

# The Acquisition of Universal Quantifiers in Russian

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## 1. Introduction

This paper is concerned with the acquisition of universal quantifier constructions by monolingual Russian-speaking children. Research concerning the acquisition of quantifiers has been conducted in a variety of languages, such as French (e.g. Inhelder and Piaget 1964), Dutch (e.g. Philip 1996b), Turkish (e.g. Adam-Terem 1987), and Japanese (e.g. Takahasi 1991); but this is the first investigation of these constructions in Russian. Our data show that Russian-speaking children do use some of the same strategies children have been shown to use in a number of other languages, such as the symmetrical strategy. In the symmetrical strategy the children produce a one-to-one mapping between subjects and objects, leading them to reject interpretations of sentences in which there are additional potential subjects or objects not engaged in the action. However, previous studies' predictions were not fully confirmed by our results. In addition to universal quantifiers in subject position, we also tested universal quantifiers in object position and sentences without any quantification. We found differences in the use of the symmetrical strategy with quantification in subject position and object position. We also found evidence of the symmetrical strategy in sentences without universal quantifiers. Finally, our data show that children with Specific Language Impairment are not significantly different from typically developing children in their ability to comprehend universal quantification.

(1) gives examples of the three types of sentences discussed in this article:

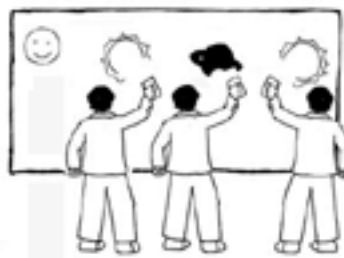
- (1) a. Each boy erases a picture. (quantified subject)
- b. A boy erases each picture. (quantified object)
- c. Boys erase pictures. (plural unmodified)

Children using the symmetrical strategy will interpret sentence (1a) as only meaning that there is a one-to-one mapping between boys and pictures. In other words, children will not select a picture with three boys erasing three individual pictures, but with an additional picture remaining on the board unerased. For sentence (1b) the symmetrical strategy also requires there to be an equal number of boys and pictures, with every boy and picture engaged in the action of erasing. Sentence (1c) does not have a universal quantifier, but still has a symmetrical and an asymmetrical interpretation. The symmetrical and asymmetrical interpretations for sentence (1a) are illustrated below by pictures 1-2:

Picture 1: Symmetrical Interpretation



Picture 2: Asymmetrical Interpretation



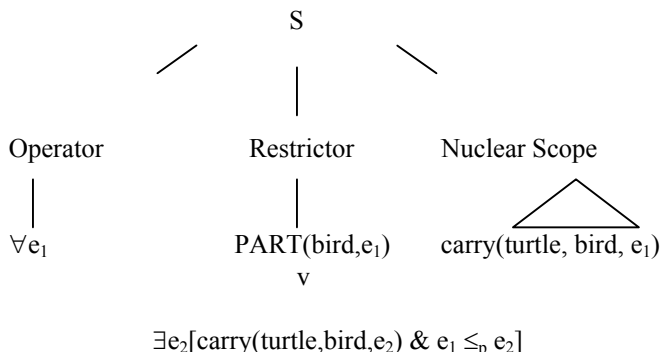
In the current study, a picture-selection task tested the use of the symmetrical strategy in these three types of sentences. For each sentence, the children were given pictures that represent the symmetrical response and the asymmetrical response.

## 2. Two Theories to be Tested

Two competing theories of the acquisition of quantification are the Event Quantification Theory (e.g. Philip 1995, 1996a) and the Full Competence Theory (e.g. Crain et al. 1996).

The Event Quantification Account (EQA) proposes that errors in the comprehension of quantification surface because universal quantifiers are interpreted by young children as adverbial modifiers that (1) quantify over events, (2) take scope over the sentence, and (3) force a one-to-one mapping between subjects and objects. Below is an example and illustration of the Event Quantification Theory (Philip 1996: 566):

(2) Every turtle is carrying a bird



This illustration shows that under the EQA, ‘for every event in which a bird participates, or which is a possible subevent of a turtle-carrying-bird-event, a turtle is carrying a bird’ (Philip 1996: 566). In other words, under the EQA the quantifier’s scope is not limited to the nominal that it immediately precedes, but instead is applied to the action, allowing only interpretations in which all instances of the named subject and named object participate.

