# Processing morphological ambiguity: An experimental investigation of Russian numerical phrases

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## ABSTRACT

Russian nouns in nominative and accusative numerical expressions appear in three different forms, depending on the numeral: nominative singular with the numeral 1, genitive singular with the paucal numerals 2–4, and genitive plural with all other numerals. Results from an acceptability judgment task and a self-paced reading task on Russian case/number marking provide support for a theory stating that the suffix used with paucal nouns is morphologically ambiguous. The ambiguity resolution process involving this suffix leads to extra processing cost, compared to the unambiguous suffixes in other numeral contexts (the number 1, and the numbers 5+). This would account for the additional processing time observed with the paucal nouns. The status of the form occurring with the paucal numerals has long been a challenging issue in Russian linguistics, and the new results add to the growing body of literature which makes use of experimental methods to address issues of linguistic theory and analysis.

## 1. Introduction

In Russian numerical phrases, the case of the noun co-occurring with the numeral varies depending on the numeral. A noun used with the numeral 1 has to appear in the nominative singular; with numerals 5 and higher, one finds the genitive plural, and the genitive singular is used with 2, 3 and 4 (so-called "paucal numerals"):

| (1) | a. | odin | kruglyj | stol | propal |
|---|---|---|---|---|---|
| | | one | round.NOM.SG | table.NOM.SG | disappeared.SG |
| | b. | tri | kruglyx | stol-a | propal-i |
| | | three | round.GEN.PL | table-GEN.SG | disappeared-PL |
| | c. | sem´ | kruglyx | stol-ov | propal-i |
| | | seven | round.GEN.PL | table-GEN.PL | disappeared-PL |
| | | 'One/three/seven round tables disappeared.' | | | |

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In (1b), semantically speaking, the sentence refers to a quantity of the noun that is greater than one; unsurprisingly, both the modifying adjective and the matrix verb are marked as plural. What is surprising, though, is that the head noun itself is marked as genitive singular (GEN.SG.). As noted above, this pattern only appears with the paucal numerals two, three and four.

There are two major theoretical approaches to this morphosyntactic phenomenon, which on the surface does not seem to be an instantiation of a regular agreement pattern. One approach treats the unexpected marking as a case of syncretism due to accidental homophony or underspecification. Under this approach, the same phonological form spells out both the genuine genitive singular ending and the paucal suffix (which we will discuss in section 2). An alternative approach considers the surface phonological form to be mapped unambiguously to a single underlying morpheme, genitive singular; under this approach, the observed syncretism is due to the underlying featural identity of the genitive singular ending and the paucal suffix. We review these different views in section 2.

In this paper, we address the unusual genitive singular suffix from an experimental point of view. Using acceptability rating and self-paced-reading paradigms, we examine native speakers' sensitivity to nominal forms in numerical contexts. Up to now, researchers have not studied processing profiles of the three different numerical environments. The way these environments are processed, however, has a bearing on our models of the interaction between morphology and phonology, and of the mapping from underlying features to surface phonological strings. An investigation of the processing of numerical phrases will also help us distinguish between competing theoretical accounts of Russian case/number morphology.

The paper is organized as follows. In section 2, we review the basic facts of Russian case and number morphology, and introduce the relevant theoretical proposals. Section 3 lays out the logic of our study and the experimental predictions made by different theoretical proposals. Section 4 presents our experimental tasks and their results, and section 5 is a general discussion of the results.

## 2. Case and number morphology in Russian

In this section, we present the background on Russian case and number morphology, and survey the existing approaches to the puzzling agreement marking pattern presented in (1).

### 2.1. The puzzle of the genitive singular

Case and number in Russian are realized morphologically on the noun as a synthetic suffix (which also contains declension class information).[1] In the current discussion, our main focus is on nouns in a numerical context – namely, nouns that are preceded by a numeral, with or without an intervening adjective. The numerical phrase has the reading of a precise quantity.[2] Based on the surface marking of the noun in the numerical phrase, such phrases can be divided into three groups. When the numeral is 1, the noun following it typically appears in the (nominative) singular (with the exception of *pluralia tantum*, and some other cases which are not relevant here––see Corbett, 1983, Babby, 1973, Hahm, 2006, Wechsler and Zlatic, 2003), and the numeral shows gender agreement with the noun. When the numeral is a number from 2 to 4, the following noun acquires a suffix which is phonologically identical to the genitive singular morpheme used in other contexts.[3] The numeral 2 (but not 3 or 4) shows gender agreement with the noun. For the numerals 5 and above, the following noun is marked as genitive plural, and there is no agreement in gender. The following examples illustrate these three patterns, for each gender (feminine, masculine, and neuter):

(2)  odin-Ø      mal'čik-Ø/   odn-a      devočk-a/   odnojablok-o
     one-MASC    boy-NOM.SG/  one-FEM    girl-NOM.SG/  one-NEUT   apple-NOM.SG
     'one boy, one girl, one apple'

(3)  tri      mal'čik-a/   tri      devočk-i/   tri      jablok-a
     three    boy-GEN.SG/  three    girl-GEN.SG/  three    apple-GEN.SG
     'three boys, three girls, three apples'

(4)  šest'    mal'čik-ov/  šest'    devoček/   šest'    jablok
     six      boy-GEN.PL/  six      girl.GEN.PL/  six      apple.GEN.PL
     'six boys, six girls, six apples'

[1] For details of Russian declensional classes, see Corbett (1983, 1991) and Zaliznjak (1977).

[2] We will not be concerned with approximative constructions where the numeral follows the noun, e.g., *štuk sem'* 'around/about seven items' (cf. Billings, 1995; Mel'čuk, 1985; Pereltsvaig, 2006; Suprun, 1959).

[3] Deadjectival nouns (e.g., *životnoe* 'animal,' *buločnaja* 'bakery') always appear in the genitive plural with the numerals 2 and above, and we will not include or discuss these nouns here.