

## The Grammatical Role of Animacy in a Formal Model of Slavic Morphology

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### 1. Introduction

This paper develops a new, Minimalist, approach to a familiar problem. The problem is to provide a satisfactory linguistic analysis of the morphosyntax of numeral expressions in the Slavic languages. More specifically, we aim to provide a formal theory defining (a) the effect that a numeral has on the morphological form of the nominal phrase it quantifies, (b) the form that the numeral itself takes, and (c) the effect of animacy. The problem is complex: not all numerals exhibit the same grammatical behavior, morphosyntactic patterns depend upon syntactic context, and there is considerable variation within individual Slavic languages and across the language family. In this paper, we limit ourselves to Contemporary Standard Russian (CSR), with some consideration of historical and dialectal data.

### 2. The Problem

The paradox of numeral phrases in Russian lies in the fact that the numeral acts like a nominal head of phrase in the direct cases (1a), but like a modifier of the quantified noun in the oblique cases (1b):<sup>1</sup>

- (1) a. видеть пять<sub>ACC=NOM</sub> красивых<sub>GEN PL</sub> птичек<sub>GEN PL</sub>  
‘to see five beautiful birds’
- b. восхищаться пятью<sub>INS</sub> красивыми<sub>INS PL</sub> птичками<sub>INS PL</sub>  
‘to be enthralled by five beautiful birds’

The syntax of (1a) is that of, say, *видеть стаю*<sub>ACC SG</sub> *красивых*<sub>GEN PL</sub> *птичек*<sub>GEN PL</sub> ‘to see a flock of beautiful birds’, in which *стая* ‘flock’ is the head of the direct object noun phrase (in the accusative case) and *красивых птичек* ‘beautiful birds’ is a genitive complement of *стая*. In (1b), each constituent of the phrase stands in the instrumental case required by the governing verb, as if *пятью*<sub>INS</sub> *красивыми*<sub>INS PL</sub> *птичками*<sub>INS PL</sub> ‘five beautiful birds’ were a noun phrase headed by ‘birds’, with ‘five’ and ‘beautiful’ as modifiers. Following Babby

(1987 and elsewhere), we term the morphosyntactic pattern displayed in (1a) HETEROGENEOUS, and that displayed in (1b) — HOMOGNEOUS. To actually posit a contrast in syntactic structure to account for this contrast in morphosyntax would lead to overgeneration (deriving constructions which are actually not grammatical), and a complicated apparatus would be required to rule out the ungrammatical possibilities. The challenge has been to find alternative means of accounting for the apparent variation in structure.

We define a NUMERAL to be a category (part of speech) that displays heterogeneous agreement in the direct cases (nominative and accusative), and homogeneous agreement in the remaining, oblique cases. This category is split into two in Russian:

LOWER NUMERALS assign the singular grammatical number under heterogeneous agreement (*видеть две реки*<sub>GEN SG</sub> ‘to see two rivers’), while HIGHER NUMERALS do not (*видеть пять рек*<sub>GEN PL</sub> ‘to see five rivers’). In contrast, the number *один* ‘one’ displays homogeneous morphosyntax regardless of syntactic context, and is therefore an adjective. Certain other numbers (e.g., *тысяча* ‘thousand’, *миллион* ‘million’) display heterogeneous morphosyntax in all contexts and are nouns.<sup>2</sup> Thus, not all numbers are categorially numerals.

Now consider the morphological category of animacy.<sup>3</sup> Nouns and adjectives assigned the accusative case in the syntax will take the morphological form of the genitive if animate, and nominative if inanimate, in the following paradigmatic contexts: all nouns and adjectives in the plural, masculine nouns in the singular of Declension I (e.g., *вол* ‘ox’ versus *стол* ‘table’), and adjectives in the masculine singular. This morphological genitive form in place of the syntactically expected accusative has traditionally been called the GENITIVE-ACCUSATIVE. We ask, then, whether an accusative numeral phrase headed by an animate noun will exhibit the heterogeneous morphosyntax of the direct cases (like the accusative) or the homogeneous pattern of the oblique cases (like the genitive)?

Consider the following examples, a pair of lower numeral phrases (2) followed by a pair of higher numeral phrases (3):

- (2) a. (прилетели) два<sub>NOM</sub> надежных<sub>GEN PL</sub> летчика<sub>GEN SG</sub>  
‘two reliable pilots (flew in)’
- b. (видеть) двух<sub>ACC=GEN</sub> надежных<sub>ACC=GEN PL</sub> летчиков<sub>ACC=GEN PL</sub>  
‘(to see) two reliable pilots’
- (3) a. (прилетели) пять<sub>NOM</sub> надежных<sub>GEN PL</sub> летчиков<sub>GEN PL</sub>  
‘five reliable pilots (flew in)’
- b. (видеть) пять<sub>ACC=NOM</sub> надежных<sub>GEN PL</sub> летчиков<sub>GEN PL</sub>  
‘(to see) five reliable pilots’

The numeral phrases in the nominative position of clause subject (2a) and (3a) exhibit heterogeneous morphosyntax: the genitive case form of the noun and adjective is determined by the numeral, not by syntactic context, and the singular number of the noun in (2a) is assigned by the preceding lower numeral, in contradiction to the plurality of its referents. In contrast, the lower numeral phrase in the accusative position of direct object (2b) exhibits homogeneous morphosyntax, i.e., the genitive case forms of the adjective and noun represent the Genitive-Accusative that would appear even in the absence of the numeral (if the numeral were the source of the genitive case, the noun would be in the singular, as in (2a)). The morphosyntax of the corresponding higher numeral phrase (3b), on the other hand, is not clear, since higher numerals do not assign singular number to the nouns which follow them. Example (3b) could represent heterogeneous morphosyntax, as in the corresponding nominative phrase (3a). Alternatively, (3b) could represent homogeneous morphosyntax as in (2b), although in the latter event something would need to be said about why the higher numeral itself does not exhibit the Genitive-Accusative.

