Russian subject-verb agreement variation: A multivariate analysis

Abstract
Russian verbs can agree with quantified subjects (e.g., ten boys, several chairs) in either the neuter singular or plural forms, depending on a number of factors, such as animacy and word order. Building on previous corpus studies in which such factors are analyzed individually, this paper presents an experimental study in which verb number is analyzed as a function of five factors simultaneously: animacy, verb semantics, word order, quantifier type, and verb tense. Native Russian-speaking participants performed a completion task, in which they were provided with sentences that balance combinations of these factors, and asked to complete the sentence by inflecting a verb provided in an uninflected form. A mixed effects regression model of the resulting verb number shows that the five factors of interest have independent effects in line with those effects observed in previous studies, and further reveals three interactions that have not been observed.

Keywords: experimental linguistics, grammatical variation, agreement, Russian,

1. Introduction
Language is full of grammatical constructions which permit a certain degree of variability in their expression. To produce even the most mundane utterances, language users must navigate this variability to communicate their thoughts. When asking about the contents of the pantry, for example, a speaker might say Who forgot to put away the crackers?, even though it would have been equally acceptable to say Who forgot to put the crackers away? The addressee might then respond I gave the dog the leftover crackers, an utterance with discards the alternative option of I gave the leftover crackers to the dog. How do speakers choose which grammatical realization to use?

Previous research in grammatical variation — especially in English — has determined that such cases are frequently influenced by multiple variables. Rates of copula contraction and deletion in African
American Vernacular English, for example, have long been known to be sensitive to the phonological makeup and pronominality of the subject, as well as the syntactic category of the following phrase (Baugh, 1980; Labov, 1969), and verb particle placement is affected by the length of the direct object, the type of determiner it has, and the idiomaticity of the VP, among many others (Gries, 2003). A similarly large constellation of factors has been shown to be relevant in predicting whether a verb will be used in active or passive voice (Weiner and Labov, 1983), which relative pronoun will be used (Guy and Bayley, 1995), which form of the dative alternation will be used (Bresnan et al., 2007), whether a possessive construction will use the s-genitive or the of-genitive (Szmrecsanyi and Hinrichs, 2008), and when a subject personal pronoun will be used or omitted in Spanish (Erker and Guy, 2012).

One type of grammatical variation that is already of enormous interest in psycholinguistic research is subject-verb number agreement (e.g., Bock and Cutting, 1992; Eberhard et al., 2005; Gillespie and Pearlmuttter, 2012; Lorimor et al., 2008). Recent multivariate analyses of English agreement patterns, especially in existential constructions, have revealed that, as with other sources of grammatical variation, number agreement is sensitive to a wide range of factors (Hay and Schreier, 2004; Riordan, 2007). The goal of the current study is to extend this approach to another source of agreement variation: Russian quantified subject noun phrases.

Russian is an inflectionally complex language, with a system of grammatical agreement that pervades most constructions. Usually, the rules governing agreement relations are straightforward. Adjectives and determiners obligatorily agree with nouns in gender, number, and case, and verbs obligatorily agree with subjects in person and number (non-past tense) or in number and gender (past tense). Yet in some constructions, these rules become more complex. In (1–2), the same construction appears in the same text with one of two different agreement suffixes on the verb: either neuter singular -o or plural -i. (Simonov [1958], cited and translated in Robblee [1993a]).

(1) U nego sgore-l-o dva tanka i v odnom iz nix—
By him burn-PAST-N.SG two tank and in one from them.sc ves’ ekipaz.
'Two of his tanks had burned, and in one of them, the whole crew.'

It was located on only what taken sand.dune where today

'sgore-l'i  dva tanka Klimovič

'\text{It was located on the dune that had just been taken, where two of Klimovič's tanks had burned.}'

Sentences with quantified subject noun phrases, such as \textit{two tanks} or \textit{several boys} can occur with either singular or plural agreement, depending on a number of properties of the surrounding utterance. In the sentences above, for example, the quantifier \textit{two} favors the plural agreement that appears in (2), while the singular agreement in (1) is favored by the fact that the subject, \textit{two tanks}, is inanimate and precedes the verb (Timberlake, 2004). The full set of these factors is quite wide-ranging, encompassing such variables as the grammatical category of the predicate (Corbett, 1979, 1998; Timberlake, 2004), the meaning of the predicate (Robblee, 1993a, 1997; Timberlake, 2004), the quantifier (Patton, 1969; Suprun, 1969), the word order (Corbett, 1983, 2006), the information structure of the utterance (Lambrecht and Polinsky, 1997; Nichols et al., 1980), the tense of the verb (Kuvšinskaja, 2012), the presence of other modifiers besides the quantifier (Corbett, 1979; Timberlake, 2004), the form of the other modifiers (Corbett, 2006; Suprun, 1957), and many others (Kuvšinskaja, 2012; Patton, 1969).

Existing studies of this particular phenomenon have tended to focus on the effects of one variable at a time, an approach that has limitations on two fronts. First, single-variable analyses usually focus on the behavior of a single variable by combining the observations across all possible values for the others. As a result, this approach disregards the fact that often certain variables tend to co-occur, which raises the question of which variable is actually responsible for the observed pattern. For example, Robblee (1993a) identifies three semantic classes of verbs that differ depending on the extent to which the event described by the verb is distinct from other events. This degree of individuation is reflected in which types of
subjects a verb can describe: Less individuated predicates can apply to most subjects, while highly individuated predicates are appropriate only for a subset of subjects, such as animates. Along this continuum of individuation, highly individuated predicates tend to be used with plural agreement. Yet it is also very commonly observed that animate subjects also tend to have higher rates of plural agreement (e.g., Corbett 2006). Is the effect of verb individuation, then, carried by the fact that the most individuated verbs tend to be used with animate subjects? Or could it be that the effect of animacy is carried by the fact that animate subjects tend to be used with individuated verbs? Since the discussion in Robblee (1993a) does not provide a breakdown of subject animacy across the different verb categories, it remains unclear whether the effects of animacy and verb individuation are truly independent of each other.

Patton (1969) encounters a similar situation when discussing the agreement patterns of time expressions. Subjects which denote periods of time prefer singular agreement in literary prose (21% plural agreement rate), but about 82% of the time they appear in sentences in which the predicate precedes the verb. Since predicate-subject order itself favors singular agreement, these proportions do not reveal whether it is the word order or the semantics of the subject that increases the preference for singular agreement, or whether they both have independent effects.

