

Numeral Phrases in Russian: A Minimalist Approach

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Abstract. The present paper seeks to update Leonard Babby's 1987 analysis of "heterogeneous" vs. "homogeneous" morphosyntax in numeral expressions, as well as to refine the analysis, making use of recent syntactic developments, namely the emergence of the case-assigning mechanism Agree. The key insight is that numerals differ with respect to whether they contain a valued case feature. Heterogeneous case marking follows from a valued case feature on the nominal, while the homogeneous pattern reflects an unvalued case feature on the numeral, allowing for the numerically-quantified nominal expression to receive a single case from a higher lexical-case-assigning head.

0. Introduction

Numeral phrases in Russian have long presented a puzzle to those attempting a theory of the syntax of this language. The puzzle itself is not difficult to formulate. When the phrase as a whole stands in a position to which the syntax assigns a direct case (nominative or accusative), the numeral acts like a nominal head of the phrase, assigning the genitive case to the quantified noun (and its modifiers) as if it were a complement. When this same phrase stands in a position assigned an oblique case, the quantified noun acts like the head of the phrase, with the numeral falling into line with the other modifiers in agreeing with that quantified noun.¹ For example, contrast (1a,b):

- (1) a. videt' pjat' krasivyx ptiček.
to see five_{ACC=NOM} beautiful_{GEN.PL} birds_{GEN.PL}
'to see five beautiful birds'
- b. vosxiščat'sja pjat'ju krasivymi ptičkami
to-be-enthralled-by five_{INST} beautiful_{INST.PL} birds_{INST.PL}
'to be enthralled by five beautiful birds'

¹ See, for example, Babby 1987, Corbett 1993, Franks 1995, Halle 1990; 1995, and Mel'čuk 1985, along with references cited there.

The morphosyntax of (1a) resembles that of, say, *videt' staju krasivyx ptiček* 'to see a flock of beautiful birds', in which *staju* 'flock_{ACC}' is the head of the direct object noun phrase and *krasivyx ptiček* 'beautiful_{GEN.PL} birds_{GEN.PL}' is the complement of *staju*. In (1b), each constituent of the phrase stands in the instrumental case required by the governing verb, just as one would expect in a phrase such as *vosxiščat'sja mnogimi krasivymi ptičkami* 'to be enthralled by many_{INST.PL} beautiful_{INST.PL} birds_{INST.PL}'. Babby (1987, p. 100 and elsewhere) has called the morphosyntactic pattern displayed in (1a) **heterogeneous**, and that displayed in (1b) — **homogeneous**.

One possible approach to the problem would be to assume that the difference in morphosyntax illustrated in (1a, b) transparently reflects a difference in syntactic structure: the numeral is the head when the numeral phrase is in a position assigned a direct case, while the quantified noun is the head in a position assigned an oblique case. Babby has convincingly rejected such an approach, arguing that the quantified noun is the head of a numeral phrase in all syntactic contexts (1987: 105–12). He has correspondingly developed a theory of case marking which accounts for the observed contrast.

The goal of this paper is to sketch an analysis in terms of recent work within the Minimalist program (cf. Chomsky 2000; 2001a; 2001b) which preserves the spirit and essential ideas Babby proposed within the framework of Government-Binding theory. The purpose of the undertaking is to take advantage of conceptual advances incorporated in Minimalism to capture significant generalizations more directly with sparser apparatus and to better account for empirical variation by placing it in the lexicon, where it should reside.

In section 1 Babby's account is summarized and some questions are raised from a contemporary perspective. Sections 2 and 3 develop an alternative for Russian. While this approach could profitably be extended to numeral phrases in other Slavic languages, space limitations preclude undertaking that task here.

