ACQUISITION of GENDER in RUSSIAN[*]

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1   The Background

In adult Russian grammar the gender feature of nouns is closely related to their declension class. Their relationship was a controversial question that evoked two opposing views regarding the way gender is represented in adult Russian grammar. The representatives of one view argue for gender to be derived from the noun declension class (Declension-to Gender account, Corbett 1982), while proponents of the opposite account argue for the reversed pattern, where the inflectional morphology can be predicted from the information on the noun gender along with a phonological cue (Gender-to-Declension account, Vinogradov 1960, Thelin 1975, Crockett 1976 among others). My goal is to focus on children's acquisition of gender in Russian in order to compare these two major divisions of research. They provide different morphological analyses of gender forms in Russian; therefore this debate makes different predictions about the acquisition of gender by children. I tested these opposing predictions using children's data gathered from an experiment to identify what exactly children rely on when assigning gender to nouns. The experiment results support the Declension-to-Gender view and provide evidence that children are significantly more successful at assigning gender to the novel nouns relying on the nominal declension paradigm rather than on the adjectival agreement.

The way gender is represented in adults' competence grammar might not necessarily be the correct model of children's acquisition of gender. The child has to learn the gender of a significant number of nouns and extract the declensional paradigms first in order to then be able to learn and apply these redundancy rules for novel nouns. The question is whether a child will be able to make generalizations and follow certain morphological, phonological and semantic cues to assign gender to novel items, or will not be able to correctly assign gender without having been exposed to the novel items with unambiguous gender marking first and having learned their gender from direct evidence. If at some point children are able to determine the gender of novel nouns, a further question can be posed: which, if any, cues will the child most

readily use for gender assignment in Russian? If children use certain cues more readily than others, this may have implications for the theories of the nature of the acquisition process and the target adult grammar. For this reason, the experiment reported here investigated whether children were more accurate in determining the gender of novel nouns from the use of one type of cue or another.

Analysis of the mapping between gender and declension is presented in Figure 1 (I adopt the declension classification of Russian nouns from Corbett 1991; the figure is adapted from Rodina 2005). It reveals that there is no straightforward correlation between either of them.
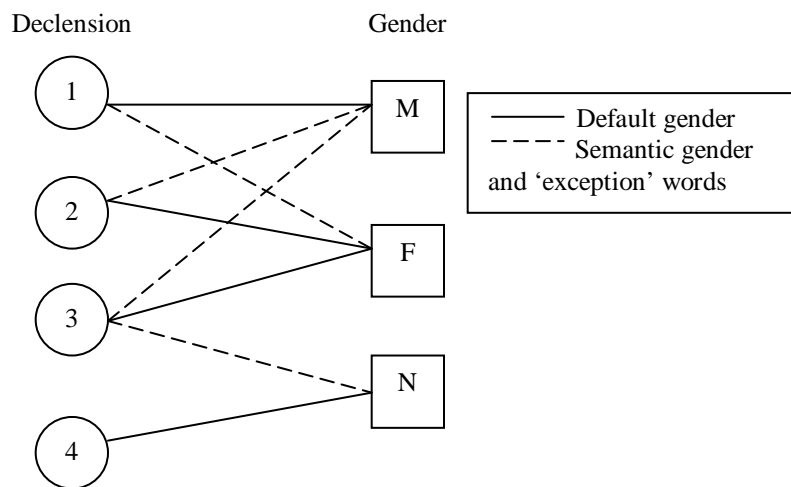

Figure 1

However, the Declension-to-Gender mapping is less ambiguous than the opposite direction. The problems for the mappings are indicated by branches: the more branches, the more problematic the mapping is. No gender would unambiguously result in one declension class. So there must be some other relevant information besides the noun gender which helps to determine the noun declension class. Corbett 1982 argues in favor of the Declension-to-Gender view: the noun gender can be fully predicted from the declension class and the semantics of the noun while the opposite is not possible. This mapping reveals fewer problems: class 4 nouns are unambiguously neuter.