A more subtle example of the problems with a one-variable approach can be found in Kuvšinskaja (2012)’s observation that the presence of delimiting adverbs such as only, precisely, and almost decreases the likelihood of plural agreement. Whereas the corpus in this study had an overall plural agreement rate of 71% (out of 1063 sentences with numerically quantified subjects), the set of 131 sentences containing such adverbs had a plural agreement rate of only 51%. There is no information provided, however, about the make-up of the set of sentences containing those adverbs: Do those 67 sentences with singular agreement share a higher rate of some other factor that could be influencing the agreement? For example, all the sentences that are provided as examples with delimiting adverbs also contain predicate-subject word order. Sentences with lexical items delimiting the specific number of the subject are often sentences whose primary informational purpose is to introduce that subject into the discourse, with particular focus on the specific quantity of the subject. This particular presentational
semantics is associated with verb-subject word order (Timberlake, 2004), so perhaps the reduced rate of plural agreement should be attributed to the different information structure and word order, which are consistently identified as factors that condition rates of plural agreement, rather than to the presence of the delimiting adverbs. In other words, the appearance of one factor could itself have been triggered by of some other property that conditioned the agreement choice (see Kuvšinskaja [2012] for further examples).

The second, related limitation of single-variable approaches is the limited consideration of possible interactions between the different factors. For example, Patton (1969) found that animacy interacted with register, such that quantified animal subjects pattern with humans in literary prose, preferring plural agreement, while in journalistic prose they pattern with inanimates, and are more likely to take singular agreement. Similarly, Robblee (1997) found that the effect of word order was not consistent across all quantifiers. What is needed, therefore, is an investigation that could confirm or disconfirm that the effect of one factor is the same in all sentences across different values of other factors.

It is now standard for studies of other types of agreement variation have embraced an analysis that takes into account the combined effects of multiple variables. Hay and Schreier (2004), for example, examine the historical development of subject-verb non-concord in 19th-century New Zealand English as a function of speaker gender, speaker birth date, verb tense, and subject type. Similarly, Riordan (2007) explored rates of non-concord in American English existential constructions as a function of subject determiner type, sentence polarity, the presence of a plural -s on the subject, the presence of any disfluencies, the length of the sequence following the subject, the age and gender of the speaker, and the type of discourse. The current study was therefore designed with two goals in mind. The first is to better understand the joint effects on Russian agreement variation of multiple variables that have previously been examined separately. To that end, the current experiment explored verbal agreement patterns with quantified subject noun phrases in Russian as a function of five different properties: the quantifier, the animacy of the subject, the semantic individuation of the verb, the word order of the sentence, and the tense of the verb.

The second goal of this project is to complement the existing research by probing more deeply
those issues of Russian agreement variation that corpus research cannot itself resolve. One such issue has to do with frequency of occurrence: Some combinations of factors implicated in the agreement choice are simply too infrequent to permit an adequate analysis. For example, highly individuated verbs are so frequently used with animate subject NPs that there are not enough naturally occurring cases of agentive verbs and inanimate subjects to disentangle the effects of animacy from the effects of individuation. A second, deeper issue concerns the extent to which usage data is representative of how people process language. Divjak (2008), for example, found that patterns of grammaticality judgements elicited in experiments do not always line up with usage patterns found in corpora, suggesting that a full understanding of how speakers process certain constructions cannot be found through usage data alone. For these reasons, a more complete picture of the issue at hand is found not simply in corpora, but in the combination of corpus and experimental research (Gilquin and Gries, 2009). Therefore, the data examined here come not from a corpus, but from an experiment in which Russian speakers completed a fill-in-the-blank task for sentences that balanced all two-way combinations of four of the five factors at issue: Quantifier, verb semantics, word order, and subject animacy. Where previous research has largely used corpus data, this project provides the experimental side.

2. Methods

2.1 Experimental conditions
The stimuli were designed to test the independence and interaction of five possible different predictors that were most consistently identified in the literature. Four were controlled in the construction of the stimuli: Quantifier identity (Quantifier), animacy of the subject noun phrase (Animacy), word order (Order), and semantic class of verb (Verb). The fifth, verb tense (Tense), could not be controlled in the stimuli, and was rather recovered from the experimental responses. Three categories of quantifier were of interest: paucals, which consist of the numerals two, three, and four; low general numerals (five, ten, twenty, etc.); and approximate quantifiers (several, few, many, etc.) (Timberlake, 2004). The specific Quantifiers used here included the paucal dva ‘two,’ the low general numerals pjat’ ‘five,’ and des’at’
‘ten,’ and the three approximate quantifiers *malo* ‘few,’ *mnogo* ‘many’ and *neskol’ko* ‘several.’ The possible Animacy values were Animate or Inanimate, and all noun phrases were carefully selected to avoid other sources of variation, as follows. To avoid the possible confound of whether animals, which are grammatically animate, pattern with humans or inanimates in experimental settings (Patton, 1969), all subject NPs denoted humans. To avoid any possible confusion of gender realization on past tense verbs, all subject nouns were grammatically masculine. The possible values for Order were Subject-Verb (SV) or Verb-Subject (VS), and sentences consisted of three constituents: a subject, a verb, and either a direct object or a prepositional phrase, depending on the transitivity of the verb. In some cases both a direct object and a prepositional phrase or some other adverbial modifier were present, in order to improve the plausibility of the sentence. In SV sentences the verb immediately followed the subject, while in VS sentences the verb immediately followed the non-subject constituent. This positioned all verbs in sentence-medial position, which allowed the effect of word-order to be studied without the possible confound of verb-position.