It might seem that first we must resolve this question of structure before developing a theory of numeral phrases. In fact, we will do the opposite: proceed to develop a theory, which will then answer for us this question of analytic detail.

### 3. Halle's Analysis: A Morphological Approach

Halle (1990; 1995) develops an approach to Russian numeral phrases within the framework of Distributed Morphology (see also Halle and Marantz 1993). Many of Halle's theoretical assumptions are incorporated in our sketch of the architecture of grammar, diagrammed in Appendix 1. This approach assumes a version of the Split Morphology Hypothesis: derivational morphology is separate from inflectional morphology. In particular, derivational morphology is in the lexicon, applying before words are inserted into syntactic structure, while inflectional morphology follows the assembly of syntactic structure in what Chomsky calls the NARROW SYNTAX. The output of the narrow syntax is a level called MORPHOLOGICAL FORM, which leads to the phonology through two distinct blocks, or components, of morphological rules.

The first of these blocks, devoted to WORD SYNTHESIS, expresses redundancies, filling in predictable details. Word Synthesis rules can only add feature values; they cannot change feature values already specified. This rule property is exploited to account for exceptions: a feature normally assigned a value by a Word Synthesis rule can exceptionally be assigned a value in the lexicon; this value will not then be changed to the value assigned by Word Synthesis. Also, Word Synthesis rules can refer to syntactic structure; for this reason we include them, along with the narrow syntax, in a SYNTAX/SEMANTICS component.

The output of Word Synthesis is fed to the READJUSTMENT block, which is the domain of morphological syncretism. That is, while rules of Word Synthesis are FEATURE-FILLING, the rules of Readjustment are FEATURE-CHANGING: feature values are replaced with other values in a given morphological context. Readjustment rules are limited to word structure proper, and therefore are unable to refer to syntactic context.

The core of Halle's analysis lies in clusters of rules in these two areas.<sup>4</sup> First we consider his Word Synthesis rules:

- (4) a. **Concord:** Spread case, number, gender, and animacy from the head noun throughout its maximal projection to its modifiers (including numerals).

b. **Assign Declension Class** (to nouns and adjectives):

[Declension Class:]  $\Rightarrow$

[Declension Class: II] / \_\_\_ + [Gender: Feminine]

[Declension Class: I] / \_\_\_ + [Gender: {Masculine/Neuter}]

The Concord rule (4a) is self-explanatory, and we present it informally. The Assign Declension Class rule (4b) is an innovation of Halle's, which we adopt. There are two ideas incorporated in this rule. First, the declension class of nouns is predictable from the inherent gender associated with the lexeme in the lexicon.<sup>5</sup> Exceptions (Declension Class III, minor declension classes, masculine words of Declension Class II such as *дядя* 'uncle', indeclinable nouns, etc.) are assigned declension class in the lexicon, so that they do not undergo this rule. Second, the adjectival declension classes are assimilated to those of the nominal system: adjectives agreeing with masculine and neuter nouns are identified as (adjectival) Declension Class I, and those agreeing with feminine nouns are identified as (adjectival) Declension Class II. This terminological generalization makes it possible to simplify the statement of the Accusative Syncretism (see below). As expected of Word Synthesis rules, (4a, b) add lexically unspecified morphological detail which is predictable from context (syntagmatic in the former case, paradigmatic in the latter).

Now consider Halle's Readjustment rules:

(5) a. **Accusative Syncretism:**<sup>6</sup>

[Case: Accusative]  $\Rightarrow$

[Case: Genitive] / \_\_\_ + [Animacy: +] +

{[Number: Plural] / [Number: Singular, Declension Class: I]}

[Case: Nominative] elsewhere

(except / \_\_\_ + [Number: Singular, Declension Class: II])

b. **Q-Gen:**

[Case: Nominative]  $\Rightarrow$  [Case: Genitive] / \_\_\_ + {Noun/Adjective}, to the right of any numeral in a direct case

c. **Singular Assignment:**

[Number: Plural]  $\Rightarrow$  [Number: Singular] / \_\_\_ + Noun, to the right of a lower (i.e., adjectival) numeral in the nominative case

ACCUSATIVE SYNCRETISM (5a) formalizes the fact that throughout the plural, and in the singular of masculine nouns and (by (4b)) adjectives of Declension Class I, the accusative takes the form of the genitive if the head noun is animate; otherwise, the accusative takes the form of the nominative (with a stipulated class of exceptions). The QUANTITATIVE GENITIVE (Q-Gen) rule (5b) assigns the genitive case after all numerals, and SINGULAR ASSIGNMENT (5c) assigns the singular number after lower numerals; the two categories of numeral are distinguished by taking higher numerals to be nouns, and lower numerals to be adjectives. As expected, Readjustment rules change feature values that have been previously assigned. Accusative Syncretism and Q-Gen replace a case value expected in a particular syntactic context with another value under a well-defined set of grammatical conditions (paradigmatic and syntagmatic, respectively). Singular Assignment replaces the semantically motivated plural number assigned in the lexicon with an anomalous singular.

