in order for homophony avoidance to kick in. Recall a similar pattern discussed earlier where accusative forms can be syncretic with the nominative just in case the noun is inanimate (and, hence, not a prototypical subject and does not frequently occur in the nominative).

The strongest evidence for this hypothesis comes from the diachronic study of names for units of measurement traced in an article by Graudina (1964). Graudina investigated units of measurement that were first officially adopted in Russia around 1880s (these are terms like *amper*, *volt*, *vat*, *gauss*, *maxwell* and so on). She analyzed the distribution of the genitive plurals of these terms in the only texts of that time where they appeared on a regular bases, the journal “Electricity.” Based on the sample of 3000 Gen-Pl forms over 30 years (1000 forms per decade), Graudina found that as these terms entered the vocabulary of the scientists in the 1880-s, they were predominantly used with the Gen-Pl allomorph *-ov/* (just as one would expect based on their Nom-Sg form): the average percentage of *-ov/* allomorphs from 1880 to 1890 was 96.5 %. However, in just 20 years time the bare stem (null Gen-Pl) became the dominant form, accounting for 91.1 % of all Gen-Pl forms from 1900 to 1910.

¹¹Shapiro (1971) even claims that for some nouns denoting military units different genitive plural allomorphs may be observed depending on whether the noun appears in the collective or individuated context (e.g., *polk dragun* ‘a regiment of dragoons’), but (e.g., *dvux dragun-ov* ‘two dragoons’). I did not find support for this claim in my search of the Russian National Corpus.

¹²For example, according to the National Russian Corpus plural forms of the nouns “eye,” “boot,” and “gramm” make up 90 %, 81 %, and 78 % of all inflectional forms of these nouns correspondingly.

Graudina notes that forms with Ø first appear mostly in advertisements, announcements, and oral reports. She attributes the quick pace of this historical change to the isolation of these terms from the prescriptive norms of grammarians during the period of their establishment in the broader vocabulary. By comparison, the older and more popularly used terms such as *gramm* are still showing variation between *-ov/* and *-Ø/*, with *-ov/* being the prescribed norm (and, as it is often the case, the less frequently used one). One explanation of these facts is that the speakers were initially preferring the overt Gen-Pl allomorph to avoid homophony with the borrowed form (the bare stem, which looks like the Nom-Sg of masculine nouns). However, over time as these lexemes came to be used mostly in the plural and became established as lexemes with a highly skewed frequency distribution, homophony avoidance became a non-issue. Graudina's study supports the idea that non-realization of the Gen-Pl is the default preference in Russian.

Overall, the homophony avoidance hypothesis in conjunction with morphological markedness can better account for the overt vs. null realizations of the Gen-Pl because it also explains the minority patterns presented in this section which appear exceptional under alternative analyses.

6 More interleaving: effects of stress and palatalization

There are two other phonological factors, plural stress and palatalization of the stem final consonant, that affect overtness of the Gen-Pl. These factors are often overlooked because their effects are largely masked by the more prominent pattern of homophony avoidance discussed in the previous section. As a result, only a small group of nouns shows these effects. Nevertheless, as I argue in this section, the influence of these two factors on the overtness of the Gen-Pl is real and becomes more visible when we look at the nouns that lack singular forms all together.

Before I go further, let me briefly explain the terms “soft-stem” and “hard-stem” as they will be used in the rest of this paper. It is well known that most Russian consonants come in pairs, palatalized (or *soft* in Slavic terminology) and plain (or *hard*). A few unpaired palatal consonants are also divided into hard and soft, with a caveat that the hard fricatives [ʃ] and [ʒ], which used to be soft but have hardened phonetically, continue to pattern with soft consonants morphologically (and are sometimes called “functionally” soft).¹³ I use the term “soft-stem” to refer to all soft and functionally soft consonants, and “hard-stem” to refer to the remaining consonants. I will not address the question of how to properly account for the split behavior of [ʃ] and [ʒ] in this paper.

¹³There are several examples of such morphological patterning. First, the inflectional class of some nouns depends of the quality of the stem-final consonant. In particular, third declension is comprised of nouns that are feminine and end in a soft consonant. Nouns ending in [ʃ] and [ʒ] also belong to this declension. Second, stems ending in these consonants behave like other soft-stems with respect to triggering the realization of unstressed /o/ as [ɪ] rather than [ə], although admittedly the two reduced versions of this vowel are often hard to distinguish from each other (cf. *góstʃ-im, múʒ-im* vs. *róst-əm*). Third, as will be discussed later in this paper, palatalization determines the choice of the overt genitive plural allomorphs. The overt allomorph *-ej/* always follows soft consonants and [ʃ], [ʒ], while the allomorph *-ov/* always follows hard consonants and [j] (which is phonologically soft). It is possible that the exceptional behavior of [j] in this case is due to a dissimilatory process (avoidance of a jVj sequence), but I will not pursue this possibility further.

6.1 Effects of stress and palatalization for nouns with overt Nom-Sg suffixes

As discussed in several sources, e.g., Brown and Hippisley (1994), Shvedova (1980), Popova (1987), a number of soft-stem nouns with an overt Nom-Sg select an overt Gen-Pl allomorph instead of the expected zero. These nouns can be divided into two groups. First are nouns that have sonority violating stem-final clusters (e.g., *kégʲlʲ-a* ‘bowling pin,’ *róxlʲ-a* ‘deadhead’ (colloq.), *rásprʲlʲ-a* ‘a fight/argument’). By selecting an overt allomorph these nouns avoid a sonority-rising word-final coda. Similar nouns with underlying yer vowels realize the yer instead (e.g., */vʲodr-ó/* – */vʲodʲór-Ø/*, ‘bucket’ nom.sg.-gen.pl.). So, these nouns can be put into the same category as nouns that select an overt Gen-Pl to avoid the phonotactically illegal Cj coda cluster. I will not further discuss or analyze this handful of nouns given the complicated and controversial nature of issues related to yer vowels.

The second group of exceptional soft-stem nouns are nouns that receive stress on the suffix in all oblique plural cases (e.g., *morʲ-á* – *morʲ-éj*, **mórlʲ*, ‘sea’ nom.pl.-gen.pl.). Stress in Russian is lexical and can differ between the singular and plural sub-paradigms. I will refer to nouns that receive stress on the inflectional suffix in the plural as “end-stressed.” The contrast between stem-stressed and end-stressed nouns of this sort is illustrated in (12) (the stressed morpheme is bolded).

(12) Portions of paradigms for the nouns *week* and *sea*

	week	sea
Nom.sg.	[nʲɪdʲélʲ -a]	[mórʲ -ɪ]
Nom.pl.	[nʲɪdʲélʲ -ɪ]	[marʲ- á]
Gen.pl.	[nʲɪdʲélʲ -Ø]	[marʲ- éj]
Dat.pl.	[nʲɪdʲélʲ -əɪ]	[marʲ- ám]
Instr.pl.	[nʲɪdʲélʲ -əɪɪ]	[marʲ- ámʲɪ]
Loc.pl.	[nʲɪdʲélʲ -əx]	[marʲ- áx]

Why would stress have an effect on the overtness of the Gen-Pl? If a noun requires stress to fall on the suffix, it needs an overt suffix to stress. If there is no such suffix, the stress has to retract to the stem breaking the uniformity of the stress pattern in the plural paradigm.

At this point I would like to emphasize that the effect of stress and avoidance of stem-final “bad” clusters shows up only in soft-stem nouns. Hard-stem nouns of the same type do not appear with an overt Gen-Pl suffix even if this creates bad codas (*/kóbr-a/* – */kóbr-Ø/* ‘cobra’ nom.sg.-gen.pl.), and even when it leads to a stress-shift (*/mest-á/* – */mést-Ø/* ‘place’, nom.pl.-gen.pl.). A number of hard-stem end-stressed nouns of this type resist shifting stress to the stem, but instead of selecting an overt allomorph *-ov/*, they have a paradigm gap in the Gen-Pl. I will return to these nouns in Sect. 7.4.