Finally, the semantic class of the verb was manipulated according to the categories proposed by Robblee (1993a). Although it is common to distinguish the effects of “activity” or “dynamic” predicates from predicates denoting presence or existence (Corbett, 1983; Kuvšinskaja, 2012; Patton, 1969), Robblee divides predicates more finely, into three semantic classes: Inversion, Intransitive, and Agentive. According to this division, Inversion predicates describe simple existence and location (e.g., *be*, *appear*, *be necessary*), with no agentivity or manner information; Intransitive predicates describe movement and posture, but their meanings include no volitionality (e.g. *grow*, *stand*, *lie*); and Agentive predicates describe activities that are carried out intentionally by the actor (e.g., *hit*, *write*, *participate*). These three categories correspond not only to increasing degrees of plural agreement, but also to the occurrence of genitive subjects in negated sentences (Robblee, 1993b). The importance of these verb classes in a domain of grammatical variation entirely separate from subject-verb agreement suggests that this division of verb semantics might be an appropriate classification to use for an investigation that is more fine-grained than a two-way difference in activity. In fact, Robblee subdivides each of the three main classes
into two subclasses, yielding six categories of verb semantics, but for the sake of simplicity these subclasses have been collapsed in this study.

A summary of the different possible levels for each factor is given in Table 1. If the patterns observed in the previous studies hold here, plural agreement rates should be higher for conditions that are lower in each column.

<table>
<thead>
<tr>
<th>Quantifier</th>
<th>Verb</th>
<th>Animacy</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>malo</em></td>
<td>Inversion e.g., <em>naxodit’s a</em> ‘be located’</td>
<td>Inanimate e.g., <em>gruzovik</em> ‘truck’</td>
<td>Verb subject (VS) e.g., ‘In the driveway stood [many trucks]’</td>
</tr>
<tr>
<td>‘few’</td>
<td>Intransitive e.g., <em>stojat</em> ‘stand’</td>
<td>Animate e.g., <em>student</em></td>
<td>Subject verb (SV) e.g., ‘[Few students] were located by the board.’</td>
</tr>
<tr>
<td><em>mnogo</em></td>
<td>Agentive e.g., <em>udarit</em> ‘hit’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘many’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>neskol’ko</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘several’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*des’at’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘ten’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*pjet’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘five’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>dva</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘two’</td>
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</tbody>
</table>

Table 1: Values for each predictor used in designing the test sentences, with examples of items that would be classified under each value.

2.2 Materials and design

Because of the large number of conditions, a full factorial design crossing all values of Quantifier, Verb, Animacy, and Order (6 × 3 × 2 × 2) would have required each participant to respond to 72 critical sentences. It seemed unlikely that participants could avoid noticing such a large number of quantified subject noun phrases without including a prohibitive number of filler stimuli, so the set of combinations included in this study was reduced by half, yielding a final set of 36 conditions. A list of the conditions included and the conditions omitted is given in the Appendix.

To construct the experimental items, six verbs of each Verb type were selected, for a total of 18.
The verbs in each condition did not differ significantly in log frequency ($F[2, 15] < 1, p > 0.7$), as determined by data from the Russian National Corpus (www.ruscorpora.ru). Each verb was used to construct two separate sentences — one with an animate subject, and one with an inanimate subject. The resulting 36 sentences were rotated through the 36 conditions in a modified Latin square design, creating six sets of experimental stimuli. A sample stimulus set is given in the Appendix.

In addition to these 36 sentences, 12 structurally similar sentences were included for the purposes of a different experiment. The members of this category contained verbs selected entirely on phonological grounds, and the data analyzed here do not include those stimuli. However, because those additional 12 sentences contained quantified subjects and were extremely similar in structure to the critical sentences, they were treated as if they were critical sentences in the stimulus list design.

The 36 critical sentences (or 48, including the structurally similar additional sentences) in each set were randomly ordered and interspersed with 96 fillers, such that no two test sentences were presented adjacent to each other, and no two test sentences were separated by more than three fillers. To direct the participants’ attention away from the structural properties of the sentences, each sentence completion task was followed with a word-association task. In this way, every critical sentence was separated from the preceding critical sentence by at least three other stimuli (a word association, a filler, and a second word association) and as many as seven (three fillers and four word associations).

Each test sentence contained a blank in the place of the verb. Immediately after the blank the intended verb was provided in the infinitive, which is also the citation form. Since conjugated Russian verb forms are never homophonous or homographic with infinitive forms, this method of presentation did not bias subjects to give any particular form as a response. Two sample test sentences are given in (3–4), while a sample filler sentence is given in (5).

(3)  
Dva lista __ (rasti) na dereve  
Two leaf __ (grow.INF) on tree  
‘Two leaves __ (grow) on the tree’
Of the 96 filler sentences, 76 contained gaps corresponding to a noun or adjective, and 20 included gaps for verbs. The fillers with verb-gaps were included so that subjects did not learn to associate sentences containing verb-gaps with sentences containing quantified noun phrase subjects. Half of sentences with a verb-gap required singular agreement, and half required plural. In every filler sentence, the intended form of the given word was unambiguous. All nouns and adjectives were given in citation form, which is the nominative singular, and additionally for adjectives, masculine gender. A list of the fillers is given in the Appendix.

The stimuli for the word-association task consisted of 36 nouns, 36 verbs, 36 adjectives, and 36 adverbs, all given in citation form. These filler words are also given in the Appendix.

2.3 Participants
The participants were students at the State University Higher School of Economics in Moscow. All were native Russian speakers. 58 subjects completed the experiment in exchange for payment that varied depending on the number of questions they answered. Subjects who responded to all 288 stimuli (both critical and fillers) received 300 rubles (approximately 10 USD). Subjects who elected to quit early received a proportionately lower compensation.

2.4 Procedure

All tasks were completed over the Internet using SurveyMonkey online survey software. The instructions informed the participants that the study was investigating word choice in different contexts by means of a word-association task. According to the instructions, the sentence-completion tasks were included only as a way of preventing the word-association task of becoming too repetitive. In the sentence completion task, the participants read the sentence on the screen and typed in the form of the word that sounded best, before advancing to the next page to perform the word association task. In this task they were instructed to read the word on the screen and type in the first word that came into their heads.

Although the entire procedure took approximately an hour when it was completed without pause, there was no time limit on any of the tasks. Since the study was performed remotely, it was not uncommon for participants to finish hours or even days after they had started. Upon completion of the study the participants were debriefed and informed of the true purpose — namely, the investigation of influences on singular or plural agreement in sentences with quantified noun phrases. Their consent was then collected one last time. Participants who decided not to finish the study were asked to click an exit button, but more frequently they simply closed the internet browser window. If they did click the exit button, they were taken directly to the debriefing page, where they could confirm their consent, and their partial data was included in the analysis. If they simply closed their browser window, there was no way to collect their informed consent, and their responses were discarded.