Q-Gen and Singular Assignment, which are responsible for heterogeneous morphosyntax, are defined by Halle to apply only to nouns and adjectives in the nominative case. However, heterogeneous morphosyntax is found in accusative contexts as well:

- (6) a. видеть два<sub>ACC=NOM</sub> надежных<sub>GEN PL</sub> счетчика<sub>GEN SG</sub>  
'to see two reliable meters'
- b. видеть пять<sub>ACC=NOM</sub> надежных<sub>GEN PL</sub> счетчиков<sub>GEN PL</sub>  
'to see five reliable meters'

Deriving such constructions requires that Q-Gen and Singular Assignment apply to the output of Accusative Syncretism, so that the syntactically assigned accusative has been replaced by the nominative. If, however, the head nouns are animate (say that *счетчики* in (6) is understood as 'meter readers', rather than as 'meters'), the derivation proceeds differently, giving the paradigm seen above in (2–3). Since Q-Gen applies only to words in the nominative and Accusative Syncretism applied to an animate Noun Phrase will not

produce nominatives to feed Q-Gen, the genitive case forms following the numerals in (6) would (as in (2b)) necessarily result from the Accusative Syncretism rule directly. Thus, while the numeral phrases in (6) with an inanimate noun exhibit heterogeneous morphosyntax, the corresponding numeral phrases with an animate noun exhibit homogeneous morphosyntax. The difference between seeing reliable meter readers and reliable meters is palpable in the morphological form of an associated lower numeral ( $\partial\text{byx}_{\text{GEN}}$  ‘two’ as in (2b) instead of the nominative form  $\partial\text{ba}$  in (6a)), but not a higher numeral ( $\text{nyam}_{\text{NOM}}$  ‘five’ in (3b) as in (6b)). This difference is explained by the proposed categorial distinction among numerals. A higher numeral is identified in the lexicon as a singular noun, but not of Declension Class I; such a morphological form will not be assigned the genitive case by Accusative Syncretism. As an adjective, a lower numeral has no inherent number, and will be assigned the plural under Concord with the following noun. As such, it will be assigned the genitive by Accusative Syncretism.

We note a number of problems with Halle’s analysis:

- (7) a. Stipulating that Singular Assignment and Q-Gen apply only to nouns and adjectives in the nominative is the mechanism for distinguishing the distribution of heterogeneous and homogeneous morphosyntax. But no explanation is offered for this restriction.
- b. Singular Assignment and Q-Gen must follow Accusative Syncretism, because the first two rules apply in cases that have undergone the last (cf. discussion of (6) above). Since Accusative Syncretism is a Readjustment rule, so must be these two rules which follow it. Therefore, these two rules should not have access to syntactic structure. But their application ‘to the right of a numeral’ represents exactly that. More generally, these rules can both access syntactic structure and change features, a type of rule predicted by the theory not to exist.
- c. Halle distinguishes higher numerals from lower ones in terms of the noun-adjective distinction, respectively. If higher numerals are nouns, one would not expect them to undergo Concord and agree with another noun in the oblique cases.

- d. Halle accounts for the nominative morphology of the numeral in the accusative phrase (3b) (*пять надежных летчиков* instead of *\*пяти надежных летчиков*) by noting that the higher numerals are singular nouns, but not of Declension Class I, so that Accusative Syncretism assigns them the nominative case. But the form ruled out in principle is attested in a range of Russian dialects and earlier stages of Russian, as will be documented below in section 4.

These problems are serious enough to suggest the need for a substantially different approach.

#### **4. Proposed Solution: A Minimalist Approach**

We share Halle's essential theoretical assumptions (as displayed in Appendix I), and agree with him (and others, such as Babby 1987) that both lower and higher numeral phrases have uniform syntactic structures with the noun as the head. Our analysis seeks to obviate the problems in his particular analysis by (a) placing case assignment (and concord) squarely in the syntax, and (b) assuming an inventory of cases including 'abstract' cases expressed by Readjustment rules as syncretic with other cases. The analysis crucially exploits the architecture of grammar displayed in Appendix I. We now sketch three aspects of that theory which will be important for the ensuing discussion.

First, an essential principle of the Minimalist approach is this: since the function of the derivation is to generate sound-meaning pairs, more precisely, pairs of representations at the SENSORIMOTOR (SM) and CONCEPTUAL-INTENTIONAL (C-I) interfaces, all features (grammatical information) must be interpretable at one or the other interface. In order to be interpretable, a feature must take the form of a type and a value. For example, plurality, interpretable at the C-I interface, would be represented on a nominal lexeme upon insertion in syntactic structure by the feature [Number: Plural]. On the other hand, there are semantically uninterpretable features (illegible at the C-I interface) which must be represented in the syntax, because (a) they are interpretable at the SM interface (i.e., are PHONOLOGICALLY INTERPRETABLE), and (b) their value is determined by syntactic context. Examples include case and concord features on an adjective. This latter type of feature is

inserted into syntactic structure in the form of a feature containing a type without a corresponding value, such as [Case:] or [Number:]; the value of such a feature must be determined during the course of the derivation. Thus, features can be VALUED or UNVALUED. As a matter of definition, we will say that two instances of a feature MATCH if they contain the same type, regardless of their value.

Second, AGREE is a basic operation of the narrow syntax, implementing case assignment and predicate agreement (cf. Chomsky 2000; 2001). For our purposes, the following simplified definition is sufficient:

- (8) a. Two categories Agree iff all of the following conditions are satisfied:
- one of the categories c-commands the other;
  - each of the categories is ACTIVE (i.e., contains some unvalued feature);
  - there is at least one matching feature shared by the two categories; and
  - for each pair of matching features, at least one must be unvalued.
- b. When two categories Agree:
- the value of any valued matching feature is copied onto its unvalued counterpart; and
  - semantically uninterpretable features in the Agreeing categories are deleted from the Syntactic/Semantic derivation and passed on to Morphological Form.

For example, in the standard situation of establishing predicate agreement, the subject nominal phrase contains valued features for 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 (for person and number), and unvalued features become valued: T is assigned values for person and number, and the subject noun phrase is assigned a value for case. The case feature, and the features for person and number on T are semantically uninterpretable and thus removed from the derivation of the C-I interface, but

passed on to Morphological Form, because they will eventually find expression at the SM interface.