1. Babby's Analysis of Numeral Phrases in Russian

On the basis of an analysis of numeral phrases in Russian, Babby (1987 and elsewhere) develops the following descriptive generalization: **lexical case** (licensed by the lexical properties of an individual lexical item) supersedes **configurational case** (licensed by syntactic context abstracted away from the individual lexical items present). This hierarchy is justified by a principle of lexical satisfaction (Babby 1985)

which requires that lexical properties be satisfied at every level (while configurational case need not be). In addition, he notes that the **Quantificational Genitive** (Gen-Q) is a configurational case, but it supersedes the assignment of the equally configurational subject nominative and object accusative under locality: since Gen-Q applies within the numeral phrase, it is assigned before the clause-level cases are. The numeral stands outside the scope of its own case assignment, so that it is assigned direct case on the basis of its clause-level configuration. The result is heterogeneous morphosyntax (1a). Oblique cases, in contrast, are lexical, and thus will prevail over the configurational Gen-Q. The result is homogeneous morphosyntax (1b).

There are several reasons to revisit Babby's analysis.

First, as he concedes (and as is noted by Franks 1995), there are technical problems with the resulting theory of case assignment: it requires that a maximal projection assign case to an intermediate projection. This is a non-standard configuration for licensing case.

Second, Babby's analysis does not apply to the "lower numerals" (two through four), and it is not clear how it can be easily patched. While phrases including lower numerals also exhibit alternating homo- and heterogeneous morphosyntax, greater morphosyntactic complexity is observed in this instance: singular number assigned to the number (but not to the adjective!); while the genitive case on the noun is not necessarily shared by its modifiers:

- (2) pisat' dve potrjasajuščie stat'i
 to-write two_{ACC=NOM} earth-shaking_{ACC=NOM.PL} articles_{GEN.SG}
 'to write two earth-shaking articles'

Third, Babby's analysis is limited to Contemporary Standard Russian. Franks (1995) discusses the problems posed by Polish and Serbo-Croatian, and there are other issues of variation as well (Rappaport 2003).

Finally, Babby assumes the distinction posited in Government-Binding theory between D-structure and S-structure, and bases the hierarchical relation between lexical and configurational case on it. This explanation is not compatible with the Minimalist architecture of grammar in which there is no D-Structure or S-Structure, thus making it impossible to distinguish configurational and lexical case on these grounds.

We now turn to developing an analysis in the newer framework which retains the essential insights of Babby's analysis: higher nu-

merals are never heads of the numeral phrase, and the homo-/heterogeneous morphosyntax distinction reduces to the distinction between configurational and lexical case. We begin with the higher numerals in section 2, and then turn to lower numerals in section 3.

2. Higher Numerals

“Higher numerals” are defined as those which are associated with the alternation of homogeneous and heterogeneous morphosyntax described above, without affecting the grammatical number of the quantified noun (cf. lower numerals illustrated by (2)). We agree with Babby that the oblique cases (associated with homogeneous morphosyntax) are lexical, and the direct cases (associated with heterogeneous morphosyntax) are configurational. What are the mechanisms of the respective modes of case assignment in the Minimalist program?

Lexical case (called “inherent case” by Chomsky) is associated with the particular argument-selection properties of a governing lexical item and thus with the assignment of semantic role. Consequently, it is properly located in the lexicon. The Minimalist view of syntax rejects “X-bar theory” (including stipulated distinctions among levels of projections) and is based on a single bottom-up cycle which sequentially creates syntactic structure via the merger of lexical items, applies operations to this chunk of structure, and then sends the result to a) further syntactic operations, b) phonological structure, or c) logical structure. Lexical case can most simply be viewed as a matter of selection, a condition on merger: a lexical item is lexically specified as combining with a category with a particular case feature. A noun, for example, may in principle be merged with a lexically-specified value for case or not. Only a noun with a specified case feature may be selected by the appropriate lexical item. After merger, there is nothing more to say. For example, the Russian verb *vosxiščat'sja* ‘to be enthralled by’ is identified in the lexicon as combining only with a phrase marked with the instrumental case. There is no need to refer to D-structure or S-structure (which do not exist in this theory). It follows directly from this approach that a lexical item with such a selectional restriction cannot combine with the Genitive of Negation or any of several other quantified structures Babby has written about (cf. Babby 1985): the distributive *po*, approximative *okolo*, and approximative structures of inversion such as *časov pjat'* ‘about five hours’: such phrases cannot satisfy the selectional requirements.