2.5 Statistical analysis
Responses were coded for tense (past and non-past), as well as for number (singular and plural). In some cases, participants rewrote the entire sentence to give a different word order, or used a different verb from the one provided. These responses were discarded. The remaining responses were then analyzed using mixed effects logistic regression modeling, with verb number — singular or plural — as the binary outcome variable and random intercepts for Participant and Word. The potential fixed effects were Quantifier, Verb, Animacy, Order, and Tense, and their interactions.

For factors with more than two levels, previous literature provided estimates of the relative order in which the different levels were expected to condition plural agreement (see Table 1). Accordingly, these factors were coded using backwards difference coding. Under this coding system, the levels of a factor are ordered, and the coefficients of the model represent the difference between each level and its immediately preceding level. A positive coefficient indicates a higher probability of observing the outcome variable compared to the immediately preceding level, and a negative coefficient indicates a lower probability.

The analysis was conducted using the R programming environment (R Development Core Team, 2011) with the package languageR (Baayen, 2008). To determine which simple effects should be included, two methods were used: forward entry of predictors, and backward elimination. The forward entry model was built by evaluating the improvement in fit as each individual predictor was included. The starting point was an initial model including only the intercept and random effects for subject and word. Its fit was compared to the fit for a model that contained one fixed effect as well as the random effects. Predictors were added in the order of the amount of attention they received in the literature, as follows. Animacy is identified most often as a factor that affects agreement realization, so it was the first effect added to the baseline model. Order is discussed almost equally as often, while the verb semantics are not mentioned in some sources (e.g., Corbett, 2006), and the identity of the quantifier neglected in others (e.g., Robblee, 1993a). Tense is mentioned only in Kuvšinskaja (2012), and so was added to the model last. The order of addition of predictors was therefore Animacy first, then Order, Verb, Quantifier, and Tense. The
addition of each one significantly improved the fit of the model, as determined by a log-likelihood ratio test.

To validate the inclusion of each of the five simple effects, the model was then inspected using backward elimination. This method involved taking the full model and testing it against a simpler model created by removing one of the predictors. This validation is necessary because later predictors in a model might equally well explain variability in the data that was explained by a predictor added earlier in the fitting process. For example, Animacy might have significantly improved the fit of the model only because it was the first predictor added to the null model. When later predictors, such as Quantifier or Tense, were added, Animacy might not have contributed anything to the model fit. For this reason, the full simple effect model was simplified by taking out predictors in the same order in which they were added. Each simplified model was tested against the full simple effects model, to determine whether the contribution to model fit associated with the earliest predictors was still present when the later predictors were in the model. As it turned out, even in the presence of all later predictors, each factor still significantly improved the fit of the model, and so the results of the backwards elimination model building process matched the results of the forward entry method.

After the simple predictors were determined, interactions were added. The empty cells in the design and the relatively small amount of data for the number of predictors precluded testing all possible interactions. Therefore, the interactions were added through forward entry and validated through backward elimination, as before. Each interaction term was selected initially based on a visual inspection of the data. Figure 1 shows two examples of the plots used for the visual inspection. The plot on the left illustrates the comparison of plurality rates for SV and VS orders across all quantifiers. According to Robblee (1997)’s data, the effect of word order is much smaller for the numeral *dva*, ‘two,’ than for the indefinite quantifiers *neskol’ko*, ‘several,’ and *malo*, ‘few,’ and numerals greater than four. Contrary to this finding, however, the data in the present study showed no obvious tendency in this direction, and for that reason an interaction term for Order × Quantifier was not included in the model-building process. On the other hand, the plot on the right shows a striking apparent interaction between Quantifier and
Animacy that has not been discussed in previous investigations. Sentences with the quantifier neskol’ko, ‘several,’ and, to a lesser extent, pjit’, ‘five,’ have a greater proportion of plural agreement for inanimate subjects, contrary to the overall pattern of animate subjects favoring plural agreement. The interaction term for Animacy × Quantifier, therefore, was included in the model. After the addition of each potential interaction term, the new model was tested against the old one to determine whether the interaction improved its fit. When the data would permit no further interactions terms, the existing terms were then removed in the same order in which they were added, to determine whether they still improved the fit of the model in the presence of all the other interactions. As with the simple effects, no interactions that improved model fit during the forward entry process turned out to be unnecessary during backward elimination.

Figure 1: Comparisons of the rates of plural agreement across all quantifiers for different word orders (left) and animacities (right).

3. Results

Of the 58 participants who were debriefed and gave their final consent, one quit without answering any questions, while a second quit after answering only six critical test stimuli. Of the total 2029 responses, another 29 were discarded because the participants rewrote the entire sentence, or used an entirely
different verb from the one provided. The remaining 2000 responses from 57 subjects were retained for analysis.

3.1 Summary of qualitative patterns

Exactly 59.5% of responses were past tense, while the remaining 40.5% were non-past. In line with Kuvšinskaja (2012)’s findings, subjects did indeed prefer to use past tense more as verb individuation decreased, with highest past tense rates occurring with Inversion verbs (Figure 2).

![Tense preferences by verb type](image)

Figure 2: Tense choices by verb type. Subjects’ preference for past tense decreases as verb individuation increases.

The overall proportions of singular and plural agreement were qualitatively similar to previous findings. The left side of Table 2 shows the counts of singular and plural responses in the current study according to each of the factors. The right side gives the proportions observed in previous corpus studies. On both sides, the relative rates of plural agreement within a category pattern similarly. For example, the current study found a rate of 49.5% plural agreement for Inversion predicates, which is much higher than the rate of 8.1% observed in Robblee (1993a). Yet in both cases the rate of plural agreement is higher for
Intransitive predicates (60.6\% here, and 49.7\% in Robblee [1993a]) and higher yet for Agentives (76.4\% here, and 856.7\% in Robblee [1993a]). This pattern can be seen in all categories: Moving from the topmost level within a category downward, rates of plural agreement tend to increase.

Table 2: Observed proportions of singular and plural responses according to Quantifier, Verb, Animacy, Order, and Tense, compared to proportions observed in previous studies. Data from previous studies on the effect of Quantifier were a combination of two papers. Robblee (1997) reports the proportions for the quantifier *malo*, ‘a few,’ and *nemalo*, ‘quite a few,’ together. Corbett (1983) reports the proportions for the other quantifiers, but collapses the responses for numerals between 5 and 10. In general, rates of plural agreement from both the current study and previous ones increase in each category from top to bottom.