Third, the new model differs from earlier models of generative grammar in interweaving lexical insertion and other syntactic operations in a single cycle. That is, rather than first creating a structure for the entire sentence ('D-Structure'), and then applying transformations proceeding from bottom to top, the new model creates lexical structure (by Merge) and applies operations to the resulting structure (by Agree) in a single cycle, from bottom to top. As a result, portions of the sentence's structure are passed on to Morphological Form before the higher syntactic structure containing these portions exists. This is the mechanism which accounts for 'island conditions', or opacity: when structure has been passed on to Morphological Form, it is no longer accessible to operations (Agree) applying higher in the tree.<sup>7</sup>

With these theoretical preliminaries out of the way, we now return to the morphosyntax of numeral phrases in Russian.

## 5. Higher Numerals

Our detailed analysis of Russian numeral phrases begins in this section with higher numerals and continues with lower numerals in the next section. The rules are formalized and presented together in Appendix 2.

A higher numeral in a syntactic context normally assigned the nominative case (e.g., (3a)) is responsible for the genitive case form of the noun it quantifies. We assume that Agree is the mechanism of case assignment: a higher numeral may be associated in the lexicon with a fixed value for case, which is then copied onto the head noun and spread to modifiers under Agree. This value cannot be the genitive, because then the numeral itself would be in the genitive (e.g., \**Прилетели пяти*<sub>GEN</sub> *летчиков*<sub>GEN PL</sub> 'Five pilots flew in'). We take as a model the grammatical category of animacy, which is 'abstract' in that it is never associated with a distinctive morpheme, but rather is only expressed in the form of a

syncretism (formalized by a Readjustment rule), replacing the accusative case feature with the nominative or genitive. Correspondingly, we assume an ‘abstract’ QUANTITATIVE case.<sup>8</sup> That is, higher numerals may be associated with the feature [Case: Quantitative]. In order for Agree to apply, the numeral must be active, i.e., contain an unvalued feature. On the basis of the (admittedly limited) gender agreement found in numerals, we take gender to be that feature, which is valued by the head noun.<sup>9</sup> The Readjustment rule QUANTITATIVE CASE SYNCRETISM (26a) replaces the quantitative case on nouns and adjectives with the genitive, and a Spell-out rule (27) assigns phonological form to numerals in the quantitative case directly. In the oblique cases, the case feature of the numeral is lexically unvalued, and is valued by a routine application of Agree as a special case of Concord.<sup>10</sup>

In attributing case assignment by the numeral to Agree, we place it in the syntax (24). Agree thus precedes the Readjustment rule of ACCUSATIVE SYNCRETISM (26c). This has two important consequences, which we discuss in turn.

First, recall that Halle attributes the heterogenous morphosyntax of numeral phrases in accusative positions such as (6b) to the application of Accusative Syncretism before Q-Gen. But our theoretical assumptions force the reverse order, so that the Quantitative Genitive is assigned in both direct case environments, rather than only in a nominative environment (pace Halle). How can we explain the fact that a valued case feature on the numeral (triggering the Quantitative Genitive) is correlated with the direct cases, and an unvalued case feature on the numeral is correlated with oblique cases?

The answer lies in the completely independent distinction between the mechanisms of structural case and inherent case. Structural case is by definition assigned by a mechanism unrelated to the assignment of a semantic role. The direct cases assigned to grammatical subjects and direct objects are structural cases: a nominal phrase is assigned the nominative (or accusative) case not because it is the subject (object) of a particular verb, but because it is the subject (object) of its clause. In the model assumed here, structural case is assigned by

the operation of Agree. An important property of structural case in Russian is that it need not be realized: the corresponding positions permit the genitive of negation, prepositional quantifiers (e.g., distributive *по*, approximative *около*, etc.), and caseless quantifiers (e.g., *много* ‘many, much’) (cf. Babby 1985). In contrast, inherent case is defined as case assigned in association with the assignment of a semantic role to the corresponding nominal phrase. Bound up as it is with the lexical properties of a governing lexical item, inherent case is licensed by selection. The case feature of an argument phrase is valued in the lexicon; the lexical representation of the verb not only stipulates, for example, that it combines with a noun phrase, but it further subcategorizes for a noun phrase with a particular case feature. In order that selection requirements be satisfied, inherent case must be realized.

The distinction between the two syntactic contexts of direct/structural case and oblique/inherent case is precisely that distinguishing heterogeneous and homogeneous morphosyntax, respectively, in numeral phrases.<sup>11</sup> The mechanism just outlined derives the facts directly, given the architecture of grammar assumed here. Since Merge and Agree apply in a single cycle, the higher syntactic context does not even exist during the NP-internal derivation, permitting heterogeneous morphosyntax to result from a valued case feature on the numeral in positions of structural case marking (both nominative and accusative). At the same time, we must block the result of an unvalued case feature on the numeral in these positions, which would give homogeneous morphosyntax; for example:

- (9) \*Пять<sub>NOM</sub> надежные<sub>NOM PL</sub> счетчики<sub>NOM PL</sub> перестали работать.  
 ‘Five reliable meters stopped working.’

We rule out this construction simply by assuming that numerals have no nominative case form.<sup>12</sup> There is a Spell-out rule for higher numerals in the quantitative case (27), required in the direct cases), but not for those in the nominative case.

Conversely, the numeral’s case feature in oblique/inherent cases 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 (8)). If Agree does not apply, then the gender feature of the numeral rendering it active would never be valued.

Numeral lexemes, then, admit the possibility of either a valued or unvalued case feature. A valued case feature on the numeral results in heterogeneous morphosyntax in the phrase, and an unvalued case feature results in homogeneous morphosyntax. The architecture of grammar automatically accounts for the association of the former with direct case positions and of the latter with oblique case positions. The fact that various quantified expressions not realizing structural case are found in precisely those syntactic contexts which permit heterogeneous case constitutes important independent evidence that structural case (unlike inherent case) need not be morphologically realized, for this is an inevitable consequence of our analysis.