So, stress and the stem-final consonant can also affect the choice between the null and overt Gen-Pl allomorphs. Namely, soft-stem end-stressed nouns prefer an overt Gen-Pl allomorph. To get a better idea about the robustness of the dependency between the overtness of the Gen-Pl and properties of end-stress and soft-stem, consider the following counts from the lexical sample introduced earlier. Out of 72 soft-stem end-stressed nouns in the sample, 69 (95 %) have an overt Gen-Pl allomorph.

Out of 262 end-stressed nouns in the sample, 221 (84 %) have an overt allomorph. And out of 173 soft-stem nouns in the sample, 143 (83 %) have an overt allomorph. However, a vast majority of these nouns are already predicted to have an overt allomorph to avoid homophony (this is what I mean by saying that homophony avoidance masks the effects of palatalization and stress). If we look only at nouns that have an overt Nom-Sg suffix (and so are not in danger of violating homophony), then having either end-stress or soft-stem by itself is not sufficient to override the preference for \emptyset in the Gen-Pl. What about nouns that have all three of the properties (overt Nom-Sg suffix, end-stress, and soft-stem), that is, nouns like /mór¹-o/ in (12)? Unfortunately, the sample includes only 7 nouns of this type, which is not sufficient to reach any conclusions. For this reason, I searched all inflectional paradigms generated from Zaliznyak's morphological dictionary (available for download from http://www.speakrus.ru/dict/all_forms.rar) for such nouns.

After excluding duplicates, morphologically related nouns with the same stem, and nouns that have only hypothetical plural forms, I was left with 60 soft-stem end-stressed nouns with an overt suffix in the Nom-Sg. For 57 (95 %) of these nouns the listed Gen-Pl allomorph is *-ej/*, supporting the generalization presented in this section and going against the claim that nouns with an overt Nom-Sg always have a null Gen-Pl. The fact that many of the nouns in this group are low-frequency nouns (e.g., *stez¹-á* 'journey, road (poetic),' *kalantf-á* 'a tall fire tower' or metaphorically 'a tall person') and some are borrowed (e.g., *paranz-á* 'paranja') indicates that the stress-palatalization interaction discussed in this section is productive in Russian.

To sum up, having both soft-stem and end-stress in the plural can override the default preference for \emptyset in the Gen-Pl. This is another example of phonology trumping morphology. Additionally, the examination of the lexical sample showed that if one ignores the overtness of the Nom-Sg, there are independent strong correlations between overt Gen-Pl allomorphs and nouns with soft-stem or end-stress. These correlations may be noticed by speakers and used to predict the Gen-Pl for nouns that are not in danger of violating homophony. I evaluate this hypothesis in the next section by examining pluralia-tantum nouns.

6.2 A final piece of the puzzle: pluralia-tantum nouns

We can further test whether stress and palatalization play a role in the speaker's grammar by looking at the distribution of the Gen-Pl allomorphs in the pluralia-tantum nouns. For these nouns the overtness of the Gen-Pl allomorph cannot depend on the Nom-Sg because they do not have singular forms. Therefore, accounts of the Gen-Pl allomorphy that refer to properties of the Nom-Sg, gender, or noun-classes make no predictions for these nouns. On the other hand, an account in which morphological and phonological constraints of the sort introduced in the next section interact with one another, does make certain predictions. For example, based on everything we have seen so far, one might expect that pluralia-tantum nouns would overall prefer not to realize the Gen-Pl overtly (due to the high ranking of *GEN.PL), except for soft-stem end-stressed nouns or in cases when zero-realization leads to "bad" coda clusters as in the rest of the lexicon. Alternatively, it could be that pluralia-tantum nouns would show across-the-board effects of stress and palatalization given the statistical correlations discussed in the last section.

Table 3 Distribution of null vs. overt Gen-Pl allomorphs in 133 pluralia-tantum nouns

Stress	Stem-final C	Gen-Pl allomorph			Total
		Null	Overt	Null overt	
Stem	Hard	62 (75 %)	20 (24 %)	1 (1 %)	83
Stem	Soft	0 (0 %)	17 (81 %)	4 (9 %)	21
End	Hard	3 (20 %)	11 (73 %)	1 (7 %)	15
End	Soft	0 (0 %)	14 (100 %)	0 (0 %)	14

To evaluate these possibilities I compiled a list of nouns that were marked as lacking singular forms in Zaliznyak's on-line dictionary (Starostin 1998). Upon closer examination, some of these nouns were not genuine pluralia-tantum nouns because they either had less frequent singular forms (e.g., "handcuff – handcuffs"), or were polysemous with a noun that had a singular form with a somewhat different meaning (e.g., *osadok* 'sediment' sg. – *osadk-i* 'precipitation' pl., *chas* 'hour' sg. – *chas-i* 'clock' pl.). After excluding such nouns from the list, I was left with 133 genuine pluralia-tantum nouns. Table 3 shows the number of overt vs. null Gen-Pl allomorphs for these nouns as a function of stress-type and palatalization of stem-final consonant.

The distribution of Gen-Pl allomorphs in these nouns is less categorical than in the rest of the lexicon. Nevertheless, a clear tendency can be observed: if a noun has a soft-stem or end-stress, it will most likely have an overt Gen-Pl allomorph. If a noun has neither soft-stem, nor end-stress, the preferred option is \emptyset in the Gen-Pl (although there are still quite a few nouns that select *-/ov/*).¹⁴ A logistic regression on the above proportion data confirms that both stress and stem-type are highly significant predictors of the proportion of overt Gen-Pl allomorphs. The odds of a null Gen-Pl increase by a factor of 10 when stress falls on the stem rather than the ending (coeff. = 2.3, $z = 3.7$, $p < 0.005$), and by a factor of 20 when the stem-final consonant is hard rather than soft (coeff. = 2.9, $z = 4.82$, $p < 0.001$).

Interestingly, this pattern of allomorph distribution is similar to the pattern I found in a wug-test with native speakers (Pertsova 2004). In that test speakers were presented visually and auditorily with nonce nouns embedded in paragraphs (in the Nom-Sg and an oblique plural form). The task was to provide a Gen-Pl form by filling-in the blank in the last sentence. Half of the trials were distractors in which forms other than Gen-Pl were solicited. Overall, I found a main effect of stress and a main effect of palatalization that was similar to the above pluralia-tantum nouns. In other words, end-stressed or soft-stem nouns were used more frequently with an overt allomorph than expected even if a noun had an overt Nom-Sg suffix. Additionally, and again similarly to the pluralia-tantum nouns above, I found a disproportionate preference for \emptyset in stem-stressed hard-stem nouns with \emptyset in the Nom-Sg. Perhaps, the speakers treated nonce nouns similarly to pluralia-tantum nouns because such nouns lacked firmly established lexical entries and, in particular, an established frequency profile of singular and plural wordforms.

¹⁴Two such nouns with *-/ov/* could be explained on the grounds that they had stems ending in an illegal Cj cluster.

Overall, pluralia-tantum nouns are different from the rest of the lexicon in the following ways. First, they show across-the-board effects of stress and palatalization, instead of an interaction between the two, like the rest of the nouns. For example, soft-stem stem-stressed nouns like *nedél'-a* 'week' do not overtly realize the Gen-PI morpheme, while similar plurale tantum nouns like *kachél'-i* do. Second, nouns that lack both of these properties (soft-stem and end-stress) prefer not to realize the Gen-PI overtly (similar to nouns discussed in Sect. 5.4 whose plural forms are significantly more frequent than the singular forms). While the second difference is easy to explain—it is due to the fact that homophony avoidance does not present a problem for these nouns, the first difference is more challenging to account for. One possible explanation, presented in the next section, provides additional support for the idea of morphological markedness.

7 An account of the data in serial OT with Optimal Interleaving

7.1 Preliminaries

In this section I provide an account for the distribution of the Gen-PI allomorphs in Russian in the framework briefly sketched in the introduction. Recall that the input to the grammar consists of syntactic representations. In this case, I assume that the input is a structure like $[N\text{-root}_x [p]; \text{gen}]$, where x is a gender feature specific to the root. Notice that the syntactic structures are always fully specified, while lexical entries may be underspecified.