3.2 Simple effects
As can be seen in the summary of the model (Table 3), all coefficients for simple effects were significantly different from 0 in the predicted direction. Inanimate subjects, Past tense, and VS word order all significantly lowered log odds of plural agreement compared to Animate subjects, Nonpast tense, and SV word order (all p < 0.001).

The coefficients of the predictor Quantifier, coded with a backwards difference coding scheme, also confirm the expected effect of Quantifier. Recall that previous studies found that the Quantifiers used here should be ordered as follows, from lowest to highest rates of plural agreement: ‘few’ < ‘many’ < ‘several’ < ‘ten’ < ‘five’ < ‘two.’ The coefficients in the model confirm that the different quantifiers correspond to varying degrees of plural agreement in the expected directions: ‘many’ more than ‘few,’ ‘several’ more than ‘many’, ‘ten’ more than ‘several’, and ‘two’ more than ‘five.’

The effect of Verb was not as straightforward. This study was designed to test Robblee (1993a)’s three categories of verbs, which were previously observed to condition plural agreement in the following order: Inversion < Intransitive < Agentive. The inclusion of the predictor Verb did significantly improve the fit of the model, suggesting that separating verbs into different semantic classes does help predict whether a speaker will choose singular or plural agreement. The fact that there was no significant difference between the adjacent levels of Verb, however, suggests that the current division is not predictive of plural agreement rates. Therefore, the data were re-coded in order to compare Agentive verbs directly with Inversion verbs. This coding revealed that Agentive verbs did differ from Inversion predicates (increase in log odds of 1.89, p = 0.001). The effect of Verb is therefore best described by saying that Inversion verbs are associated with significantly lower log odds of plural agreement than Agentive verbs.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef ( \beta )</th>
<th>SE(( \beta ))</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.71</td>
<td>0.36</td>
<td>10.3</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Animacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inanimate</td>
<td>-0.96</td>
<td>0.21</td>
<td>-4.5</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>
### Table 3: Summary of the mixed effects logistic regression model. Coefficients for the ordered factors Quantifier and Verb show the difference in probability of plural agreement for two adjacent levels. Positive coefficients indicate that the second level has a higher probability of plural agreement than the preceding one.

3.3 *Interactions*

The model building process described in Section 2.5 yielded three interaction terms: Quantifier × Animacy, Verb × Tense, and Quantifier × Verb. The improvement in model fit that each term contributed...
to the model confirms the observed non-uniformity of plural agreement rates across Animacy and Quantifier, across Tense and Verb, and across Quantifier and Verb, illustrated graphically in Figure 3. Inanimate nouns have lower rates of plural agreement when they are quantified by ‘many’ and ‘ten’ than would be expected based on the simple effects of Animacy and Quantifier, and much lower rates when they are quantified by ‘two.’ Past tense verbs have lower rates of plural agreement when they are used with Intransitive verbs, and higher rates when they are used with Agentive verbs, compared to the expected rates based on the simple effects of Tense and Verb. And, finally, the increase in plural agreement associated with Intransitive verbs compared to Inversion verbs is enhanced for the Quantifier ‘many,’ but reduced for the Quantifier ‘several’. In other words, Intransitive verbs increase in plural agreement rates more than Inversion verbs when moving from the quantifier ‘few’ to ‘many,’ but the increase is reduced compared to the increase in Inversion verbs when moving from ‘many’ to ‘several.’
Figure 3: Interactions in plural agreement rates between Quantifier and Animacy (top left; note that only data with VS order is given), Tense and Verb (top right), and Quantifier and Verb (bottom).

3.4 Model fit

Two measures were used to evaluate the fit of the model. The first makes the simplifying assumption that an observation with a fitted value greater than a given threshold is predicted to be plural, while observations with lower fitted vowels are predicted to be singular. The threshold used here was 0.62, which is the overall rate of plural agreement in the responses. In this way, it is possible to simply count up the number of “right” and “wrong” predictions made by the model. An accuracy matrix is given in Table 4, showing an overall correct prediction rate of 85.4%.

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Plurality</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>Right</td>
<td>658</td>
<td>1050</td>
</tr>
<tr>
<td>Wrong</td>
<td>98</td>
<td>194</td>
</tr>
<tr>
<td>Percent Correct</td>
<td>87.0%</td>
<td>91.2%</td>
</tr>
</tbody>
</table>

Table 4: Accuracy matrix for the mixed effects logistic regression model.

The second measure of model fit evaluates the specific probabilities generated by the model. Figure 4 shows one way of doing this. The predicted probabilities of plural agreement are binned into deciles, and plotted against the observed proportions of plural agreement for each bin (Baayen, 2008). As
Figure 4 shows, the correlation of predicted and actual proportions of plural agreement is very high ($R^2 = 0.997$).

![Figure 4: A plot of the predicted probabilities against the observed proportion of plural agreement for each decile of the data. A perfect fit would generate points that fall exactly on the gray line.](image)

4. Discussion

The experiment presented here was designed to complement and elaborate on the findings of previous corpus studies investigating influences on Russian agreement variation, and the results largely confirmed these previous findings. Even when multiple predictors and interaction terms are included in the analysis, Animacy, Quantifier, Verb, Tense, and Order still have independent contributions to make to the choice of verb form, largely in the predicted directions: Inanimate subjects, VS word order, and Past tense all lower the probability of observing plural agreement, while the probability of seeing plural agreement increases in the predicted direction along the scale of Quantifiers: ‘few’ is the lowest, followed by ‘many,’ ‘several,’ ‘ten’ and ‘five,’ and ‘two’ is the highest. Indeed, even the absence of a difference between the Quantifiers ‘five’ and ‘ten’ is consistent with the general division of numerals into paucal (‘two’, ‘three,’ and ‘four’) and non-paucal (e.g. ‘five’ through ‘ten’). While paucals are expected to differ from non-paucals, the non-paucals themselves are often treated as patterning similarly (e.g. Corbett, 1983), which is exactly the finding here for the Quantifiers ‘five’ and ‘ten.’ Similarly, the effect of Verb
also revealed a significant increase in the probability of plural agreement for Agentive verbs compared to Inversion verbs. The lack of reliable difference in the pairwise comparisons between Inversion and Intransitive verbs, and between Intransitive and Agentive verbs, suggests that Robblee (1993a)’s three way distinction is not predictive of plural agreement here, but a two-way distinction between activity predicates and existence predicates, such as the one identified by Kuvšinskaja (2012) and Corbett (1983), or between dynamic and non-dynamic predicates, as used in Patton (1969), would certainly be consistent with the distinction between Inversion and Agentive verbs observed here.