The second important consequence of ordering the assignment of the Quantitative Genitive before Accusative-Syncretism affects numeral phrases whose head noun is grammatically animate. Recall that (3b) could *prima facie* be interpreted as exhibiting either homogeneous or heterogeneous morphosyntax, depending upon whether the genitive case forms represent the Quantitative Genitive (heterogeneous morphosyntax, valued case feature) or the Genitive-Accusative (homogeneous morphosyntax, unvalued case feature). Our theory resolves this question in favor of the former analysis. We have two scenarios to consider.

The analysis provided above of an inanimate higher numeral phrase (6b), entailing that the higher numeral is associated with the feature [Case: Quantitative], applies directly to an animate counterpart (3b): since the syntactic operation Agree applies before the Readjustment rule of Accusative Syncretism, the Quantitative Genitive is assigned in a direct case position before the Genitive-Accusative and without regard to animacy. The application

of Agree copies the animacy of the noun onto the numeral, but this is irrelevant to the morphological expression of the quantitative case, as it is to the spell-out of every other case except the accusative.

If the case feature of a higher numeral in a direct object position is unvalued, the quantified noun is assigned the accusative case, and the numeral and modifiers agree with that noun. Each of these words, including the numeral, then undergoes Accusative Syncretism (26c), replacing the accusative with the genitive. But the result is ungrammatical:

- (10) \*Мы нашли пяти<sub>ACC=GEN</sub> надежных<sub>GEN PL</sub> летчиков<sub>GEN PL</sub>.  
'We found five reliable pilots.'

Since the numeral itself seems indifferent to the animacy of the head noun (compare (3b) and (6b)), the simplest account is to assume that higher numerals have no animacy feature at all. The numeral is assigned accusative case by Agree, and then undergoes Accusative Syncretism, replacing its [Case: Accusative] feature with [Case: Nominative]. Since numerals have no nominative case (see above), the result of this derivation is unpronounceable. Thus, only a valued case feature on a higher numeral in a direct case position leads to a grammatical result: heterogeneous morphosyntax.

Halle accounted for the ungrammaticality of constructions such as (10) by treating numerals as *singularia tantum* members of the third declension, to which the Accusative Syncretism rule will not assign the Genitive. This could not be the entire story in Russian, because not all higher numerals belong to the third declension (e.g., *сорок* '40', *девяносто* '90', *сто* '100', *двести* '200', etc.). Clearly this account could be patched, because it is true that higher numerals do not belong to Declension Class I, the class that Accusative Syncretism assigns the genitive to in the singular. However, the same logic obtains in grammars otherwise quite similar to that of CSR which permit such constructions. In particular, analogous facts are attested in earlier stages of Russian (Bulakhovskii 1958, 200; see also Grannes 1986):

- (11) a. На нынешних неделях призывали они нас к себе в дом, девяти<sub>ACC=GEN</sub> человек пехотного чина да пяти<sub>ACC=GEN</sub> человек посацких людей.  
 ‘In recent weeks they called us to (their) home, nine infantrymen and five petit bourgeoisie ...’
- b. Кормим десети<sub>ACC=GEN</sub> человек.  
 ‘We are feeding ten people.’

Such forms are attested in Russian dialects as well (ibid):

- (12) Убили пяти<sub>ACC=GEN</sub> уток.  
 ‘They killed five ducks’

We propose to treat the issue as one of low-level, lexical variation. That is, in CSR higher numerals do not have an animacy feature, but in other variants of Russian they may. On the second scenario discussed above, with an unvalued case feature, the numeral is assigned [Case: Accusative, Animacy: +], which would be rendered by Accusative Syncretism as [Case: Genitive].<sup>13</sup> In this way, we account for the fact that a numeral phrase in the accusative may or may not differ from that same phrase in the nominative.

A richer paradigm is found in CSR in the alternation of adjectival and numeral forms such as *многие* / *много* ‘many’ and *несколько* / *несколько* ‘a few’. Either form can be used in the accusative:

- (13) Мы видели {много<sub>QUANT</sub> / многих<sub>GEN PL</sub>} людей.  
 ‘We saw many people’

The form without agreement *много* 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 Spell-out rule directly. The form with agreement *многих* 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 the genitive as a result of Accusative Syncretism. Thus, the genitive case of *люди* ‘people’ has

different sources in the two variants of (13). The same two options are available in subject position as well:

- (14) a. Много<sub>QUANT</sub> людей<sub>GEN PL</sub> пришло.  
‘Many people came.’  
b. Многие<sub>NOM PL</sub> люди<sub>NOM PL</sub> пришли.  
‘Many people came’

(14b) is an option not available to numerals, which have no Spell-out 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.

## 6. Lower Numerals

In Russian the genitive singular is assigned to nouns with plural referents after certain numerals in nominative case positions. We take this to be the defining property of the lower numerals: *два* ‘two’, *три* ‘three’, *четыре* ‘four’, and *оба* ‘both’. Russian represents a marked situation, in contrast to Polish, for example, in which the corresponding numerals have no morphosyntactic effect and combine with the plural in whatever case the syntactic context requires; e.g., *dostałem {dwa / trzy / cztery / oba} listy*<sub>ACC=NOM PL</sub> ‘(I) received {two / three / four / both} letters’. The fact that the Quantitative Genitive is assigned after higher, but not lower, numerals in such a closely-related language suggests that in Russian the genitive after lower numerals is independent of that after higher numerals: Polish has the latter without the former. Lower numerals in Russian, then, can be treated as analogous to higher numerals, associated with an ‘abstract’ case expressed by syncretism, except that the value of that case differs in the two kinds of numerals. We assume a PAUCAL case for Russian, which is spelled out on the head noun by the PAUCAL CASE SYNCRETISM Readjustment rule (26b) as the genitive singular. There is, incidentally, fragmentary evidence in Russian of a distinct phonological expression of the paucal category: four words have specially stressed forms found only when they follow lower numerals:

(15)

nominative	ряд ‘row’	час ‘hour’	шаг ‘step’	шар ‘sphere’
genitive	ряда	часа	шага	шара
paucal	рядá	часá	шагá	шарá

Such exceptions to the syncretism are identified in the lexicon (cf. (23)), thereby escaping the effect of the normal Paucal Case Syncretism rule.