Setting aside the discussion of semantic gender and other details of these mappings, I will point out one of the problems obvious in the Gender-to-Declension direction, namely feminine gender being the default for two noun classes. This is a problem because to determine the declensional class for such nouns a child needs to know not only their gender information, but also the phonological shape of the nouns in an unambiguous case, such as nominative, where inflection –a triggers class 2, and a zero inflection triggers class 3 (again,

putting aside semantically marked gender). For example, a child receives an input with nominative singular *lozhk-a* 'spoon', and *kost'* 'bone', both of which are feminine. Supposing, the child knows that these nouns are not semantically marked feminine. The child is left with two default options: these nouns can belong either to class 2, or 3. The phonological shape should tell the child that *lozhk-a* is a class 2 noun, since it has a morpheme –*a*, and *kost'-∅*, respectively, is a class 3 noun. However, what will happen if the input gives these nouns in an ambiguous case, such as genitive singular (*lozhk-i*, *kost-i*)? Neither the nouns' gender, nor their phonological shape will be able to lead to the correct result, as proponents of the Gender-first theory argue. Given only this information in the input, the child will be unable to conclude that these two nouns belong to different declensional classes and extract the relevant inflectional paradigms. Therefore, more declensional information is necessary. And this, already, breaks the idea of the Gender-to-Declension approach. This problem disappears in the opposite direction: Declension-to-Gender approach.

Although it may now seem that Declension-to-Gender view predicts a clear-cut gender assignment, further problems still remain. These problems arise from the phonological representations of specific morphological forms, which will be discussed further in connection with the relevance of morphological cues that children might be using in order to correctly assign gender to nouns.

I evaluate two cues that possibly trigger gender acquisition by children: adjectival gender agreement and noun declensional paradigm. The tested hypothesis is that to determine the gender of a novel item all a child needs is the use of the novel noun in the right context, the context being one of the cues for gender acquisition. Given the correct context, the child will apply the relevant rules and be able to derive the noun gender from this context. So, the two questions I pose for the experiment are whether the hypothesis is correct, and if yes, which cues are most effective. Since the predictions of the Declension-to-Gender approach are more accurate for the adult grammar, a more specific hypothesis is that the children will successfully cope with the task of determining the gender of the novel nouns under the condition where these nouns are introduced in the context of unambiguous declensional information (in the instrumental case) as opposed to the condition of adjectival agreement.

The morphological cues for gender assignment seem to be of particular importance for a subset of Russian nouns that is usually referred to as 'opaque' (Taraban & Kempe 1999). Such are the nouns whose morpho-phonological shape in certain cases is ambiguous. Consider examples from a group of opaque nouns in (1), which is the focus of my study:

(1) sen-o [senə]   Sen-a [senə]
    hay-N-4   Seine-F-2
    'hay'   'the Seine'

These are neuter 4th class and feminine 2nd class nouns with an unstressed inflection, which is reduced to a shwa vowel. The inflections of both nouns have

a homophonous morpho-phonological form; therefore there must be an additional cue to this form for a child to get the noun gender.

For adults and second language learners both cues in question are equally helpful for gender assignment. I tested it in an adult control study with novel nouns. Similarly, if children, too, successfully rely on any of the morphological cues, we expect them to make no or few errors in gender assignment. Let us compare two opaque nouns of different genders where they are ambiguous only in the nominative and locative cases:

(2)   'the Seine' F-2   'hay' N-4
     NOM   Sen-a   sen –o
     ACC   Sen-u   sen-o
     GEN   Sen -y   sen -a
     DAT   Sen -e   sen -u
     INST   Sen -oj   sen -om
     LOC   Sen-e   sen -e

If the declension cue is helpful, the prediction is that when children rely on unambiguous forms, they will correctly assign gender, for example:

(3) a.   Tut net Sen-y / * Sen-a
         Here no Seine-F-2-GEN-sg.
         'There is no Seine here'

    b.   Tut net sen-a / * sen-y
         Here no hay-N-4-GEN-sg.
         'There is no hay here'

Adjectival agreement on gender is another possible helpful cue for gender assignment. Our expectation is perfect or near-perfect children's performance on gender assignment in the following example:

(4) a.   Tut net sux-oj   Sen-y / *Sen-a
         Here no dry$_f$-Gen-sg Seine$_{f-2}$-Gen-sg
         'There is no dry Seine here'

    b.   Tut net sux-ogo   sen-a / *sen-y
         Here no dry$_n$-Gen-sg hay$_{n-4}$-Gen-sg
         'There is no dry hay here'

If (3) and (4) are something that children rely on, we expect correct gender assignment, which will result in correct gender agreement on adjectives, past tense verbs, etc.

In sum, the goal of this paper is as follows. In order to test the different hypotheses concerning gender acquisition by Russian children I need to look at

experimental data of elicited production in which the novel noun is used in the context of two different morphological cues. If the hypothesis is right, I expect the child to be able to determine the noun gender and correctly produce it in the elicited output. Furthermore, by comparing the data obtained under two different conditions, I should be able to see which cue is a more efficient trigger of novel nouns' gender determination for the children.

2 Method
2.1 Subjects

The experiment was conducted on 30 monolingual Russian-speaking children between 3 and 5;7 years old. The mean age of tested children is 4;4 years. The age range where the acquisition of gender and case inflections have been claimed to take place in Russian is between 3 and 6 years of age (Zakharova 1973, Popova 1973). There were 20 girls and 10 boys in all groups. All subjects were students of a full-time kindergarten in Russia. The children were divided into three groups, referred to as order 1, order 2 and order 3 for convenience. Within each group there were 10 subjects of the same average age. The groups differ in terms of the way the stimuli were offered to them. Orders 1 and 2 received stimuli of the same gender per item, but under different conditions; orders 1 and 3 received stimuli of different gender per item, but under the same conditions; and orders 2 and 3 vary in terms of both stimuli gender and conditions under which they were offered.

2.2 Stimuli

I tested novel nouns modeled after real ones ending in an unstressed shwa vowel, such as (1). A child had to determine its gender and had two options: feminine class 2 nouns and neuter class 4 nouns. A sample of novel items is presented in (5).

(5)	Feminine	Neuter
Nominative	xot-a	xot-o
Instrumental	xot-oj	xot-om

A novel noun from this group was presented to the child in a modified input according to two conditions. In condition 1 (Adjective Agreement) unambiguous agreement information is given (the adjective is stressed finally) while declension information is ambiguous (the noun is presented in the nominative case). An example of the input under condition 1 is given in (6):

(6)   Eto golub-oje xoto,   a   eto zolot-oje xoto.
        This blue-N   novel item (NI), and this gold-N   NI.
        'This is a blue NI, and that is a golden NI'

In condition 2 (Instrumental Case) the declension information is unambiguous (the noun is in the instrumental case) whereas agreement information is missing (no adjective is presented). Instrumental case in the singular appears to be the most informative to distinguish between opaque nouns. So, instrumental case inflections of the nouns in question (class 2 and 4) are *–oj* and *–om*, respectively, which sound different from each other. The example in (7) shows a sample input under condition 2:

(7) Kloun risuet xot-om, i kozlik tozhe risuet xot-om. Tol'ko oni raznye.
Clown draws NI-N-inst and goat also draws NI-N-inst. Only they different.
'The clown is drawing with NI and the goat is drawing with NI. But they are different.'