The candidates are derivation chains which include lexical items to be inserted into the morpho-syntactic structures and their pronunciations. A candidate may contain any combination of stems and affixes from the lexicon, including combinations in which some or all morphemes are not overtly realized (of course, most such candidates will be harmonically bounded by the morphologically faithful candidates).

The following are the lexical entries for the Gen-PI exponents:

- (13) a. $[\text{Gen PI}] \leftrightarrow \text{-ej/}$
 b. $[\text{Gen PI}] \leftrightarrow \text{-ov/}$ ¹⁵

Recall that the choice between the allomorphs (as well as other competitors including zero-realization) is decided by the grammar consisting of morphological and phonological constraints, namely, morphological faithfulness and markedness constraints, phonological constraints, and Output-Output faithfulness-type constraints. The latter constraints have been widely used to capture paradigm uniformity and paradigm contrast effects (Sturgeon 2003; Hall and Scott 2007; Albright 2008; Steriade 2008). Such constraints presuppose that in addition to the morphemes, the lexicon also contains some fully inflected forms, the “inflectional bases,” which can be referenced in evaluation of inflectionally related forms. OO-constraints have been

¹⁵It is possible that -ov/ should also be specified as $[-\text{fem}]$ since no feminine noun in the lexicon has -ov/ in the Gen-PI. Speakers could notice this fact and lexically represent it. However, since my account will not be greatly affected by positing such a feature, I will not pursue this possibility here.

proposed before for Russian to account for various facts related to stress (Kenstowicz 1997; Butska 2002; Yanovich and Steriade 2010). To see the range of irregularities for which it might be helpful to assume OO-correspondence consider the paradigm of the noun ‘devil’ below.

(14) Full paradigm of the noun *tʃórt* ‘devil’

	Singular	Plural
Nom.	tʃórt	tʃértʲ-ɪ
Acc.	tʃórt-a	tʃərtʲ-éj
Gen.	tʃórt-a	tʃərtʲ-éj
Dat.	tʃórt-u	tʃərtʲ-ám
Instr.	tʃórt-əm	tʃərtʲ-ámɪ
Loc.	tʃórtʲ-ɪ	tʃərtʲ-áx

Notice that the plural forms of “devil” have a palatalized stem-final consonant, while the singular forms do not. The stress in the plural falls on the inflectional suffix (except for the nominative), while in the singular it falls on the stem. The stressed stem vowel in the Nom-Pl is different from the singular stem-stressed forms. There is no way to predict all of these alternations from a single UR or even from a single surface form. Although such nouns combining several irregular features are overall rare—frequent nouns tend to have one or the other irregularity of the sort illustrated above (Corbett et al. 2001), and many of them are split along the lines of the singular/plural distinction, with greater uniformity within each of these subparadigms than across. Therefore, I assume two inflectional bases in Russian: a singular and a plural base. For simplicity, I will assume that the plural base is the semantically unmarked and frequent Nominative form. A typical OO-Correspondence constraint will relate an output form with its *primary* base, that is, the base that is most featurally similar to it. Nom-Pl is the primary base for other plural forms. The constraint that will reference this base is the stress constraint below. It is an abbreviation for IDENT(STRESS)-IO and IDENT(STRESS)-OO:

- (15) IDENT(STRESS) (ID(STR)): incur one violation for each syllable in the UR or in the primary inflectional base that is stressed in the input but unstressed in the output or vice versa.

I am assuming that nouns with fixed stem-stress have the stress encoded in the UR. For nouns with mobile stress (different stress pattern in the singular vs. plural) the stress is determined by the primary inflectional base.¹⁶

Another OO-constraint that will be used in the analysis is special in that it references the citation form of the paradigm, the Nom-Sg:

¹⁶A minority of nouns have further stress alternations within the singular or plural subparadigm. I assume that such nouns are exceptional.

- (16) CONTRAST-CITATION(CONC): incur a violation if an output form A is segmentally identical to the citation form of the lexeme that A belongs to.

According to this constraint, the homophony avoidance in Russian will be restricted to the Nom-Sg.

7.2 The dependency between the Nom-Sg and the Gen-Pl through constraint interaction

For now I continue to ignore the question of which of the two overt Gen-Pl allomorphs is chosen (this question will be resolved in Sect. 7.3). So, only one overt allomorph appears in each tableau. The input line represents the stage in the derivation in which the stem, but not the Gen-Pl morpheme, has already been spelled out. The Nom-Sg form is provided in the tableau's title. I ignore many of the phonetic details (recall, that in the serial model assumed here, the URs are inserted first and the phonetic forms are computed through a sequence of operations that apply to the URs at different steps in the derivation).

The following ranking captures the fact that ordinarily the Gen-Pl is not overtly realized:

- (17) *vin-ó* 'wine,' nom.sg.neut

/vin/√ <i>wine.neut.</i> + gen.pl.	*GEN.PL.	M-MAX
a. $\text{vin-}\emptyset$		*
b. <i>vin-ov</i> _{Gen.Pl.}	*!	

However, a violation of the CONC constraint forces the appearance of an overt allomorph:

- (18) *trón-Ø* 'throne,' nom.sg.masc.

/tron/√ <i>throne.masc.</i> + gen.pl.	CONC	*GEN.PL.	M-MAX
a. <i>tron-Ø</i>	*!		*
b. tron-ov _{Gen.Pl.}		*	

CONC is not violated in nouns with distinct singular and plural stems;

- (19) *utʲónok-Ø* 'duckling,' nom.sg.masc.; *utʲát-a* nom.pl.

/utʲát/√ <i>duckling.pl.</i> + gen.pl.	CONC	*GEN.PL.	MAX-M
a. $\text{utʲát-}\emptyset$			*
b. <i>utʲát-ov</i> _{Gen.Pl.}		*!	

This ranking shows a trade-off between morphological markedness and an OO-Correspondence constraint creating complementary distribution of zeros in the Nom-Sg and Gen-Pl for a large number of Russian nouns.

7.2.1 Analysis of stress and palatalization

Recall that while majority of nouns with an overt Nom-Sg (i.e., feminine and neuter nouns ending in -a or -o), do not overtly mark the Gen-Pl (cf. tableau (17)), some such nouns prefer the overt allomorph -ej/: namely, soft-stem end-stressed nouns. Thus, one challenge is to account for the effects of stress and palatalization for this group of nouns. Additionally, we saw that pluralia-tantum nouns can have an overt allomorph when they possess just one of those properties, soft-stem or end-stress. So, another challenge is to account for the difference between pluralia-tantum nouns and the rest of the lexicon. Both of these goals are accomplished with help of an additional, more specific morphological markedness constraint *GEN.PL./-MASC. prohibiting realization of the Gen-Pl morpheme on feminine and neuter nouns (which are more marked than masculine nouns with respect to gender). Pluralia-tantum nouns lack gender features altogether since there are no gender distinctions in the plural. This fact is taken to be key in accounting for the difference between regular and pluralia-tantum nouns. The more specific morphological markedness constraint is introduced below.

- (20) *GEN.PL./-MASC.: assign a violation to an output form which contains a single lexical entry realizing the features [Gen.Pl.] in the presence of a stem that is marked either as [fem] or [neut]

Note that this morphological markedness constraint is different from the constraints we have considered so far because it makes reference to context features. Such constraints are independently needed to account for cases in which a morpheme is realized differently from its standard realization in presence of certain other marked morphemes. One example is the so-called “spurious se” in Spanish where the Dative clitic *lo* is replaced by the reflexive 3p. clitic *se* (assumed to be the elsewhere clitic) if it is followed by an Accusative clitic. Thus, typically morphological markedness constraints militate against realization of marked combinations of morphological features by a single morpheme, but occasionally they also militate against a sequence of marked morphemes, which can be captured by constraints with environments.

Returning to Russian, let us consider pluralia-tantum genderless nouns for which the more specific markedness constraint will be inactive. When such nouns are stem-stressed and have a hard consonant at the end of the stem, they prefer the default non-realization of the Gen-Pl:

- (21) *bús-i* ‘bead necklace,’ nom.pl. (no singular forms)

/bús/ $\sqrt{\text{beads.pl.} + \text{gen.pl.}}$	*GEN.PL./-MASC.	*GEN.PL.	MAX-M
a. $\text{bús-}\emptyset$			*
b. <i>bús-OV</i> _{Gen.Pl.}		*!	