The morphological form of adjectives in the paucal case is subject to variation. In the masculine gender, the paucal case of adjectives could take the form of either the nominative or the genitive case as recently as the nineteenth century, although the nominative is virtually impossible today. In the feminine, either case form is permissible for the paucal today. Thus:

- (16) a. два {маленьких<sub>GEN PL</sub> / \*маленькие<sub>NOM PL</sub>} стола<sub>GEN SG MASC</sub>  
‘two small tables’
- b. две {маленьких<sub>GEN PL</sub> / маленькие<sub>NOM PL</sub>} девочки<sub>GEN SG FEM</sub>  
‘two small girls’

Correspondingly, readjustment rule (26b) rewrites paucal case as the genitive for adjectives as a default, with an option of the nominative available in the presence of the feature [Gender: Feminine].

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 (2a); the numeral itself is spelled out as a form of the paucal case (see (27)). A numeral in this form cannot appear in a position of oblique/inherent case (\*с два<sub>PAUC</sub> летчиками<sub>INS PL</sub> ‘with two pilots’): neither of the matching case features is unvalued, so that Agree cannot apply (recall the definition of the operation given in (8)). If the case feature is Merged as unvalued, then the numeral is perfectly compatible with oblique/inherent case and undergoes Agree as does an adjective, giving homogeneous morphosyntax: с двумя<sub>INS</sub> летчиками<sub>INS PL</sub> ‘with two pilots’; this same form in a direct/structural case position, however, will give an ungrammatical result:

- (17) \*Прилетели два надежные<sub>NOM PL</sub> летчики<sub>NOM PL</sub>.  
 ‘Two reliable pilots flew in.’

Under the homogeneous morphosyntax invoked by an unvalued case feature, the numeral is assigned the nominative case to agree with the subject noun. As in the case of analogous constructions with higher numerals, homogeneous morphosyntax in a direct case position is blocked by the absence of rule spelling out nominative numerals.

While higher numeral phrases in the accusative exhibit heterogeneous morphosyntax in CSR (3b), the typical pattern for lower numerals is homogeneous (2b). This homogeneous pattern is impossible for higher numerals in CSR because such numerals have no animacy feature. It is an accidental, lexical fact, that the animacy feature is unavailable to higher numerals, because, as noted above, earlier stages of Russian and some dialects exhibit homogeneous morphosyntax in the higher numerals just as in the lower numerals. This marked state of affairs in the higher numerals of CSR is not shared by lower numerals, which behave like adjectives in taking on the animacy, gender and case of the head noun and undergoing Accusative Syncretism. What, then, blocks heterogeneous morphosyntax for lower numerals in this context? The answer is: nothing. There are two areas of CSR in which precisely this is observed, with the lower numbers exhibiting behavior more typical of the higher numerals.

The first involves simple lower numerals. Some examples follow from Krys’ko 1994, who also sees the influence of higher numerals at play:

- (18) a. Артемий Осипович имел у себя два<sub>PAUC</sub> сына<sub>GEN SG</sub> [1770]  
 ‘A. O. had with him two sons.’  
 b. Золото купило четыре<sub>PAUC</sub> жены<sub>GEN SG</sub>. [Lermontov]  
 ‘Gold purchased four wives.’  
 c. Не очень плохо иметь три<sub>PAUC</sub> жены<sub>GEN SG</sub>. [from the contemporary film  
*Кавказская пленница*]  
 ‘It isn’t too bad to have three wives.’

While such examples are non-standard today, grammars and stylistics manuals such as Rozental' (1987, 132) note that numeral phrases with simple lower numerals may exhibit heterogeneous morphosyntax in a position of accusative case assignment. In the literary norm, this is only possible (if somewhat bookish) with feminine nouns denoting animals and birds, that is, non-personal animate beings:

- (19) a. Платил прогоны за две<sub>PAUC</sub> свежие<sub>NOM PL</sub> лошади<sub>GEN SG</sub>.  
 'He paid tolls for two fresh horses.'
- b. подстрелить три<sub>PAUC</sub> утки<sub>GEN SG</sub>  
 'to shoot three ducks'
- c. поймать четыре<sub>PAUC</sub> рыбы<sub>GEN SG</sub>  
 'to catch four fish'

This effect is possible in CSR with masculine nouns, but only in special contexts, as in the following example (cited by Mel'chuk 1980):

- (20) Он успевае́т посмотре́ть за день не более́ чем четыре́<sub>PAUC</sub> челове́ка<sub>GEN SG</sub>.  
 'He manages to examine in a day no more than four people.'