There were 32 novel nouns that were modeled after real nouns in Russian and were ambiguous in the same way. The use of nonce nouns as stimuli allowed me to manipulate the input as one gender for one group of subjects and another gender for another group of subjects. This was done in order to be able to present the same novel noun in different genders to different groups of subjects. Thus, the input of orders 1 and 2 differed in terms of the NI's gender, but the items were presented under the same conditions; whereas the input of orders 1 and 3 had nouns of the same gender but presented under different conditions.

2.3 Procedure

The method of the study was elicited production. The materials used in the experiment included toys, four puppets and various objects that were named with a novel noun. The children's task was to ask the puppet bear to do a number of actions with this or that object, where the object's novel name was to be used in the instrumental case.

The experiment had four stages. It began with a training period where the child was given the modified input according to the conditions described above. Note that Adjective Agreement condition was ordered first in orders 1 and 2, and second in order 3. This will turn out to be important for the discussion of the results, in particular, whether or not there was a simple learning effect. At stage one I used unambiguous stimuli and could provide feedback to the child to hint at the correct answer so the child could understand the procedure.

The second stage was the presentation of the tested novel item to the child in the modified input under a certain condition. This stage lasted a while until it became obvious that the child felt comfortable with the novel item.

Immediately following this period was the session of elicited production where the child was asked to produce the nouns in the context where their knowledge of gender was tested. Under both conditions the goal was to elicit the use of the novel item from the child in a similar setting, i.e. using the novel item in the instrumental case, preceded by an adjective. This was done in order for

the elicitation tasks under both conditions to be equally difficult. However, in each case the child had to use a different cue provided in the input in order to produce the correct statement.

Finally, there was a fourth stage whose aim was to distract the child's attention from being tested, and instead creating an impression that the subject of the experiment was the puppet, not the child. This was done by a follow-up stage resembling a truth-value judgment test. The child was asked to reward the puppet if it performed the action she had requested correctly.

3   Results

The criteria for determining whether children assigned gender to the novel items correctly or not were to look at both the elicited noun and the adjective's ending in the instrumental case. First of all, I eliminated those responses when the results appeared un-interpretable, i.e. any agreement error, or the use of the novel item in a case other than instrumental. Second, I checked whether the noun agreed with the adjective in both case and gender, and if the assigned gender matched the one in the input. In that case the response was considered to be a correct one. Then I compared the expected noun gender in the input to the elicited gender assignment and, finally, drew the conclusion based on whether the noun gender matched the input or not.

To analyze the data obtained from the experiments, statistical tests were run on the SPSS program. An alpha level of .05 was used for all statistical tests. The tests were performed twice: first, to compare the data from orders 1 and 2 (differing by the gender of the novel items in the input); second, to compare the data from orders 1 and 3 of the experiment subjects (differing by which condition was presented first). The subject statistical analysis is a general linear model two-factor anova with repeated measures (i.e. average measures across items) on both factors (gender and condition) for two orders (two groups being compared). The measures were the averages between 1 and 0, where 1 corresponded to the correct gender assignment, and 0 to the incorrect gender assignment by each subject across items. Two factors (gender and condition) resulted in four repeated measures for each subject. With an alpha level of .05, the effect of condition was statistically significant, $F(1,18) = 11.194$, $p = .004$.

The significant effect of condition is such that under the Instrumental Case condition the children's performance was significantly higher for the novel items of both genders than their performance under the Adjectival Agreement condition. As the graph in Figure 2 shows, feminine nouns have a higher rate of performance under both conditions, but this effect was marginal.
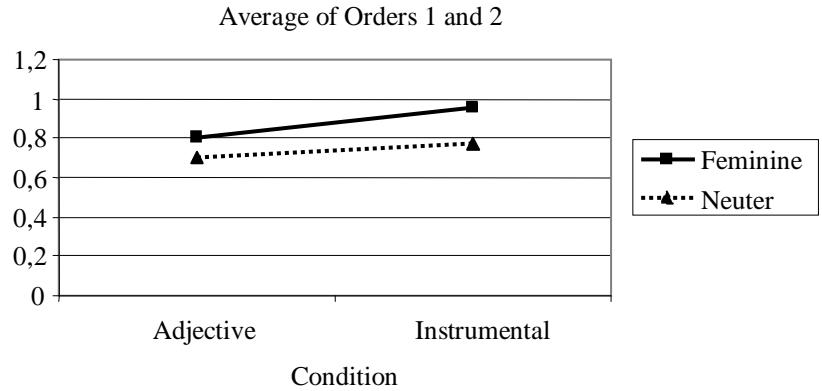
Average of Orders 1 and 2