The experimental data also revealed three significant interactions that have not yet been noted in previous studies. The effect of different quantifiers on the probability of plural agreement is magnified for animate nouns compared with inanimate ones, and the effect of Verb individuation is magnified in the past tense compared to the non-past. Further, the difference between the indefinite quantifiers ‘few’ and ‘many’ is minimized in Inversion verbs compared to Intransitives and Agentives. The first two interactions in particular reveal properties of Russian agreement variation that have not been observed before. First, they reveal the greater sensitivity of animate nouns (especially in VS order) to the other influences on agreement. Whereas inanimate nouns range from 0.25 to 0.73 in their plural agreement rates, animate nouns have a much larger range, reaching from 0.13 to 0.95. Thus, it is not simply the case that animate nouns are uniformly more likely to take agreement. Rather, it could be that, in contrast to inanimate nouns, they are more sensitive to other factors that change plural agreement rates, yielding lower rates when those factors are disfavorable, and higher rates when those factors are favorable. The second interaction shows a similar pattern for tense. Past tense verbs do not simply have lower rates of plural agreement than non-past verbs. They also show the effect of verb individuation more strongly.

These findings add to the existing body of knowledge regarding probabilistic variation in language production (e.g., Bod et al., 2003; Bresnan et al., 2007; Gahl and Garnsey, 2004; Jaeger, 2010; Jurafsky, 2002). Yet the effects of the different factors observed here can be understood as more than a collection of influences that language users must juggle when they speak. As Timberlake (2004) points out, the effects of these different factors may be unified under one semantic domain: The amount of
individuation of the activity described in the sentence. When the quantified entity is more easily conceptualized as a single unit, the verb is more likely to appear with singular agreement, and when the quantified entity is more easily conceptualized as a set of multiple individuals, the verb is more likely to appear with plural agreement. Consider, for example, the seemingly counterintuitive fact that, as numerical quantifiers express increasingly larger quantities, the verb is increasingly likely to take singular agreement. Corbett (1998) attributes this tendency to the ability of speakers to easily individuate small groups of two or three and understand the actions as the behavior of a set of separate individuals. Larger groups of fifty or a hundred, however, cannot be so easily thought of as individuals. This distinction can be compared to the distinction between a few disgruntled vandals and a mob of rioters: Although both collections are made up of the same individuals, the latter is best conceptualized as a single unit. In Russian, this distinction is responsible for the increased preference for plural agreement associated with larger numerals.

This same reason accounts for the fact that animate nouns — which are more easily understood as agentive entities — also prefer plural agreement. The effect of VS order follows suit: Presentational semantics (usually encoded by VS order) introduces a new entity into the discourse, and it is harder to individuate a new entity than a familiar one. Finally, the effect of tense can also be included in this explanation. Events that took place in the past are more likely to be completed than events which are ongoing, and completed events can be more easily understood as a single activity, rather than an ongoing activity performed by multiple individuals. It should be noted that, if this account of tense is accurate, then it makes the prediction that the true distinction is not actually tense, but aspect: Imperfective aspect should prefer plural agreement, while perfective aspect should prefer singular agreement. Because this study did not control for aspect in the stimuli, it was not possible to test this hypothesis with the data presented here.

The current findings have implications for the claims about the role of notional agreement in Russian, compared to other languages. Lorimor et al. (2008) found that, compared to other languages such as English, Dutch, French, Italian, Spanish, and Slovak, Russian consistently appears at the low end
of the scale of rates of number agreement attraction, gender agreement attraction, and notional number agreement. They propose that this relative robustness of the agreement system (at least in attraction constructions) is due to the rich morphology of Russian verbal inflection: “The richer the number morphology of a language, the more reliable it is at maintaining grammatical agreement relationships and the less likely it is to succumb to notional agreement” (pg. 790–791). This argument, however, is problematic for two reasons. First, if Russian agreement processes are insulated from notional number, then why did verb number vary according to the verb individuation? The relationship cannot simply be explained away as a quirk associated with a particular verb lemma. Even when individual verb lemmas were assigned a random effect in the model described here, the difference between the rates of plural agreement for Agentive and Inversion verbs was significant. If, as it seems to be, the actual meaning of the verb influences its agreement patterns, then notional semantics must be able to influence the realization of variable number agreement. The second problem is the consistency of the direction of influence associated with the factors observed here. In every case, the condition that promotes easier individuation at a conceptual level favors plural agreement. This is also true of other properties not investigated here. Therefore, it seems most likely that the choice of number agreement is indeed acutely sensitive to notional properties.

5. Conclusion

Subject-verb agreement is used by psycholinguistic researchers to as a tool to investigate a large set of questions, ranging from issues of planning scope (e.g., Bock and Cutting, 1992; Gillespie and Pearlmutter, 2012; Solomon and Pearlmutter, 2004), to lexical representations of numerosity (Bock et al., 2006), to the flow of grammatical and notional information during grammatical encoding (e.g., Eberhard et al., 2005; Franck et al., 2008). In order to better understand how people process agreement — and the broader questions that agreement can be used to answer — it is necessary to understand which variables affect that process. To that end, this study consisted of an experimental investigation into variation in Russian verb agreement with quantified subject NPs. Verb number was analyzed as a function of five
factors that had previously been identified as influences on the rates of plural agreement: subject animacy, quantifier identity, verb individuation, verb tense, and word order. Multivariate analysis of these factors revealed that they do indeed have independent effects, even when the presence of other factors was controlled. It is not possible to attribute the effect of animacy, for example, solely to the fact that animate subjects most frequently occur with agentive verbs. Further, a regression model showed three two-way interactions between those properties, providing a subtler understanding of how agreement morphology is associated with other properties of a given sentence. The experimental data presented here therefore contribute both to the body of research into probabilistic influences on grammatical variation and also to the research into what properties speakers must navigate when they are processing an agreement relation.