The second body of data involves compound numerals ending in lower numerals, which exhibit the two patterns of morphosyntax characteristic of simple lower numerals, but with two differences. First, the gender of the noun is irrelevant; second, heterogeneous morphosyntax is normative, with the homogeneous pattern already bookish and somewhat unnatural:

- (21) a. Решено послать́ шестьсо́т соро́к две́<sub>PAUC</sub> сестры́<sub>GEN SG</sub>. (Vinogradov 1934)  
 'It was decided to send six hundred forty-two nurses.'
- b. Кие́вский университе́т приобре́л соро́к два́<sub>PAUC</sub> преподава́теля<sub>GEN SG</sub>. [ibid.]  
 'Kiev University acquired forty-two instructors'
- (22) a. напра́вить на рабо́ту соро́к три́<sub>PAUC</sub>молоды́х<sub>GEN PL</sub> специа́листа<sub>GEN SG</sub>  
 'to send forty-three young specialists to work'
- b. обрабо́тать сто́ (два́дцать) два́<sub>PAUC</sub> клиента́<sub>GEN SG</sub>  
 'to wait on one hundred (twenty) two clients'

While some commentators (Krys'ko 1994, Grannes 1986) see a trend toward the numeral becoming indeclinable, this is hardly plausible, in view of the morphosyntactic effect of the numeral in assigning the genitive singular to the noun which follows it. Rather, the issue is whether the lower numerals have a lexically fixed case feature ([Case: Paucal]) or not. The result in either case follows from the rules we have already described.

## 7. Summary

Slavic numerals (as opposed to 'numbers') are defined by their ability to be Merged in syntactic structure with or without a value for Case; gender and animacy features are necessarily unvalued. 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. Herein lies the essence of the hybrid nature of numerals.

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 in the narrow syntax by Agree to nouns with an unvalued case feature; moreover, structural case has the property that it need not be realized (prepositional quantifiers and the Genitive of Negation are permitted in the corresponding positions). Inherent case is licensed in the narrow syntax by selection (essentially, Merge); that is, the noun be associated in the lexicon with 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 a position of inherent case: in order for a noun to stand in this position, it must be valued for case to be selected, but such a noun is not active and the numeral cannot Agree with it.

An unvalued case feature is syntactically possible in both structural and inherent case positions. However, the lack of a Spell-out 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 may be lexically marked with the quantitative case, and lower numerals may be 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 undergo Readjustment rules to be replaced by the genitive (with the paucal case of nouns undergoing a change in number as well, from plural to singular). A numeral can stand in the Genitive-Accusative only in a configuration of homogeneous morphosyntax: heterogeneous morphosyntax follows from a lexically specified case feature, which in turn will not undergo Accusative Syncretism. Finally, Spell-out rules assign phonological form to numerals in the abstract cases.

The analysis developed here can and should be extended naturally and with a minimal number of stipulations to account for the range of intricate morphological facts across several variants of Russian and other Slavic languages. Limitations of space require that this project be pursued in separate work.

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## NOTES

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

<sup>2</sup> The number *тысяча* 'thousand' can in some styles and contexts exhibit properties of a higher numeral; we put these facts aside here.

<sup>3</sup> The morphological category of animacy does not directly reflect biological animacy; discussion can be found in any standard grammar or stylistics handbook (e.g., Rozental' 1987).

<sup>4</sup> We have taken the liberty of reformulating Halle's rules somewhat, in part to be compatible with our own notational conventions and in part because the rules are stated somewhat differently in the two papers referred to (1990; 1995). We follow the earlier paper more closely, because the later paper does not discuss numeral phrases. The five rules attributed to Halle here correspond to those in Halle (1990) as follows: Concord (4a) is Halle's (20), Assign Declension Class (4b) is his (21); Accusative Syncretism (5a) is his (24); Q-Gen (5b) is his (32); and Singular Assignment (5c) is his (34).

<sup>5</sup> Cf. Fraser and Corbett 1995, where precisely the opposite is assumed: gender is predictable (with exceptions) from the declension class.

<sup>6</sup> Halle (1990, 1995) does not mention that Accusative Syncretism does not apply to neuter nouns and adjectives of Declension Class I gender (cf. *видеть страшное животное* 'to see a terrible<sub>NEUT SG DECL I ACC=NOM</sub> animal<sub>NEUT SG DECL I ACC=NOM</sub>'). We will assume (as presumably he does) that no neuter nouns are grammatically animate; that is, a Word Synthesis rule assigns [Animacy: -] to words with the feature [Gender: neuter].

<sup>7</sup> For discussion on the basis of interrogative and relative clause structures in Polish, see Rappaport 2000.

<sup>8</sup> See unpublished work by Coats (1993) for a similar approach to numeral syntax, where abstract cases expressed by syncretism are called 'parasitic cases'.

<sup>9</sup> Gender agreement of the numeral with the quantified noun is limited in Russian to distinguishing non-feminine and feminine forms of the following numerals in the nominative case: *два / две* 'two', *оба / обе* 'both', and *полтора / полторы* 'one-and-a-half'.

<sup>10</sup> It is not clear what makes the head noun active for the purpose of copying the values of its agreement features onto modifiers under Agree. This question goes beyond the particular question we are investigating, and we must leave it open here.

<sup>11</sup> We must leave aside here the enigmatic accusative assigned to duration adverbs (*голодать неделю*<sub>ACC</sub> ‘to starve a week’) and quantity expressions (*стоять копейку*<sub>ACC</sub> ‘to cost a kopek’).

<sup>12</sup> This assumption is neither original on our part nor radical. Schenker 1971 comes to an analogous conclusion for Polish, extending a more restricted position staked out earlier by Klemensiewicz and Decaux.

<sup>13</sup> Note that when the Quantitative Genitive is assigned by Agree, a side effect of the operation is copying the plurality of the head noun onto the numeral. Accusative Syncretism can then have the effect described in the text, because in the plural declension class is irrelevant.