However, if a pluralia-tantum noun is end-stressed, it selects an overt Gen-Pl allomorph (see Sect. 6.2). This is attributed to the relatively high ranking of IDENT(STRESS):

(22) *dux-í* ‘perfume,’ nom.pl. (no singular forms)

/dux/√ <i>perfume</i> +gen.pl.	*GEN.PL./-MASC.	STRESS	ID(STR)	*GEN.PL.
a. \mathbb{E}^{S} dux-óv _{Gen.Pl.}				*
b. dux-Ø		*!		
c. dúx-Ø			*!	

Soft-stem pluralia-tantum nouns also prefer an overt allomorph but for a different reason: to avoid word-final soft consonants. The constraint ensuring this ban is a positional markedness constraint against word-final [-back] consonants (due to perceptual disadvantage of the palatalization contrast in this position, Kochetov 2002).

(23) *C[-BACK]# (C^J#): assign a violation for an output that contains a [-back] consonant at the end of a word.

Here’s an example of a soft-stem pluralia-tantum noun:

(24) *katféj-í* ‘swing(s),’ nom.pl. (no singular forms)

/katféj/√ <i>swings</i> +gen.pl.	*GEN.PL./-MASC.	ID(STR)	*C ^J #	*GEN.PL.
a. \mathbb{E}^{S} katféj-éj _{Gen.Pl.}				*
b. katféj-Ø			*!	

We now turn to minimally different non pluralia-tantum nouns for which the more specific markedness constraint GEN.PL./-MASC. is active. Recall, that nouns of this type typically prefer not to realize the Gen-Pl (unless they have both soft stem and end-stress). This is explained by the fact that an overt Gen-Pl allomorph for these nouns would lead to violations of the more specific, higher-ranked morphological markedness constraint which is irrelevant for the pluralia tantum-nouns.

(25) *nedéj-a* ‘week,’ nom.sg.fem. (fixed stem-stress)

/nedéj/√ <i>week.fem</i> +gen.pl.	*GEN.PL./-MASC.	ID(STR)	*C ^J #	*GEN.PL.
a. nedéj-éj _{Gen.Pl.}	*!			*!
b. \mathbb{E}^{S} nedéj-Ø			*	

Only soft-stem end-stressed nouns of this type have an overt Gen-Pl allomorph:

(26) *stéz-á* ‘road,’ (poetic) nom.sg.fem. (fixed end-stress)

/stéz/√ <i>road.fem.</i> +gen.pl.	STRESS	*GEN.PL./-MASC.	ID(STR)	*C ^J #	*GEN.PL.
a. \mathbb{E}^{S} stéz-éj _{Gen.Pl.}		*			*
b. stéz-Ø			*	*!	
c. stéz-Ø	*!			*	

Notice that ID(STR) and *GEN.PL./-MASC. are crucially unranked, because if the latter constraint outranked the former we would predict that having end-stress always leads to overt realization of the Gen-Pl, which is not true. For example, consider a hard-stem end-stress noun below:

(27) *mést-o* ‘place,’ nom.sg. neut. (end-stress in pl: nom.pl. = *mest-á*)

/mést/√ <i>place.neut.</i> +gen.pl.	STRESS	*GEN.PL./-MASC.	ID(STR)	*C ^J #	*GEN.PL.
a. <i>mest-óv</i> _{Gen.Pl.}		*			*!
b. <i>mést-Ø</i>			*		
c. <i>mest-Ø</i>	*!				

The tie between the unranked constraints is decided by the next highest applicable constraint, which is *GEN.PL for hard-stem nouns, and *C^J# for soft-stem nouns (see tableau (26)). So, the above ranking provides a unified explanation for the asymmetry between hard- and soft-stem nouns discussed in Sect. 6.1 and the lack of this asymmetry in the pluralia-tantum nouns due to the inactivity of the *GEN.PL./-MASC. constraint. Additionally, this proposal further demonstrates that morphemes in the more marked (feminine and neuter) environments are more likely to be deleted.

Finally, CONC has to be ranked above *GEN.PL./-MASC. since feminine nouns with Ø in the Nom-Sg prefer an overt Gen-Pl allomorph to avoid homophony (just like the masculine nouns in (18)):

(28) *mól^j-Ø* ‘moth,’ nom.sg.fem. (fixed stem-stress)

/mól ^j /√ <i>moth.fem</i> +gen.pl.	CONC	*GEN.PL.-MASC.	*C ^J #	*GEN.PL.
a. <i>mól^j-ej</i> _{Gen.Pl.}		*		*
b. <i>mól^j-Ø</i>	*!		*	

The above ranking also predicts that masculine nouns which allow Ø in both Nom-Sg and Gen-Pl should all be hard-stem and stem-stressed nouns. This is because in the absence of CONC violations, the effects of IDENT(STRESS) and *C^J# become visible (as they do in the pluralia-tantum nouns). This prediction is largely borne out: none of the nouns with Ø in both the Nom-Sg and Gen-Pl discussed in Sect. 5 were soft-stem nouns, and only a few high-frequency nouns were end-stressed nouns. If we look just at the colloquial names of fruit and vegetables, which are more likely to show the productive trend, we can see the effects of stress. All names of fruit and vegetables that can appear with Ø in the Gen-Pl in colloquial speech are stem-stressed (e.g., *pomidór* ‘tomato,’ *apel^jsín* ‘orange,’ *baklazhán* ‘eggplant’), but not end-stressed (e.g., *ogurts-óv*, **oguréts* ‘cucumber’ gen.pl., *kabachk-óv*, **kabachók* ‘squash’).

7.3 Distribution of the overt allomorphs

So far, I have explained when the Gen-Pl is realized overtly and when it is not. In this section, I extend the analysis to predict which of the two overt allomorphs is chosen. The choice between *-ov/* and *-ej/* is phonologically determined. It depends on the

preceding consonant: *-ej/* appears after soft consonants as well as [ʃ], [ʒ], but not [j] (see beginning of Sect. 6 and footnote 13), while *-ov/* appears elsewhere:

- (29) Examples of genitive plurals of soft-stem vs. hard-stem nouns
- | soft-stem nouns | hard-stem nouns |
|---------------------|----------------------|
| [mʲɪ-ɛj] ‘mouse’ | [kráb-ɔf] ‘crab’ |
| [tʲimʲ-ɛj] ‘shadow’ | [stal-ɔf] ‘table’ |
| [ugʲ-ɛj] ‘coals’ | [slan-ɔf] ‘elephant’ |

I analyze this restriction as a preference for sequences of consonants and vowels to agree for the feature [back]. This type of agreement held for all consonant-vowel sequences in Old Russian. In Modern Russian, sequences of hard consonants before front vowels are still illegal in native words, while sequences of soft consonants before back vowels are somewhat restricted, but possible. Thus, it is best to analyze this agreement pattern as two separate phonotactic constraints as explained below. The appearance of *-ov/* rather than *-ej/* after hard-stems is due to an active phonotactic restriction:

- (30) *C_[+back]V_[-back](*CE): incur one violation for each sequence of a hard consonant followed by a front vowel.

Several repair strategies are employed across morpheme and word boundaries to fix such sequences (Blumenfeld 2002). For example, consonants undergo palatalization when preceding other case suffixes beginning with /e/ (e.g. [kót] – [katʲ-ɛ], ‘cat,’ nom.sg.-loc.sg). This means that the above phonotactic constraint is ranked higher than IDENT(BACK).

- (31) *trón* ‘throne,’ nom.sg.masc. (fixed stem-stress)

/trón/√ <i>throne.m.</i> +gen.pl.	CONC	*CE	ID(BACK)	*GEN.PL.
a. [☞] trón-ov _{Gen.Pl.}				*
b. trón-∅	*!			
c. trón-ej _{Gen.Pl.}		*!		*

The choice of *-ej/* over *-ov/* after soft-stems is motivated by a similar constraint prohibiting sequences of [–back] consonants followed by [+back] vowels. The difference is that this constraint is not active elsewhere in Russian (although some specific sequences of palatalized consonants followed by back vowels are still restricted). So, avoidance of the [–back][+back] sequences in the Gen-Pl is an example of the Emergence of the Unmarked effect (McCarthy and Prince 1994).