The mechanism of configurational (called “structural” by Chomsky) is different: it is completely divorced from the assignment of a semantic role. It is based on the syntactic operation *Agree*, which implements case assignment and predicate agreement (Chomsky 2000; 2001a; 2001b). The following simplified definition is sufficient here:

- (3) a. Two categories **Agree** iff all of the following conditions are satisfied:
- one of the categories c-commands the other;
 - there is at least one matching feature shared by the two categories; and
 - each of the categories is **active** (i.e., contains a feature without a value)
- b. When two categories *Agree*:
- the value of any valued matching feature is copied onto an unvalued counterpart; and
 - semantically uninterpretable features in the *Agreeing* categories are deleted from the syntactic derivation and passed on to Phonological Form.

For example, in the standard situation of establishing predicate agreement, the subject nominal phrase contains valued features for, e.g., person and number, and an unvalued case feature (rendering it active); the Tense node representing predicate agreement contains unvalued features for person and number (rendering it active). The two categories can *Agree* because they contain matching features (person and number), and unvalued features become valued: T is assigned values for person and number copied from the subject, and (nominative) case is assigned to the subject noun. Uninterpretable features such as agreement features on T and case on the noun are later removed from the syntactic derivation because they are irrelevant to further operations and interpretation, but they are passed on to PF, because they will eventually find formal expression. *Agree* is also the mechanism of noun-phrase-internal concord, whereby modifiers receive case, number, and gender features from the noun that they modify.

Let us return to numeral phrases and consider a concrete example:

- (4) videt' krasivye risunki
 to-see beautiful_{ACC.PL} drawings_{ACC.PL}
 'to see beautiful drawings'

On the approach to configurational case marking just outlined, the direct object *krasivye risunki* ‘beautiful drawings’ has an unvalued case feature, but valued features for gender (masculine) and number (plural). Following Minimalist assumptions, a transitive verb phrase is headed by *v* (“small *v*”), which assigns the accusative the way T assigns the nominative: it has unvalued gender and number features, and assigns the accusative on the application of the operation Agree. The conditions under which Agree are satisfied in this example (with unvalued features, both *v* and the complement phrase are active, and they have matching features), so Agree applies: the gender and number features of *risunki* are copied onto *v*, and the accusative case is assigned to the noun. The assignment of configurational case is optional, making positions in which it is assigned eligible for the Genitive of Negation and the quantified distributive and approximative nominal structures noted above (*ne videt’ risunkov* ‘to not see drawings_{GEN.PL}’, *videt’ po risunku* ‘to see one drawing each’).

When a higher numeral is added, the noun takes the Gen-Q instead of the accusative:

- (5) *videt’ pjat’ krasivyx risunkov*
 to-see five_{ACC=NOM} beautiful_{GEN.PL} drawings_{GEN.PL}
 ‘to see five beautiful drawings’

If the numeral is the source of the Gen-Q, then it is analogous to *v* in assigning case by Agree. If the numeral has an unvalued feature for gender, and the noun has an unvalued feature for case, then both categories are active, Agree applies, and the numeral assigns the genitive. However, there is a difference between the lexical category of a numeral and the functional categories of T and *v*: numerals in Russian can express case. We assume, then, that unlike T and *v*, the numeral in (5) is associated in the lexicon with a fixed value for case, which is then copied onto the head noun under Agree. This value cannot be the genitive, because then the numeral would be in the genitive even in positions of direct case assignment:

- (6) **videt’ pjati risunkov*
 to-see five_{GEN} drawings_{GEN.PL}
 ‘to see five drawings’

We assume, then, an ‘abstract’ Quantitative case which is spelled out in the post-syntactic morphology by syncretism with the genitive (ear-

lier called the 'Gen-Q'), in rough analogy to the expression of Animacy in Russian, which is deeply embedded in the morphosyntax of the language, but is expressed only by syncretism with the genitive. Thus, higher numerals may be specified in the lexicon with the case feature [Quantitative]. Such an NP object is analogous to the Genitive of Negation and quantified distributive and approximative structures noted above in that the corresponding configurational case (here, accusative) is never actually expressed.

We began with the descriptive observation that in numeral phrases, heterogeneous morphosyntax is found in syntactic contexts of direct/structural case, and homogeneous morphosyntax is found in oblique/inherent case contexts. Since we now attribute heterogeneous case marking to a valued case feature on the numeral and homogeneous case marking to an unvalued case feature, our task is to ensure the correlation of case feature and the direct/oblique case position. The mechanism just outlined derives the facts directly.