Figure 2   Subject Analysis: Orders 1 and 2

The data obtained from the subjects of orders 1 and 3 controlled for the learning effect of condition. The two conditions were now given in the reversed order: Instrumental Case condition was presented first and Adjectival Agreement condition second. Nevertheless, the results are very similar to those of orders 1 and 2: there was a significant statistical effect of condition with an alpha level .05: $F(1,18) = 20.350$, $p < .001$.
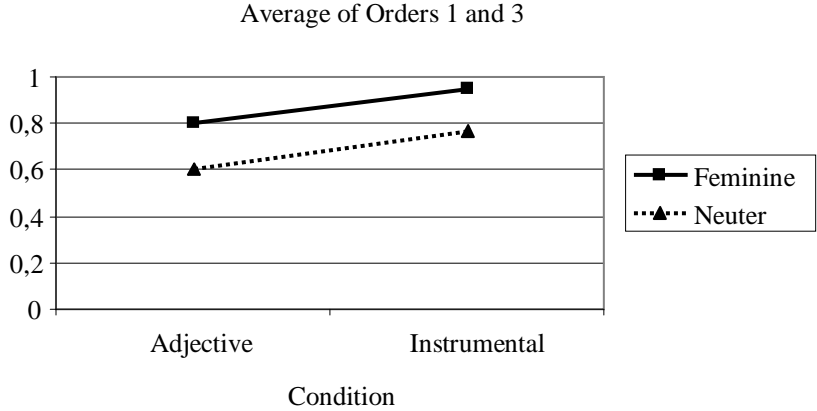
Average of Orders 1 and 3

Figure 3   Subject Analysis: Orders 1 and 3

The significant effect of condition in orders 1 and 3 was the same as in orders 1 and 2: novel nouns of both genders were produced significantly more accurately in terms of their gender assignment under the Instrumental Case condition than under the Adjectival Agreement condition. As in the previous

pair of groups, feminine nouns again were performed better than neuter nouns, which statistically was a marginally significant result.

Parallel to the subject analysis, I ran the univariate items analysis of variance on the SPSS program. The goal of the items statistical test was, first, to check whether the items (novel nouns) do not stand out as being biased toward one gender or the other, and second, to control the results of the subject analysis. The items analysis is a general linear model univariate test. For each such item order, gender and condition were specified as fixed factors. The average univariate measure across subjects (children) was the dependent variable corresponding to each item. Similar to the subject analysis, the alpha level was .05. I ran the test twice to compare the two sets of data from orders 1 and 2 and orders 1 and 3.

In both sets of orders the statistical tests performed on the items again revealed a significant effect of condition, like in the subject analysis: Instrumental Case condition proved to be significantly more facilitating for the nouns of both genders ($p < .001$).

4   Discussion

The main general result of the performed experimental study is the significant effect on condition for the accurate production of novel nouns' gender by the subjects. This result supports the hypothesis that for correct gender assignment children need the relevant exposure to the novel noun in the input. Moreover, the children's performance on gender assignment depends on the kind of exposure: the condition under which the novel noun was introduced in the context of its declensional paradigm proved to be significantly more successful at facilitating correct gender assignment than the condition under which the novel noun is presented in the context of adjectival agreement.