- (32) *C_[-back]V_[+back](*C^JO): incur one violation for each sequence of a soft consonant followed by a back vowel.

This constraint must be ranked lower than ID(BACK) since [–back][+back] sequences are attested. In addition, the choice of the Gen-Pl allomorph with respect to this constraint is partially opaque. Namely, due to vowel reduction (and final obstruent devoicing) unstressed *-ov/* is realized as [ɔf], which does not contain a

[+back] vowel on the surface, and hence should be able to appear after soft consonants. One possibility for avoiding this problem is to say that the relevant distinction should be between [+front] and [−front] vowels, so that the illegal sequence is [−back][+front]. But such an assumption is not necessary since the serial nature of the model already predicts this opacity as an absence of a lookahead effect. Namely, vowel reduction in the suffix must occur after the suffix has been selected, and the choice of how to realize Gen-Pl cannot “look ahead” to the process of vowel reduction. Therefore, the phonotactic constraint above is evaluated with respect to the unreduced vowel of the allomorphs. The tableau below demonstrates this stage of the derivation.

(33) *mazʲ*-Ø ‘lotion, smear,’ nom.sg.fem. (fixed stem-stress)

<i>/máʒʲ/</i> / <i>√smear.f.</i> +gen.pl.	CONC	ID(BACK)	*CʲO	*GEN.PL.
a. $\text{máʒʲ-ej}_{Gen.Pl.}$				*
b. <i>máʒʲ</i> -Ø	*!			
c. <i>máʒʲ-ov</i> _{Gen.Pl.}			*!	*

So, we see that phonological factors are relevant not only for determining overt-ness of the Gen-Pl but also for deciding between the two overt allomorphs. Inter-ranking of morphological and phonological constraints allows for a unified explanation of both types of generalizations found in the Gen-Pl: those affecting the overt-ness of the morpheme, and those affecting the choice between the two overt allomorphs.

7.4 Paradigm gaps

Finally, I briefly touch on the nouns that have paradigm gaps in the Gen-Pl. These are almost exclusively feminine nouns ending in *-a* in the Nom-Sg (plus one neuter noun *dn-ó* ‘bottom’) that are end-stressed throughout the paradigm and that have a hard stem. The current account predicts that these nouns should have no overt Gen-Pl (see tableau (27)).

All nouns with gaps have a fixed end-stress, which is rare for feminine and neuter nouns. So, one possible explanation is that the paucity of evidence for this type of nouns is responsible for the gaps. Explanations of this sort have been proposed by Albright (2007) and Yang et al. (2012). Although the exact details of these two proposals differ somewhat, the crucial assumption is that speakers’ generalizations are restricted to very specific lexical subclasses. What this means for Russian is that we would have to assume that when learning the Gen-Pl allomorphy speakers consider nouns of different genders and stress-patterns separately. Crucially, they would have to not generalize (or not rely on generalizations) across similar classes of nouns that exhibit the same relevant behavior. For instance, even though all feminine hard-stem nouns behave in the same way with respect to the realization of the Gen-Pl, we would have to assume that speakers still consider stem-stressed nouns separately from end-stressed nouns and separately from nouns with different stress in the singular and plural.

To test the hypothesis that paucity of the data within a specific lexical class leads to gaps, I searched Zaliznyak's list of inflectional paradigms mentioned earlier for feminine nouns with fixed end-stress and hard-stem. After excluding from the search really rare nouns (those that do not appear in the Russian National Corpus of 6 million words) as well as nouns whose plural forms were marked as "hypothetical," I was left with 68 nouns. According to Zaliznyak's morphological dictionary, 35 of these 68 nouns have gaps in the Gen-Pl. That is, about half of the nouns of this type (33 nouns) do not have gaps, and consistently appear with no Gen-Pl suffix as expected (e.g., *bulav-á* – *buláv* 'club/mace,' *gr^lad-á* – *gr^lád* 'ridge'). What distinguishes the 33 nouns without gaps is that almost all of them have a related wordform in their extended morphological family with stress falling on the same syllable as it does in the Gen-Pl (cf. the derivationally related forms of the two nouns above *buláv-k-a*, *gr^lád-k-a*). On the other hand, nouns with gaps typically lack stem-stressed allomorphs (with very few exceptions, most of which have an alternative explanation). I have previously accounted for this pattern by positing an inviolable *lexical* OO-constraint IDENT(STEMSTRESS)_{Lex} in the separate filter-like component of grammar following Orgun and Sprouse (1999).

Lexical OO-constraints can be satisfied if any of the *listed* forms provide a correspondent for the property in question (Steriade 1999, 2008). In this case, the relevant property is position of stress: if there is at least one related form in which stress falls on the last syllable of the stem (i.e., the expected location of stress if the Gen-Pl was null), no gaps arise. While a full discussion of this analysis and its merits is beyond the scope of this paper, I make just a few observations here. Given the serial architecture of the grammar assumed in this paper, there is a natural way to implement the idea of a filter proposed in the Orgun and Sprouse paper. One can assume that at an earlier stage in the derivation the bare stem is selected as a winner according to the constraints discussed in this paper, but at a later stage after all the other processes have applied, the IDENT(STEMSTRESS)_{Lex} constraint rules out the only surviving competitor(s) for lexemes that have no stem-stressed allomorphs anywhere in the extended morphological family. We would have to assume that such lexical constraints apply only to fully derived words. This type of analysis can be interpreted as a kind of extreme *lexical conservatism* (using the term of Steriade), where speakers feel uncomfortable producing words with unattested stress-patterns. At the same time, speakers might be less conservative with novel "wug" words which do not have established lexical entries. Crucially, not all phonological operations are subject to lexical conservatism: certain processes, especially those that are grounded in phonetics (e.g., flapping, vowel-reduction) seem to be automatic and are blind to morphology. It's possible that speakers may be more conservative with respect to properties that are lexically arbitrary and specific (such as stress in Russian), rather than those that pertain to alternations occurring across many lexemes. Of course, lexical conservatism can be overcome by memorizing or listing a form in question, and so we would expect that gaps should mainly occur in low-frequency words and in paradigm cells that do not serve as bases. For instance, a few nouns in Russian also involve an idiosyncratic stress-shift to the stem in the Nom-Sg (since masculine nouns do not have an overt Nom-Sg suffix), but no gaps exist in the Nom-Sg which is a citation form and has often been proposed to be one of the bases for Russian. Also as expected, most nouns

with Gen-Pl gaps are low-frequency nouns. Only one of them is relatively frequent, *mechta* ‘dream, hope’ (58 ipm), and the gap in this noun is already on its way out, as the Gen-Pl form *mécht* is increasingly more accepted. For instance, it appears 14 times in the newspaper subcorpus of RNC from 2000 to 2013, and only once in the same subcorpus from 1970 to 2000.

8 Alternative accounts

8.1 Inflectional classes

Can the Gen-Pl allomorphy be accounted for more straightforwardly by referencing inflectional classes? An account of this sort has been previously suggested in Brown and Hippisley (1994). However, even this account (formulated in the Network Morphology framework using the language DATR) involved a mixture of phonological and morphological conditioning. One can informally summarize it as follows: nouns of declensions III and Ia select an overt Gen-Pl allomorph (-ej/ or -ov/ depending on the palatalization of the stem-final consonant), and nouns of declension II and Ib select a null allomorph.¹⁷ (The declensional classes of Russian were summarized in Table 1.) Notice, however, that the only other indication for grouping declensions III and Ia, on the one hand, and II and Ib, on the other hand, is that they have similar Nom-Sg forms: the former two declensions have no overt Nom-Sg inflection, while the latter two have a vowel suffix in the Nom-Sg. Thus, this account seems to be a notational variant of Jakobson’s generalization. If declensions II and Ib indeed patterned together in opposition to III and Ia, we might expect that this opposition would show up in some other case in the plural or singular, but it does not. In fact, no inflectional distinctions show up in any other oblique plural forms, and in the singular, it is classes Ia and Ib that are almost identical and stand in opposition to classes II and III. Thus, while a declension class analysis of this sort is in principle possible, it is no more “natural,” nor more explanatory than positing a direct dependency between the Nom-Sg and the Gen-Pl forms.

