



# Selectional restrictions as phonotactics over sublexicons

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## Abstract

Affixation and allomorphy are often phonologically predictable: thus, the English indefinite “a” appears before consonants, and “an” before vowels. We propose a theory of phonological selection that separates rules of morpheme realization from phonological knowledge about the bases and the derived words. This phonological knowledge is encoded in miniature phonotactic grammars, which are learned over sublexicons defined by morphological generalizations. Each sublexical phonotactic grammar determines the likelihood that a new word will follow the associated rule. We examine a complex case of suppletive allomorphy in Russian, whose diminutive suffixes define sublexicons differing in constraints on final consonant place and manner, presence and location of consonant clusters, vowel hiatus, and stress. In elicitation, Russians choose allomorphs for words without diminutives based on how these words and the derived diminutives fare in the sublexical phonotactic grammars. In a nonce word study, Russians also chose allomorphs based on sublexical phonotactic well-formedness, even when the phonotactic violations were non-local to the affix itself. These patterns are missed by alternative approaches such as emergence of the unmarked, insertion rules that refer directly to phonological information, and the Minimal Generalization Learner.

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## 1. Introduction

Affixes sometimes impose phonological selectional restrictions on bases (Siegel, 1974; Carstairs, 1988), requiring them to have certain phonological properties for affixation. For example, in English, the comparative and superlative suffixes attach to monosyllabic words (*smart-er*) and some disyllabic ones (*silli-er*), but not trisyllabic or longer words (*\*intelligent-er*). In Russian, masculine nouns can form diminutives with three allomorphs, each of which imposes a host of phonological selectional restrictions on the location of stress, place and manner of articulation of the last consonant, and the presence and location of consonant clusters—to name a few:

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## (1) Russian diminutive allomorphy, in brief

	Unaffixed	Diminutive	Gloss	Some restrictions imposed by suffix:
a.	ángʲil	ángʲil-ók	‘angel’	<i>stress-initial /stress-final base, no hiatus, no CC#</i>
b.	mónstr	mónstr-ʲik	‘monster’	<i>stress-final base, no final dorsal consonants</i>
c.	ajfón	ajfón-tʲik	‘iPhone’	<i>stress-final base, no final coronal obstruents, no CC#</i>

There is a debate in the morphological and phonological literature as to how such restrictions should be stated in the grammar and what people actually know about phonological conditions on affixation. We propose that these restrictions are learned from the lexicon, much as in the influential proposals by [Albright and Hayes \(2003\)](#) and [Hayes and Wilson \(2008\)](#), and that the phonological generalizations about affixation arise from phonotactic learning over *sublexicons* defined by morphological operations ([Becker and Gouskova, in press](#)).

We argue that selectional restrictions are encoded diacritically in morphological realization rules. Learners figure out which morphemes are marked to combine with which allomorphs; once the sublexicons are assembled, people learn sublexical phonotactic grammars that characterize each sublexicon, but the phonological information is not encoded in the insertion rules themselves. Thus, we assume that morphological realization is formally separated from phonological knowledge—but phonological knowledge about the sublexicons can be used in certain situations. For example, nonce words and loanwords are not tagged for diminutive formation rules, but people can consult the sublexical phonotactic grammars to decide on the probability that the item will follow a particular rule (this can be modeled as grammar inference; see [Becker and Gouskova, in press](#); [Albright, 2008](#)).

We argue that both the shape of the base and the shape of the affixed word inform sublexical phonotactic generalizations. In the terminology of [Bybee \(1995\)](#), both source- and product-oriented generalizations matter. This has been a matter of some controversy, since the morphological literature has largely focused on source-oriented generalizations about selectional restrictions ([Bobaljik, 2000](#); [Paster, 2006](#); [Embick, 2010](#)), whereas the phonological literature, especially constraint-based frameworks, focus on product-oriented generalizations ([Kager, 1996](#); [Mascaró, 2007](#); [Bye, 2007](#); see [Nevins, 2011](#) for an overview). We demonstrate that both play a role in the Russian case as well as in other cases; the key to our solution to this controversy is that rules refer to diacritics only, but learners keep track of information about both base and affixed sublexicons in deciding which diacritics to put on new items.

The case of Russian diminutive formation provides some important evidence for our theory. First, the phonotactic properties of bases that predict diminutive allomorphs do not need to be local to the suffixes themselves. For example, the presence of vowel hiatus in the base diminishes its likelihood of combining with [-ok]: thus, words such as [klóun] ‘clown’ do not diminutivize easily even though the hiatus sequence is not phonologically local to the [-ok] suffix. We identify a similar effect of medial consonant clusters, which highlights another aspect of selectional restrictions that our theory captures: restrictions are often orthogonal to the phonology of the affixes and cannot be reduced to markedness-based explanations that attribute the failure of affixation to the phonological ill-formedness of the resulting word. We argue that this is because some of the restrictions are generalized from base phonological words, not affixed words.

Our theory can be distinguished from alternative approaches to selectional restrictions, which include subcategorization frames, Generalized Alignment, and the Emergence of the Unmarked. We argue that these theories get some aspects of phonological selectional restrictions right, but they are not sufficiently powerful for cases such as Russian diminutive allomorphy, which involves both restrictions on the site of affixation and less local properties of the word. The work on the typology of phonologically conditioned suppletive allomorphy has established conclusively that selectional restrictions of allomorphs cannot always be reduced to universal phonological markedness ([Paster, 2006](#); [Bobaljik, 2000](#); [Embick, 2010](#); [Nevins, 2011](#)), but we suggest they can be described using phonotactic constraints over word shapes, which often have a language-specific character.

The paper is organized as follows. We start by presenting the proposal in section 2. We next describe Russian diminutive formation (section 3) and an analysis of the Russian lexicon and the sublexicons formed by bases and diminutives (section 4). The elicitation study is described in section 5, and a forced choice nonce word study is in section 6. Our interpretation of the results is discussed in section 7, and in section 8 we discuss alternatives such as the emergence of the unmarked, subcategorization frames, and the Minimal Generalization Learner. We discuss acquisition in section 9; section 10 is the conclusion.

## 2. Proposal: phonotactic grammars for morphological sublexicons

### 2.1. Assumptions about selection and morpheme insertion

This section briefly outlines the assumptions about morphological theory that underlie our proposal. We assume a realizational theory of morphology (Distributed Morphology, [Halle and Marantz, 1993](#); [Halle, 1994](#); [Embick and Marantz,](#)

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