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Appendix

Stimulus conditions included and omitted in the experimental design

<table>
<thead>
<tr>
<th>Quantifier</th>
<th>Animacy</th>
<th>Subject/Predicate</th>
<th>Predicate/Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inversion</td>
<td>Intransitive</td>
<td>Agentive</td>
</tr>
<tr>
<td>‘two’</td>
<td>Animate</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>‘five’</td>
<td>Animate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>‘ten’</td>
<td>Animate</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>‘several’</td>
<td>Animate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>‘few’</td>
<td>Animate</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>‘many’</td>
<td>Animate</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Inanimate</td>
<td>✓</td>
<td>x</td>
</tr>
</tbody>
</table>

Sample stimulus set

One set of stimulus sentences is given below, with translations. Sentences 1–36 are critical stimuli. Sentences 37–48 are the structurally similar sentences which were included for a different experiment. The translation follows the word order of the Russian stimulus as closely as possible, but in some cases VS word order in Russian is given as SV in English to render a grammatical translation. The other versions of these sentences in the other stimulus lists vary the word order or the quantifier.
1. Два журналиста __ (быть) в классе
2. Пять бульдозеров __ (появиться) на стройке
3. Десять хулиганов __ (видеться) в окне
4. Несколько памятников __ (оказываться) в центре внимания
5. Мало хирургов __ (оставаться) в больнице
6. Много прудов __ (находиться) в парке
7. Два рисунка __ (лежать) в коробке
8. Пять преступников __ (покраснеть) от стыда
9. Десять листвьев __ (расти) на дереве
10. Несколько акробатов __ (висеть) под куполом цирка
11. Мало грузовиков __ (стоять) в проезде
12. Много авторов __ (идти) по улице
13. Два партизана __ (пробиваться) к своим
14. Пять гектаров __ (дать) хороший урожай
15. Десять хулиганов __ (видеться) в окно
16. Несколько каналов __ (показывать) эту передачу
17. Мало спортсменов __ (показывать) отличные результаты
18. Много потоков __ (пробиваться) сквозь щели
19. На полке __ (быть) два мобильника
20. На стройке __ (появиться) пять инженеров
21. За домом __ (видеться) десять кустов
22. В центре внимания __ (оказываться) несколько писателей
23. На улице __ (оставаться) много автобусов
24. У доски __ (находиться) много студентов
25. На траве __ (лежать) два зоолога
26. В саду __ (покраснеть) пять помидоров
27. В одном доме __ (растить) десять мальчиков
28. На вешалке __ (висеть) несколько пиджаков
29. У постели __ (стоять) мало священников
30. По рельсам __ (идти) пять студентов
31. Красным цветом __ (писать) два самописца
32. Домашнюю работу __ (давать) пять преподавателей
33. После оползня дом __ (ударить) десять камней
34. По пятницам __ (работать) несколько поваров
35. Зимой хорошо __ (работать) мало лифтов
36. статьи __ (писать) много профессоров
37. Два героя __ (спасти) деревню от дракона
38. Пять стульев __ (мочь) уместиться вдоль стола
39. Десять неудачников __ (найти) только разочарование в жизни
40. Несколько пальцев __ (плести) небрежные косы
41. Мало пастухов __ (вести) стадо от реки
42. Много тракторов __ (вести) груз по дороге

Two journalists __ (be) in the classroom
Five bulldozers __ (appear) on the construction site
Several monuments __ (be visible) through the window
Few surgeons __ (remain) in the hospital
Many ponds __ (be located) in the park
Two drawings __ (lie) in the box
Five criminals __ (blush) from shame
Ten leaves __ (grow) on the tree
Several acrobats __ (hang) beneath the circus big top
Few trucks __ (stand) in the driveway
Many authors __ (walk/go) along the street
Two partisans __ (get through to) their own people
Five hectares __ (give) a good harvest
Ten prisoners __ (hit) the black dog
Several channels __ (show) this program
Few athletes __ (show) excellent performances
Many rivulets __ (get through) the cracks
On the shelf __ (be) two cell phones
On the construction site __ (appear) five engineers
Behind the house __ (be visible) ten bushes
In the center of attention __ (turn out to be) several writers
On the street __ (remain) few buses
By the blackboard __ (be located) many students
On the grass __ (lie) two zoologists
In the garden __ (turn red) five tomatoes
In one house __ (grow) ten little boys
On the coat rack __ (hang) several jackets
By the bed __ (stand) few priests
Along the rails __ (walk/go) many trains
Two automatic recording styluses __ (write) in red
Five teachers __ (give) homework
Ten rocks __ (hit) the house after the avalanche
Several cooks __ (work) on Fridays
Few elevators __ (work) well in the winter
Many professors __ (write) articles
Two heroes __ (save) the village from the dragon
Four chairs __ (can) fit along the table
Ten unlucky people __ (find) only disappointment in life
Several fingers __ (weave) untidy braids
Few shepherds __ (lead) the flock away from the river
Many tractors __ (convey) the load along the road
During the tornado two basements (save) the local residents

Five shoemakers (can) fill the orders of a large village

Ten boats (find) shelter in the harbor

Several artisans (weave) baskets at the fair

Few paths (lead) to nowhere

Many coachmen (convey) apples to the market

Fillers

Filler sentences. The filler sentences below are divided into three categories: Those with missing nouns (Numbers 1–38), those with missing adjectives (39–76), and those with missing verbs (77–96).