This discussion raises an important question of what should count as an inflectional class to begin with. For instance, if we assume enough inflectional classes so that any word or a group of words that differs in any way from other words even in just one inflectional form is grouped into its own class, then any instance of allomorphy can be “explained” as inflectional class allomorphy. But this would lead to a highly redundant system that misses many generalizations, a position many linguists find uncomfortable. This is evident from several theoretical proposals for restricting proliferation of inflectional classes and inter-class syncretism, such as Carstairs (1994)’s No Blur Principle or Noyer (2004)’s constraint on inter-class syncretism. The key generalization that we would like to explain in this case is: why inflectional classes whose Nom-Sg forms are null have an overt Gen-Pl allomorph, and vice versa? I have

¹⁷Brown and Hippisley (1994) also include an additional override into their framework to account for the stress-palatalization interaction discussed in Sect. 6.1.

suggested that this is due to a tradeoff between two independently motivated grammatical forces, homophony avoidance with the citation form and simplification of morphologically marked structures.

8.2 Subcategorization analysis

In another alternative account of the Russian Gen-Pl, Bailyn and Nevins (2008) propose to treat this allomorphy in terms of purely phonological subcategorization restrictions on the allomorphs. They propose that the Gen-Pl allomorphs are subcategorized for different types of stems, depending on the phonological properties of the last stem-segment. In order for such analysis to work, the authors assume that what is traditionally thought of as the Nom-Sg suffixes are actually theme-vowels which are part of the stem. Given this assumption, the conditioning factor for the allomorphy is the stem-final segment with a three way distinction between a vowel, soft consonant, and hard consonant. The proposed lexical entries are summarized below.

- (34) Lexical Entries for the Gen-Pl allomorphs (from Bailyn and Nevins 2008)
- a. *-ej/*: after stems with the null theme-vowel, ending in C^j
 - b. \emptyset (yer): after stems with a vocalic theme-vowel (*-a* or *-o*)
 - c. *-ov/*: elsewhere

Crucially, the conditioning property cannot be directly “read from” the plural stem due to a general phonological rule that deletes all theme-vowels before other vowels (and all nominal suffixes begin with vowels). Thus, on the surface the theme-vowels are only visible in the Nom-Sg. In addition, the reason why theme-vowels do not show up in the Gen-Pl of nouns with the \emptyset allomorph, is that the \emptyset is really a yer vowel, which first triggers the deletion of the theme-vowel and then deletes itself. One of the main problems of this analysis is that it is highly opaque. It posits elements that *never* surface, namely the genitive plural allomorph yer which is never realized (unlike other yers in Russian which could be learned from vowel-zero alternations). It also posits theme-vowels that almost never surface, except in the Nom-Sg. Another problem is that this analysis assumes an implausible behavior on the part of the learners: why would a learner decide that the vowels which show up only in one case in the same position as case suffixes are in fact not case suffixes, but are part of the stem?

In general, any subcategorization analysis would have a hard time explaining the distribution of allomorphs that appear in environments which do not constitute a natural class, or a complement of a natural class. This is exactly the kind of situation we find in the Russian Gen-Pl. For instance, assuming that *- \emptyset /* is subcategorized for declensions II and IV, or nouns that end in *-a* or *-o* in the Nom-Sg would not be sufficient as we have seen that some declension I nouns and many pluralia-tantum nouns also occur with \emptyset . One also cannot assume that *- \emptyset /* is the elsewhere allomorph chosen whenever the conditions for *-ov/* and *-ej/* are not met. This is because there is no homogeneous set of conditions that can describe the distribution of *-ov/* and *-ej/*: *-ov/* occurs mostly with hard-stem declension I (masculine) nouns, but also with end-stressed hard-stem pluralia-tantum nouns, and a few neuter nouns; *-ej/* almost always occurs with soft-stem nouns, except for soft-stem stem-stressed declension

II and IV nouns. A subcategorization account would either have to use disjunctive statements or posit a lot of exceptions. Secondly, as it has been previously observed, subcategorization accounts of optimizing allomorphy suffer from a duplication problem: they are forced to encode the same markedness restrictions twice, once in the morpho-lexical component of the grammar, and once in the phonological component. For example, as we have seen, the preference for sequences of consonants and vowels to agree for the feature [back] in Russian is responsible for the choice between *-ov/* and *-ej/* in the Gen-Pl. This preference is part of the phonological grammar of Russian because of the active phonotactic restriction against front vowels following plain consonants. Similarly, there are restrictions against Cj coda clusters, and preferences for uniform stress-patterns within singular and plural paradigms that have to be independently encoded in the phonological component of grammar because they have effects that go beyond the Gen-Pl.

9 Conclusion

This paper argues that Russian Gen-Pl allomorphy is best accounted for in a model in which morphological spell-out is serially interleaved with phonological computation, and in which there can be tradeoffs between various factors that are typically assumed to reside in separate grammatical components. These factors include morphological markedness and faithfulness, paradigm-uniformity and paradigm-contrast, as well as regular phonological constraints. Competition among these factors at different stages in the derivation determines which lexical items are chosen to realize morpho-syntactic features and how they are pronounced. Such a model provides an explanation for several relatively minor but regular patterns, which would have to be assumed exceptional on most other accounts. The purely morphological accounts (e.g., in terms of inflectional classes) still have to reference phonological properties of the stems to account for the choice between the two overt allomorphs *-ej/* and *-ov/*. Purely phonological accounts, like Bailyn and Nevins (2008), end up proposing highly opaque phonology that essentially codes a morphological distinction between nouns with overt or null Nom-Sg suffixes.

One of the key assumptions made in this paper is that the grammar includes morphological markedness constraints. This assumption makes specific predictions about non-realization of morphological features. In the most typical case, non-realization (or zero-realization) of morphological features happens when they are least marked. Secondly, such non-realization can become optimal in the most marked contexts due to high ranking of morphological markedness constraints. Thus, we would not expect to find many paradigms in which morphological zeros occurred in the intermediately marked, but not in the more marked or less marked contexts (e.g., paradigms in which singular and dual were overtly marked, but plural was zero-marked). Another prediction is that only certain kinds of phonological constraints can either block or condition the appearance of zeros: these are constraints that would be violated only by zero-marked forms. In the Russian case described here we saw several examples of blocking: for example, avoidance of word-final soft consonants blocks the bare-stem candidates ending in a soft consonant. In examples from Iscrulescu mentioned

in Sect. 4.1 we saw constraints that can condition non-realization: for example, avoidance of uneven trochees in Old Saxon leads to non-realization of relatively unmarked morphological category (i.e., Nom/Acc case). Another interesting example of the interaction between phonological constraints and zero/overt morphology comes from Artés (2014), who describes hypocoristic formation in the Valencian dialect of Catalan. In this dialect, the unexpected minority masculine suffix *-o* is inserted into a hypocoristic to satisfy the minimal word requirement (words must be minimally bimoraic). So, the short name for *Manel-Ø* is *Nel-o* (cf. *Nel* in Central Catalan) with an overt masculine allomorph *-o* instead of the expected default \emptyset that occurs on most masculine nouns. Catalan has a general-purpose epenthetic vowel, but *-o* is better than an epenthetic vowel, because it satisfies a morphological requirement for realizing the gender feature as well as fixing the phonological problem.