Given the fact that on current assumptions there is no D-Structure and that Merge and Agree operate cyclicly, the higher syntactic context does not even exist during the NP-internal derivation. As a result, a valued case feature on the numeral can assign the quantitative case (giving heterogeneous morphosyntax) in positions of structural case marking (both nominative and accusative), without competition from clause-level case assignment operations. At the same time, we must block the result of an unvalued case feature in these positions; for example:

- (7) *videt' pjat' krasivye risunki
 to-see five_{NOM} beautiful_{NOM.PL} drawings_{NOM.PL}
 'to see five beautiful drawings'

If the case feature on the higher numeral *pjat'* 'five' is unvalued, the numeral agrees in case (and gender) with the quantified noun and is assigned the nominative case. This construction exemplifies homogeneous morphosyntax in a direct case position, which is not possible. We rule out this construction by simply assuming that numerals have no nominative case form.² There is a Spellout rule for higher numerals

² This assumption is neither original on my part nor radical. Schenker 1971 comes to this conclusion for Polish, extending a more restricted position staked out earlier by Klemensiewicz.

in the quantitative case, required in the direct cases, as noted above, but not for those in the nominative case.

Conversely, the numeral's case feature in oblique/inherent case positions must be lexically unvalued, in order to give homogeneous morphosyntax. What is the result if a numeral in this context is lexically associated with a valued case feature? Recall that the quantified noun must be associated with a lexically valued case feature itself in a context of inherent case, so that it is visible to selection by the governing lexical item. Agree, then, could not apply, because the case features by definition do not match (since neither is unvalued; see the definition in (3)). If Agree does not apply, then the gender feature of the numeral rendering it active would never be valued, and the form ultimately uninterpretable. In such a syntactic context, only an unvalued case feature will admit a legitimate derivation, in the form of homogeneous morphosyntax.

Numeral lexemes, then, admit the possibility of either a valued or unvalued case feature, and the architecture of the grammar automatically accounts for the fact that a valued case feature invokes heterogeneous morphosyntax in the corresponding phrase, and an unvalued case feature invokes homogeneous morphosyntax. It is a significant advantage of this analysis that heterogeneous morphosyntax is found in precisely those syntactic contexts which permit various quantified expressions which do not realize the positional structure case: there is independent evidence that structural case (unlike inherent case) need not be morphologically realized, and this is indeed the case when a numeral phrase is marked with the quantitative case in a direct case position.

In the discussion of (7), we noted that homogeneous agreement in a direct position is blocked by the absence of a nominative form of numerals; what is traditionally considered the nominative (e.g., *pjat* 'five') is actually the Quantitative case form. While this will account for the absence of homogeneous agreement for subjects and for inanimate objects (in which the accusative is normally syncretic with the nominative), it does not explain the impossibility of homogeneous morphosyntax in the case of animate objects, as in:

- (8) *My našli pjati nadežnyx letčikov.
 we found five_{ACC=GEN} reliable_{GEN.PL} pilots_{GEN.PL}
 'We found five reliable pilots.'

The quantified noun and modifier are assigned structural accusative case and then undergo the post-syntactic morphological rule of accusative syncretism, replacing the accusative with the genitive. The numeral itself must Agree with the head noun, and correspondingly be assigned the values of the latter's formal features, including the accusative case. The numeral itself seems indifferent to the animacy of the head noun: example (9) can be interpreted as having either an animate or inanimate direct object:

- (9) My našli pjat' nadežnyx sčetčikov.
 we found five_{QUANT} reliable_{GEN.PL} meters/meter readers_{GEN.PL}
 'We found five reliable meters/meter readers.'

Within his own analysis, Babby suggests that numerals do not have animacy in their inventory of features (1987: 111). This idea can be carried over wholesale to the present approach. Construction (9) results from a valued case feature on either interpretation of the quantified noun. An unvalued case feature would be analogous to (7), and be blocked by the absence of a spellout rule for a nominative form.