1 большую часть домашнего (время) они проводили на ногах
2 Больной отвечал на (вопросы) психологов
3 После гибели мужа барыня с (дети) поселились в Италии.
4 Около (деревья) ходила черная корова
5 Из шести (лаборантки) три были в отпуске
6 В отличие от (бежка) бурундук не боится людей
7 Благодаря (компьютер) дети смогут легче работать дома
8 С самой утренней (заря) дождь не переставал
9 На (крылья) своих жаворонки унесли капли росы.
10 Девочка начинает искать (коробок) со спичками
11 Легкий ветер от (время) надувает занавески
12 Поручик дал (лакей) целых пять рублей
13 Одной из самых известных историй о любви является история (барышня) и хулигана
14 Мальчик бежит вдоль (дорога)
15 Жена уговаривает (муж) навестить соседа
16 Сюжет романа выстроен вокруг любовных историй двух (сестры)
17 Братья проводят (зима) в доме тети
18 Все письма оставляют без (ответ)
19 Литераторы пишут множество (письма)
20 Изначально люди не обладали никакой (письменность)
21 Антонимы стали (предмет) лингвистического анализа сравнительно недавно
22 В античности город имел две (гавань), военную и торговую
23 Лучше час свободы, чем сорок лет (тюрьма) и рабства
24 Свет (ракета) заполнил подвал
25 They spent most of their domestic (time) on their knees
26 The sick man answered the psychiatrist’s (questions)
27 After the death of her husband the lady took up residence in Italy with her (children)
28 A black cow was walking around the (trees)
29 Out of six (female lab assistants) three were on leave
30 As opposed to the (squirrel), the chipmunk is not afraid of people
31 Thanks to the (computer) children can work at home more easily
32 The rain had not stopped since the (dawn)
33 On their (wings) the skylarks carried drops of dew
34 The little girl began to search the (box) of matches
35 From time to (time) a light wind blew the curtains
36 One of the most famous love stories is the story of the (lady) and ruffian
37 The little boy runs along the (street)
38 The wife persuades her (husband) to call upon the neighbor
39 The plot of the novel is built around the love story of two (sisters)
40 The brothers spend the (winter) in their aunt's house
41 All the letters remain unanswered [literally: without (answer)]
42 The literary men write a great many (letters)
43 Initially people did not have any kind of (written language)
44 Antonyms became a subject of linguistic analysis comparatively recently
45 In classical times the city had two (harbors), military and commercial
46 It is better to have an hour of freedom than forty years of (prison) and slavery
47 The light of the (rocket) filled the basement
The captain sat down next to the __ (officer)
The dogs ran forward joyfully [literally: with __(joy)]
Usually towards the end of the __ (summer) the vacationers get sick of relaxing.
In the __ (library) you shouldn't talk loudly
it was almost as hot in the __ (corridor) as it was cold outside
It's genuinely necessary to think about this __ (problem)
There is no __ (hate) in Buddhism
This area is most rich in __ (asteroids)
It was necessary to move the beginning of the __ (activity) to two o'clock
Without __ (microbes) life on the planet would have been impossible
It is always useful to know what is being done in an enemy __ (state)
Again it was necessary to go on a visit abroad [literally behind __ (border)]
It was necessary to make a __ (decision) quickly
It was useless to comfort the __ (old woman)
He will never write such __ (letters)
A commander is proud of __ (his) subordinates
He was in a dark blue suit and __ (nylon) shirt
In the warm bar it smelled of __ (strong) coffee
The father brought a saucepan with __ (fresh) caviar
From the darkness a __ (strong) wind beat at one's face
The steamship sailed up to a __ (smallish) dock
The cabmn stopped next to an __ (illuminated) front door
On the streetcorner corner was a photographer's [literally: __ (photographic)] shop window
One hairpin lay on the bedside table [literally: __ (nocturnal) table]
The advertising agent embezzled three thousand __ (government) [money units]
The department turned out to be in a state of __ (systemic) crisis
The giraffe's neck is unusually __ (long)
In Germany there are several __ (professorial) duties
Martial folklore is rich in __ (entertaining) stories
The uncle began to suspect a __ (secret) engagement
The old friend appears __ (unhappy)
Finally the truth of his __ (true) character will come to light
The younger daughter tries to attract attention to __ (her) own self
The letters of the international __ (phonetic) alphabet are divided into three categories
In __ (western) culture pseudonyms are used only by literary people
Greek is one of the ancient __ (written) language of the world
Reading in a __ (foreign) language is harder than reading in one's native language
The __ (poor) librarian sighed and shook her head
The old man want to make all people __ (happy)
The talented playwright described moments in the life of Russian monarchs.
Earning 10 thousand a month is enough for a (normal) life.
There are not enough (flower) pots on the windowsill.
(Each) person wants to be confident at least in something.
Everyone sleeps better in (fresh) air.
Achieving success in (such) conditions is complicated.
Downpours are possible at (any) time of year.
It was necessary to faithfully preserve all the sculpture's (colorful) nuances.
It is very hard now to find (good) nurses and medical assistants.
The deputies will have to specify (their) attitude towards the laws.
The detectives managed to render the (vicious) gang harmless.
One can't solve this problem with (one) algorithm.
The young woman was certain that her lover (despised) her cat.
The little girl's mother (got married) for love.
The color of honey (depend) on the plant.
From the moment of its creation this law (endured) several revisions.
Pharmaceutical firms (participate) in scientific races.
Catholic monks and nuns (abandoned) the monasteries.
Horses (feel) an approaching storm very well.
The grandchildren and great-grandchildren (guarded) Russian land from enemies.
Dogs (chew) all the furniture.
The neighbors shouted and (cried) loudly.

Filler words. The words used for the word-association task are given below. Numbers 1–36 are adverbs; 37–72 are nouns; 73–108 are verbs; and 109-144 are adjectives.

<table>
<thead>
<tr>
<th>1</th>
<th>аккуратно</th>
<th>carefully</th>
<th>73</th>
<th>арестовать</th>
<th>arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>безопасно</td>
<td>safely</td>
<td>74</td>
<td>бежать</td>
<td>run</td>
</tr>
<tr>
<td>3</td>
<td>внимательно</td>
<td>attentively</td>
<td>75</td>
<td>беседовать</td>
<td>chat</td>
</tr>
<tr>
<td>4</td>
<td>достаточно</td>
<td>sufficiently</td>
<td>76</td>
<td>вглядываться</td>
<td>peer at</td>
</tr>
<tr>
<td>5</td>
<td>естественно</td>
<td>naturally</td>
<td>77</td>
<td>восхищаться</td>
<td>admire</td>
</tr>
<tr>
<td>6</td>
<td>заботливо</td>
<td>thoughtfully</td>
<td>78</td>
<td>встречать</td>
<td>meet</td>
</tr>
<tr>
<td>7</td>
<td>заметно</td>
<td>noticeably</td>
<td>79</td>
<td>выворачивать</td>
<td>unscrew</td>
</tr>
<tr>
<td>8</td>
<td>заумно</td>
<td>overly abstrusely</td>
<td>80</td>
<td>высиживать</td>
<td>brood (as a hen)</td>
</tr>
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