Finally, the above theory allows us to explain not only generalizations about overt/zero morphology but also certain kinds of syncretisms (those for which other theories use Impoverishment or Rules of Referral). For instance, in a theory proposed by Noyer (1998) Rules of Impoverishment are formulated as readjustment rules that apply prior to vocabulary insertion but after the syntactic contexts have been determined. These language-specific rules delete certain marked feature values in specific contexts. Then the lexical redundancy rules insert the unmarked value of the deleted features back into the lexical entries. As a result of these manipulations, a particular morphological category appearing in a marked context is spelled out by a less marked exponent. On the account proposed here, no manipulation of lexical items is necessary. The grammar does not insert or delete any features; instead, a high ranking of a morphological markedness constraint can automatically result in insertion of a less-marked exponent given that this exponent realizes some of the input features (see Pertsova 2014 for an OT-analysis of Impoverishment in Spanish clitics).

Overall, the fact that the choice of allomorphs can be determined by a number of competing factors, some phonological and some morphological in nature, supports the idea that morphological spell-out and phonological computation occur at the same time and can influence one another.

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References

- Aissen, J. (1999). Markedness and subject choice in optimality theory. *Natural Language & Linguistic Theory*, 17, 673–711.
- Albright, A. (2007). The many sources of uncertainty: Conflicting vs. insufficient generalizations. In C. Rice & S. Blaho (Eds.), *Modeling ungrammaticality in optimality theory*. London: Equinox Publishing.
- Albright, A. (2008). Inflectional paradigms have bases too: evidence from Yiddish. In A. Bachrach & A. Nevins (Eds.), *Inflectional identity*. Oxford: Oxford University Press.
- Anderson, S. R. (2008). The English “group genitive” is a special clitic. *English Linguistics*, 25, 1–20.
- Arregi, K., & Nevins, A. (2006). Obliteration vs. impoverishment in the Basque *g-/z-* constraint. In *Penn linguistics colloquium special session on distributed morphology* (Vol. 30, pp. 1–14).
- Artés, E. (2014). Valencian hypocoristics: when morphology meets phonology. In J. Kingston, C. Moore-Cantwell, J. Pater, & R. Staubs (Eds.), *Supplemental proceedings of Phonology 2013*, LSA.

- Baerman, M. (2011). Defectiveness and homophony avoidance. *Journal of Linguistics*, 47(1), 1–29.
- Bailyn, J., & Nevins, A. (2008). Russian genitive plurals are impostors. In A. Bachrach & A. Nevins (Eds.), *Inflectional identity* (pp. 237–270). Oxford: Oxford University Press. Chap. 8.
- Benua, L. (1997). Transderivational identity: Phonological relations between words. PhD thesis, University of Massachusetts Amherst.
- Bermúdez-Otero, R., & Payne, J. (2011). There are no special clitics. In G. H. Alexandra Galani & G. Tsoulas (Eds.), *Morphology and its interfaces*, Amsterdam: John Benjamins.
- Blevins, J., & Wedel, A. (2009). Inhibited sound change: an evolutionary approach to lexical competition. *Diachronica*, 26(2), 143–183.
- Bloomfield, L. (1962). *The Menomini language*. New Haven: Yale University Press.
- Blumenfeld, L. (2002). Russian palatalization and stratal OT. In *FASL, Amherst, MA* (Vol. 11).
- Blumenfeld, L. (2012). Allomorphy happens for a reason (at least sometimes). In *Workshop on locality and directionality at the morphosyntax-phonology interface*, poster.
- Bonet, E. (1991). Morphology after syntax: Pronominal clitics in Romance. PhD thesis, MIT.
- Booij, G. (1998). Phonological output constraints in morphology. In W. Kehrein & R. Wiese (Eds.), *Phonology and morphology of the Germanic languages* (pp. 143–163). Tübingen: Max Niemeyer.
- Brooks, P. J., Braine, M. D., Catalano, L., & Brody, R. E. (1993). Acquisition of gender-like noun subclasses in an artificial language: The contribution of phonological markers to learning. *Journal of Memory and Language*, 32(1), 76–95.
- Brown, D., & Hippiusley, A. R. (1994). Conflict in Russian Genitive plural assignment: a solution represented in DATR. *Journal of Slavic Linguistics*, 2(1), 48–76.
- Brunner, J. (2010). Phonological length of number marking morphemes in the framework of typological markedness. In S. Fuchs, P. Hoole, C. Mooshammer, & M. Zygis (Eds.), *Between the regular and the particular in speech and language* (pp. 5–28). Berlin: Peter Lang.
- Bulakhovskii, L. (1952). *A course of Russian literary language* (5th ed.). Kiev: Radianska shkola.
- Burzio, L. (2005). Sources of paradigm uniformity. In L. J. Downing et al. (Eds.), *Paradigms in phonological theory* (pp. 65–106). Oxford: Oxford University Press.
- Butska, L. (2002). Faithful stress in paradigms: Nominal inflection in Ukrainian and Russian. PhD thesis, Rutgers University.
- Bybee, J. (1998). The emergent lexicon. In *Proceedings of the 34th regional meeting of the Chicago Linguistic Society: The panels*.
- Bye, P. (2007). Allomorphy—selection, not optimization. In S. Blaho, P. Bye, & M. Krämer (Eds.), *Studies in generative grammar: Vol. 95. Freedom of analysis*, Berlin: Mouton de Gruyter. Chap. 4.
- Calabrese, A. (2011). Investigations on markedness, syncretism and zero exponence in morphology. *Morphology*, 21, 283–325.
- Carstairs, A. (1994). Inflection classes, gender, and the principle of contrast. *Language*, 70, 737–787.
- Comrie, B. (1975). Definite and animate direct objects: a natural class. *Linguistica Silesiona*, 3(13–21).
- Corbett, G. (2009). Canonical inflectional classes. In F. Montermini, G. Boyé, & J. Tseng (Eds.), *Selected proceedings of the 6th Décembrettes, Cascadilla Proceedings Project, Somerville, MA* (pp. 1–11).
- Corbett, G., Hippiusley, A. R., Brown, D., & Marriott, P. (2001). Frequency, regularity, and the paradigm: a perspective from Russian on a complex relations. In *Frequency and the emergence of linguistic structure*. Amsterdam: John Benjamins.
- Crosswhite, K. (1999). Intra-paradigmatic homophony avoidance in two dialects of Slavic. In M. K. Gordon (Ed.), *UCLA working papers in linguistics, papers in phonology 2* (Vol. 1).
- Dimmendaal, G. (1983). *The Turkana language*. Dordrecht: Foris.
- Embick, D. (2010). *Localism versus globalism in morphology and phonology. Linguistic inquiry monographs*. Cambridge: MIT Press.
- Flemming, E. (2002). *Auditory representations in phonology*. London: Routledge.
- Frijo, L., & McDonald, J. (1998). Properties of phonological markers that affect the acquisition of gender-like subclasses. *Journal of Memory and Language*, 39, 218–235.
- Gouskova, M. (2012). Unexceptional segments. *Natural Language & Linguistic Theory*, 30(1), 79–133.
- Graudina, L. (1964). O nulevoj forme roditel'nogo mnozhestvennogo u sushestvitel'nyx mužskogo roda. In I. P. Muchnik & M. V. Panov (Eds.), *Razvitije grammatiki i leksiki sovremennogo russkogo yazyka* (pp. 181–209). Moskva: Nauka.
- Greenberg, J. H. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In J. H. Greenberg (Ed.), *Universals of language* (pp. 73–113). Cambridge: MIT Press.