A richer paradigm is found in Russian in the alternation of adjectival and numeral forms such as *mnogie* : *mnogo* 'many' and *neskol'kie* : *neskol'ko* 'a few'. Either form can be used in the accusative:

- (10) My videli mnogo / mnogix ljudej
 we saw many_{QUANT} / many_{GEN.PL} people_{GEN.PL}
 'We saw many people.'

The form without agreement *mnogo* is inserted with the valued feature [Case: Quantitative] and no animacy feature, just like a higher numeral in CSR; the operation Agree assigns the quantified noun the quantitative case, later readjusted to the genitive, and the numeral in the quantitative case is given phonological form by a Spellout rule directly. The form with agreement *mnogix* is inserted with the unvalued features for animacy, case, and number, as would be an adjective; correspondingly, it agrees with the quantified NP, which is in genitive as a result of Accusative Syncretism. Thus, the genitive case of *ljudej* 'people' has different sources in the two variants of (10a). The same two options are available in subject position as well:

- (11) a. Mnogo studentov prošlo.
 many_{QUANT} students_{GEN.PL} came
- b. Mnogie studenty prišli.
 many_{NOM.PL} people_{NOM.PL} came
 ‘Many students came.’

(11b) is an option not available to numerals, which have no Spellout rule for the nominative case. Thus, that lacuna is not one of principle, but is simply an accidental fact of Russian. As such, it belongs in the lexicon, where we have placed it.

3. Lower Numerals

Russian represents a marked situation in assigning the genitive singular to numerals after lower numerals in the direct cases. A simpler situation obtains in Polish, for example, in which lower numerals have no morphosyntactic effect and combine with the nominative plural: *dwa, trzy, cztery listy* ‘two, three, four letters_{NOM.PL}’. The fact that Polish assigns the genitive after higher numerals but not lower ones suggests that the two phenomena are distinct. Lower numerals in Russian, then, can be treated as analogous to higher numerals, except that the value of their potentially inherent case feature differs. We assume a **paucal** case for Russian which is spelled out on the head noun as the genitive singular. The plausibility of this assumption is suggested by fragmentary evidence for just such a case in Russian in the form of specially stressed forms for four words (*rjad* ‘row’, *čas* ‘hour’, *šar* ‘sphere’, and *šag* ‘step’) when they follow lower numerals only; for example, while the normal genitive form of *šar* ‘sphere’ has stress on the stem (e.g., *cvet šára* ‘the sphere’s color’), it takes stress on the ending after lower numerals: *dva, tri, četyre šará* ‘two, three, four spheres’.

As in the case of higher numerals, two options are made available in the lexicon for lower numerals. The case feature can be valued as [Paucal] on Merge, invoking heterogeneous morphosyntax (12); the numeral itself is spelled out as a form of the paucal case:

- (12) najti dva nadežnyx sčetčika
 to-find two_{PAUC} reliable_{GEN.PL} meters_{GEN.SG}
 ‘to find two reliable meters’

Such a numeral cannot appear in a position of oblique/inherent case (**s dva sčetčikami* ‘with two_{PAUC} meters_{INST.PL}’): in this context, neither of

the matching case features is unvalued, so that Agree cannot apply (recall the definition of the operation given in (3)). If the case feature is Merged as unvalued, then the numeral is perfectly compatible with oblique/inherent case and undergoes Agree much like an adjective, giving homogeneous morphosyntax: *s dvumja sčetčikami* ‘with two_{INST} meters_{INST.PL}’; this same form in a direct/structural case position, however, will give an ungrammatical result:

- (13) *najti dva nadežnye sčetčiki
 to-find two_{ACC=NOM} reliable_{NOM.PL} meters_{NOM.PL}
 ‘to find two reliable meters’

Under the homogeneous morphosyntax invoked by an unvalued case feature, the numeral is assigned the accusative case to agree with the object noun. When the noun is inanimate and the accusative is spelled out as the nominative, this construction is blocked like its higher numeral analogues by the absence of rule spelling out nominative numerals. When the object noun is animate so as to invoke the genitive accusative, spell-out is possible, because the nominative without a phonology is replaced by the genitive under the animate accusative rule:

- (14) najti dvux nadeányx sčetčikov
 to-find two_{ACC=GEN} reliable_{ACC=GEN.PL} meter readers_{ACC=GEN.PL}
 ‘to find two reliable meter readers’

The homogeneous pattern in (14) is possible for lower numbers while its counterpart for higher numerals is not (cf. 9). This is explained by a lexical distinction between the two classes of numerals: lower numerals have an animacy feature, while higher numerals do not. It is an accidental, lexical fact, that the animacy feature is incompatible with [Case: Quantificational], because earlier stages of Russian and some dialects exhibit homogeneous morphosyntax in the higher numerals just as in the lower numerals.³

³ The literary norm permits homogeneous morphosyntax in contexts analogous to (14) under certain conditions; see Rappaport 2003 for an extension of this approach to constructions such as the following:

- (i) pojmat’ četyre ryby
 to-catch four_{PAUC} fish_{GEN.SG}
 ‘to catch four fish’

The form of the adjective after lower numerals is subject to considerable variation. In combination with masculine nouns, both cases on the adjective were possible as recently as in the 19th century, although the nominative is virtually impossible today. Interestingly, stylistics books note that feminine nouns in principle permit either the nominative or genitive form of the adjective, but the nominative is favored when the noun has homophonous forms for the genitive singular and nominative plural. Thus:

- (15) a. dva malen'kix/*malen'kie stola
 two small_{GEN.PL/*NOM.PL} tables
 'two small tables'
- b. dva malen'kix/malen'kie devočki
 two small_{GEN.PL/NOM.PL} girls
 'two small girls'
- c. dve širokix /*širokie rekí (nominative plural: réki)
 two broad_{GEN.PL/*NOM.PL} rivers
 'two broad rivers'

The contrast between (15a, b) indicates that gender is present in the plural:⁴ the paucal case is spelled out as the default by a syncretism with the genitive for adjectives, with an option of the nominative available in the presence of the feature for feminine gender. It is difficult to formalize, but this latter option is ruled out if following noun takes a form phonologically distinct from the nominative.

4. Summary

- Numerals in Russian (as opposed to “numbers”) may be Merged in syntactic structure with or without a value for Case; features for gender and animacy are necessarily unvalued, to be assigned a value in concord with the quantified noun. Adjectives have unvalued features for all these feature types. Nouns also can be Merged with or without a valued case feature, but gender and animacy must be valued. Here lies the essence of the hybrid nature of numerals.

(ii) obslužít' sto (dvadcat') dva klienta
 'to-serve hundred (twenty) two_{PAUC} clients_{GEN.SG}
 'to serve one hundred (twenty) two clients'

⁴ This conclusion, based on independent evidence, was reached by Zaliznjak 1964.

- The distinction between valued and unvalued case features accounts for the distribution of heterogeneous and homogeneous morphosyntax, respectively, within numeral phrases.
 - Structural case is assigned by Agree to nouns with an unvalued case feature; moreover, structural case need not be realized (since it permits the genitive of negation and special quantified nominal structures, the latter with prepositions or inversion). Inherent case is licensed by selection (essentially, Merge); that is, the noun must have the appropriately valued case feature in order to be selected.
 - A numeral with a valued case feature which will be copied onto the head noun (giving heterogeneous morphosyntax) can stand in a position of structural case, but not in one of inherent case: the latter position entails that the noun have a valued case feature, so that it cannot receive another case value by Agreeing with the numeral.
 - Syntactic considerations permit a numeral with an unvalued case feature in positions of either structural or inherent case. Sometimes both possibilities are in fact attested, and they may not be phonologically distinct. However, the lack of a Spellout rule for numerals assigned the nominative under Agreement renders some outputs unpronounceable.
- Animacy is an “abstract” formal feature of nouns because it is always expressed in the form of a syncretism with the genitive case. We propose that numerals may be associated with case features which are “abstract” in this same way: higher numerals are lexically marked with the quantitative case, and lower numerals are lexically assigned the paucal case. These case features are copied by Agree onto the quantified noun (and its modifiers). The quantitative and paucal case on nouns and adjectives are spelled out by the genitive (with the latter case invoking a further morphological change in number from plural to singular).

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