Such results support the Declension-to-Gender (Corbett 1982, Corbett & Fraser 1994) view of the relationship between gender and declension in Russian: gender assignment can be predicted by the information provided in the nominal declension paradigm. The full paradigm with nouns' unambiguous morphological forms reduces the discrepancy between nouns' declension class and gender caused by the opacity of the morphological ambiguous forms, at least those tested in this experiment.

Unlike learners of Russian as a second language, the morphological cue of the novel nouns' agreement with adjectives (condition 1 of the experiment) did not cause the children to perform well on the gender assignment. In fact, in most cases the children made specific errors in their production where the nouns and adjectives did not agree with each other on gender. The most frequent type of error (noun-adjective disagreement on gender) serves as additional support of the general result that the Adjectival Agreement condition is not too helpful for the gender acquisition by children.

The fact that the condition effect is similarly significant in the statistical tests on both pairs of groups shows that it cannot be the learning effect, because

the order of conditions was reversed. The group of children who received the novel nouns under the Instrumental Case condition prior to the Adjectival Agreement condition (order 3) show the result similar to those of the other order.

Another general result from the study is a marginally significant effect on gender in the subject analysis, which was significant in the items analysis. This result shows that generally children are better at feminine rather than neuter nouns' gender assignment. Such result matches with a greater frequency of feminine nouns in adult grammar (Zazorina 1977).

5   Conclusion

Two theoretical approaches to gender and declension in adult grammar were evaluated in this paper: Declension-to-Gender and Gender-to-Declension views. These approaches differ in their acknowledgment of what comes first: can a noun's gender be predicted on the basis of its declension (Declension-to-Gender approach), or can nominal declensional class paradigm be derived from the gender of a noun (Gender-to-Declension approach). I investigated what kind of relevant context of the novel nouns the children used more readily for successful acquisition of gender. Among the options of such cues, I focused on the nominal declensional paradigm as one cue, and the nouns' agreement with adjectives as another.

Having analyzed the predictions of both, I came to the conclusion that Declension-first account is a more accurate one, since it appears to be less problematic for the mapping between gender and declension class. On the basis of these evaluations, I held an experimental study whose results supported the Declension-first approach.

The main conclusion is that children successfully coped with the task of determining the gender of the novel nouns under the condition where these nouns were introduced in the context of unambiguous declensional information (in the instrumental case). The condition of another cue – Adjectival Agreement – was significantly less facilitating, as the statistical analysis of the experimental data showed. This difference is taken as supporting the Declension-to-Gender model.

The interpretation of the results obtained from this study is based on an additional assumption, which is that there is an expected discrepancy between the possible ways children process gender information. Even if the Declension-to-Gender approach is the correct model for adult grammar, we still find that adults have no problem assigning correct gender to novel nouns using either kind of input: nominal declension or the adjectival agreement information. This means that the adults are successful at applying the rules in the backwards direction; that is, getting the declension given the gender. However, we expect children not to be very good at processing backwards: given the Declension-to-Gender model, they are expected to be more successful at getting the gender information from the nominal declension than applying the rules backwards and

getting the gender information from the adjective. This is what the results of the performed experiment show. Note that children are not completely unsuccessful at gender assignment under the condition of adjectival agreement, but just less successful. Since their processing is not as efficient as adults' when going backwards, we see evidence for one model over another.

An alternative explanation why children performed better under the Instrumental Case condition over the Adjectival Agreement condition has to do with a possibility that children could have problems with processing agreement in general. The information about a novel noun's gender given on the noun itself as opposed to the information about the noun given outside of the nominal domain could be acquired earlier and/or easier by children. If this is the case, the results of my current study do not necessarily bear on any of the discussed theories of gender. An agreement processing problem is a side issue, which would not falsify either theoretical approach I discussed in this paper. In other words, problems with the processing of agreement could remain a problem even if the other model (Gender-first approach) was the correct one. In order to pursue this further, I need to look at various kinds of agreement phenomena to see if there is such a general problem with agreement.

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