- Grimshaw, J. (2000). Optimal clitic positions and the lexicon in Romance clitic systems. ROA/000374.
- Hall, T., & Scott, J. (2007). Inflectional paradigms have a base: Evidence from s-dissimilation in Southern German dialects. *Morphology*, 17(1), 151–178. doi:10.1007/s11525-007-9112-z.
- Halle, M., & Marantz, A. (1993). Distributed morphology and the pieces of inflection. In K. Hale & S. J. Keyser (Eds.), *The view from building 20* (pp. 111–176). Cambridge: MIT Press.
- Heath, J. (1984). *Functional grammar of Nunggubuyu*. Canberra: Australian Institute of Aboriginal Studies.
- Ichimura, L. K. (2006). Anti-homophony blocking and its productivity in transparadigmatic relations. PhD thesis, Boston University.
- Iscrulescu, C. (2006). The phonological dimension of grammatical markedness. PhD thesis, University of Southern California.
- Ito, J., & Mester, A. (2004). Morphological contrast and merger: ranuki in Japanese. *Journal of Japanese Linguistics*, 20, 1–18.
- Jakobson, R. (1957). The relationship between genitive and plural in the declension of Russian nouns. *Scando-Slavica*, 3(1), 181–186.
- Janda, L. (1996). Back from the brink: a study of how relic forms in languages serve as source material for analogical extension. Lincom Europa.
- Jones, D., & Ward, D. (1969). *The phonetics of Russian*. Cambridge: Cambridge University Press.
- Kager, R. (1999). *Optimality theory*. Cambridge: Cambridge University Press.
- Kenstowicz, M. (1997). Uniform exponence: Extension and exemplification. In V. Miglio & B. Morén (Eds.), *University of Maryland working papers in linguistics, Selected papers from the Hopkins optimality workshop* (Vol. 5, pp. 139–154).
- Kenstowicz, M. (2005). Paradigmatic uniformity and contrast. In L. Downing, T. A. Hall, & R. Raffelsiefen (Eds.), *Paradigms in phonological theory*, Oxford: Oxford University Press.
- Kim, Y. (2010). Phonological and morphological conditions on affix order in Huave. *Morphology*, 20, 133–163.
- Kochetov, A. (2002). *Production, perception and emergent phonotactic patterns*. New York: Routledge.
- Kurusu, K. (2001). The phonology of morpheme realization. PhD thesis, University of California at Santa Cruz, URL <http://roa.rutgers.edu/files/490-0102/490-0102-KURISU-0-0.PDF>, available as ROA 490-0102.
- Kuznetsov, P. (1953). *Historical grammar of the Russian language*. Morphology. Moscow State University.
- López García, A. (1995). *Gramática Muisca*. LINCOM Europa, München, Newcastle.
- Lubowicz, A. (2007). Paradigmatic contrast in Polish. *Journal of Slavic Linguistics*, 15(2), 229–262.
- Manzini, M., & Savoia, L. (2005). *I dialetti Italiani e Romanci. Morfosintassi Generativa*, Edizioni dell'Orso, Alessandria.
- McCarthy, J. (2010). An introduction to Harmonic Serialism. *Selected Works*.
- McCarthy, J. J., & Prince, A. M. (1994). The emergence of the unmarked: Optimality in prosodic morphology. In M. González (Ed.), *Proceedings of the North East Linguistic Society* (Vol. 24, pp. 335–379). Amherst: GLSA.
- Müller, G. (2005). A distributed morphology approach to syncretism in Russian noun inflection. In O. Arnaudova (Ed.), *FASL* (Vol. 12).
- Ní Chiosáin, M., & Padgett, J. (2001). Markedness, segment realization, and locality in spreading. In *Segmental phonology in optimality theory* (pp. 118–156). Cambridge: Cambridge University Press.
- Noyer, R. (1992). Features, positions and affixes in autonomous morphological structure. PhD thesis, MIT.
- Noyer, R. (1998). Impoverishment theory and morphosyntactic markedness. In D. K. Brentari & P. M. Farrell (Eds.), *Morphology and its relation to phonology and syntax* (pp. 264–285). Stanford: CSLI.
- Noyer, R. (2004). A constraint on interclass syncretism. In G. Booij & J. van Marle (Eds.), *Yearbook of morphology*, Dordrecht: Springer.
- Orgun, C. O., & Sprouse, R. (1999). From mparse to control: deriving ungrammaticality. *Phonology*, 16, 191–224.
- Paster, M. (2005). Subcategorization vs. output optimization in syllable-counting allomorphy. In J. Alderete, C. Hye Han, & A. Kochetov (Eds.), *Proceedings of the twenty-fourth West Coast conference on formal linguistics* (pp. 326–333).
- Payne, J. (2009). The English genitive and double case. *Transactions of the Philological Society*, 107(3), 322–357.
- Pertsova, K. (2004). Distribution of genitive plural allomorphs in the Russian lexicon and in the internal grammar of native speakers, Ma thesis, UCLA.

- Pertsova, K. (2014). Morphological markedness in an ot-grammar: zeros and syncretism. In J. Kingston, C. Moore-Cantwell, J. Pater, & R. Staubs (Eds.), *Supplemental proceedings of phonology 2013*, Washington: Linguistic Society of America.
- Popova, T. V. (1987). Morphonologičeskie tipy substantivnyx paradigim v sovremennom russkom literaturnom jazyke. In T. V. Popova (Ed.), *Slavyanskaya morfonologija* (pp. 16–37). Moskva: Nauka.
- Prince, A., & Smolensky, P. (1993). Optimality theory: Constraint interaction in generative grammar. RuCCS-TR-2 ROA-537, Rutgers University.
- Rebrus, P., & Törkenczy, M. (2005). Uniformity and contrast in the Hungarian verbal paradigm. In L. Downing, T. A. Hall, & R. Raffelsiefen (Eds.), *Paradigms in phonological theory*, Oxford: Oxford University Press.
- Shvedova, N. (1980). *Russian grammar*. Moskva: Nauka. Academy of Sciences USSR, The Institute of the Russian Language.
- Shapiro, M. (1971). The genitive plural desinences of the Russian substantive. *The Slavic and East European Journal*, 15(2), 190.
- Sharoff, S. (1998). The frequency dictionary for Russian. <http://bokrcorpora.narod.ru/frqlist/frqlist-en.html>.
- Silverstein, M. (1976). Hierarchy of features and ergativity. In R. Dixon (Ed.), *Grammatical categories in Australian languages* (pp. 112–171). New Jersey: Humanities Press.
- Starostin, S. (1998). Zaliznyak's on-line dictionary. <http://starling.rinet.ru/cgi-bin/main.cgi?flags=eygtmnl>, An Etymological database project.
- Steriade, D. (1999). Lexical conservatism in French adjectival liaison. In M. Authier, B. Bullock, & L. Reed (Eds.), *Proceedings of the 25th linguistic colloquium on Romance languages*. Amsterdam: John Benjamins.
- Steriade, D. (2008). A pseudo-cyclic effect in Romanian morpho-phonology. In A. Bachrach & A. Nevins (Eds.), *Oxford studies in theoretical linguistics: Vol. 18. Inflectional identity*. Oxford: Oxford University Press.
- Sturgeon, A. (2003). Paradigm uniformity: Evidence for inflectional bases. In G. Garding & M. Tsujimura (Eds.), *WCCFL* (Vol. 22, pp. 464–476).
- Teeple, D. (2008). Lexical selection and strong parallelism. ROA archive 000992.
- Urbanczyk, S. (1999). A-templatic reduplication in Halq'emeylem. In *Proceedings of the West Coast Conference on Formal Linguistics* (pp. 655–669).
- Walker, R., & Feng, B. (2004). A ternary model of morphology-phonology correspondence. In *Proceedings of WCCFL 23* (Vol. 23, pp. 773–786).
- Weinert, S. (2009). Implicit and explicit modes of learning: similarities and differences from a developmental perspective. *Linguistics*, 47(2), 241–271.
- Wolf, M. A. (2008). Optimal interleaving: serial phonology-morphology interaction in a constraint-based model. PhD thesis, University of Massachusetts Amherst.
- Wolf, M. A. (2009). Lexical insertion occurs in the phonological component. In E. Bonet, M.-R. Lloret, & J. Mascaró (Eds.), *Understanding allomorphy: perspectives from optimality theory*. London: Equinox Publishing.
- Yang, C., Gorman, K., Preys, J., & Borwczyk, M. (2012). Productivity and paradigmatic gaps, a talk presented at NELS, 43.
- Yanovich, I., & Steriade, D. (2010). Uniformity, subparadigm precedence and contrast derive stress patterns in Ukrainian nominal paradigms, talk at OCP 6.
- Yearley, J. (1995). Jer vowels in Russian. In J. L. Beckman, L. W. Dickey, & S. Urbanczyk (Eds.), *Papers in optimality theory* (pp. 533–571). Amherst: GLSA.
- Zipf, G. (1932). *Selective studies and the principle of relative frequency in language*. Cambridge: Harvard University Press.