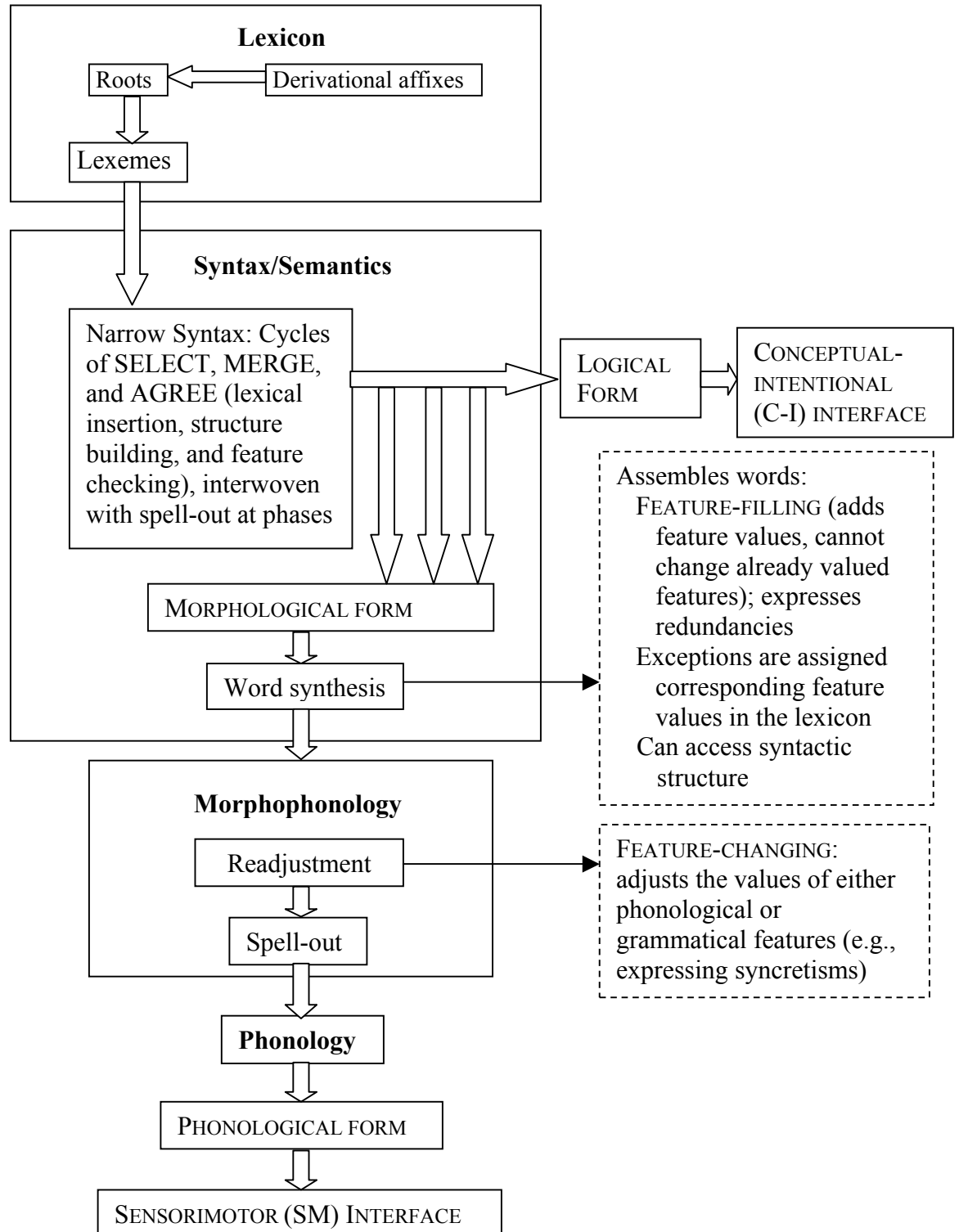
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## APPENDIX I

Synthesis of Halle 1990, 1995, Halle and Marantz 1993, and Chomsky 2000; 2001, incorporating Distributed Morphology, Minimalism, and the Split Morphology Hypothesis.



## APPENDIX II

(23)

<i>Lexicon</i> (sample representations)
<p>{p'at'-} [Case: Quantitative; Number:, Gender:]</p> <p>{dv-} [Case: Paucal; Number:, Gender:]</p> <p>{časá}[Case: Paucal]</p>

(24)

<i>Syntax/Semantics</i>
<p>Agree has the following relevant effects:</p> <ul style="list-style-type: none"> <li>• Copies quantitative case from a higher numeral onto a following head noun;</li> <li>• Copies paucal case from a lower numeral onto a following head noun;</li> <li>• Features of a head noun are copied onto modifiers (including numerals)</li> </ul>

(25)

<i>Word Synthesis</i>
<p><b>Assign Declension Class</b> (to nouns and adjectives) (=4b)</p> <p>[Declension Class:] ⇒</p> <p style="padding-left: 40px;">[Declension Class: II] / ___ + [Gender: Feminine]</p> <p style="padding-left: 40px;">[Declension Class: I] / ___ + [Gender: {Masculine/Neuter}]</p>

(26)

<i>Readjustment Rules</i>
<p><b>a. Quantitative Case Syncretism</b></p> <p>[Case: Quantitative] ⇒ [Case: Genitive] / ___ + {Noun/Adjective}</p>
<p><b>b. Paucal Case Syncretism</b></p> <p>[Case: Paucal; &lt;Number: Plural&gt;] ⇒</p> <p style="padding-left: 40px;">[Case: Genitive; &lt;Number: Singular&gt;] / ___ + Noun</p> <p style="padding-left: 40px;">[Case: Genitive «or Nominative»] / ___ + Adjective</p> <p style="padding-left: 80px;">«+ [Gender: Feminine]»</p>

c. **Accusative Syncretism** (=5a)

[Case: Accusative] ⇒

[Case: Genitive] / \_\_\_ + [Animacy: +] + {[Number: Plural] / [Number: Singular; Declension Class: I]}

[Case: Nominative] elsewhere (except / \_\_\_ + [Number: Singular, Declension Class: II])

(27)

***Spell-out*** (sample rules)

{p'at'-}[Case: Quantitative] ⇒ {p'at'}

{dv-}[Case: Paucal; Gender: Masculine] ⇒ {dva}