When applied to our experiment, the EQA predicts that the children will use the symmetrical strategy whenever faced with a quantifier, regardless of the quantifier’s position. Since under the EQA it is the quantifier that scopes over the event, resulting in the symmetrical response, children should not select a symmetrical response when no quantifier is present. These predictions are not compatible with our results. Despite the predictions of the EQA, Philip (1996) does provide some data that is not symmetrical for subjects and objects. His data show that children produce more adult-like responses with subjects than objects. However, the asymmetries in our data demonstrate a different pattern.

The Full Competence View (FCV) argues that children have control over universal quantification and that any observed errors are due to infelicitous experiment design. It proposes that children do not

differ from adults in their ability to apply quantification, but instead, in the parameters required for a given question to fulfill ‘the condition of plausible dissent’ (Crain et al. 1996:116). In order to satisfy this condition ‘the assertion must be in doubt at some point’ (Crain et al. 1996:116). In addition, the FCV asserts that tasks that are too simple can ‘impair children’s performance’ (Crain et al. 1996:149).

In response to Philip’s yes/no question design, Crain et al. (1996) makes the observation that for many of the questions, both yes and no answers are not plausible. Since the given questions are infelicitous, the FCV proposes that children alter the task so that it is a felicitous one. Instead of answering the given question, they answer the question that they think was intended by the speaker. This question is about the symmetry between the subject and object.

The FCV does not apply to our methodology. Unlike Philip’s experiments, our experiment does not use yes/no questions. Our picture-selection task provides children with multiple choices that are all potential answers for the children to consider. To further ensure that the task is not infelicitous for children, we included a distracter item for each sentence. If the task is infelicitous then the children’s non-symmetrical responses should be divided equally between the distracter and the asymmetrical response. As will be seen, the FCV is not able to account for all of our results.

### 3. Current Study

Our experiment included 30 sentences in 3 different conditions, some with additional sub-conditions. The conditions were:

- (1) Universal quantifier in subject position
  - a. Quantified subject *vse* ‘each’
  - b. Quantified subject *kazhdyj* ‘all’
- (2) Universal quantifier in object position
  - a. Quantified object *vse* ‘each’
  - b. Quantified object *kazhdyj* ‘all’
- (3) Plural unmodified

Each of these (sub-)conditions was further split into an equal number of positive and negative items. We are only reporting on the findings of the (sub-)conditions with positive items in this article.

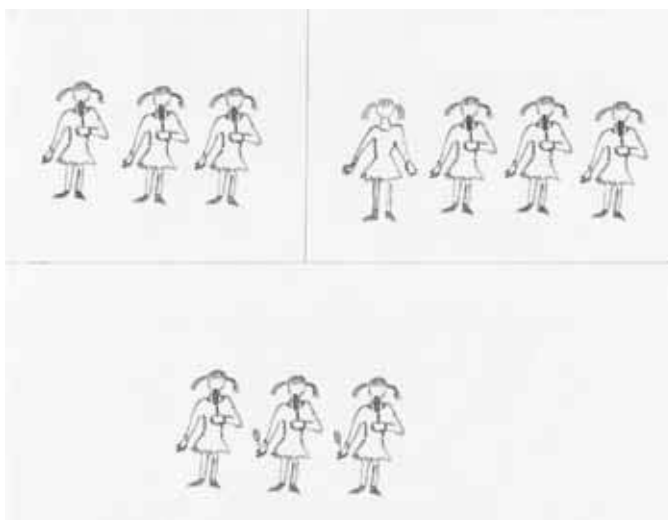
The subjects were 42 monolingual Russian-speaking children, aged 4-12. Ten of the children were diagnosed with Specific Language Impairment, an impairment that is characterized by a deficit in language use without accompanying social, cognitive, hearing, or neurological deficits. In addition, eleven adult native speakers of Russian completed the same experiment.<sup>1</sup>

In our picture-selection task, the children listened to sentences and were asked to choose one of three pictures for each sentence. This picture-selection method allowed us to simultaneously test children’s ability to comprehend the items and to observe patterns or preferences in their choices. Below are sample sentences with their respective pictures for each of the conditions:

- (3) Universal quantifier in subject position
  - a. *Vse devočki djat moroženoje*  
all girls eat ice cream  
‘All of the girls are eating ice cream.’

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<sup>1</sup> It is possible that the adults were using an extra-grammatical strategy to perform the picture-selection task; however, this additional strategy did not affect the results of this study.



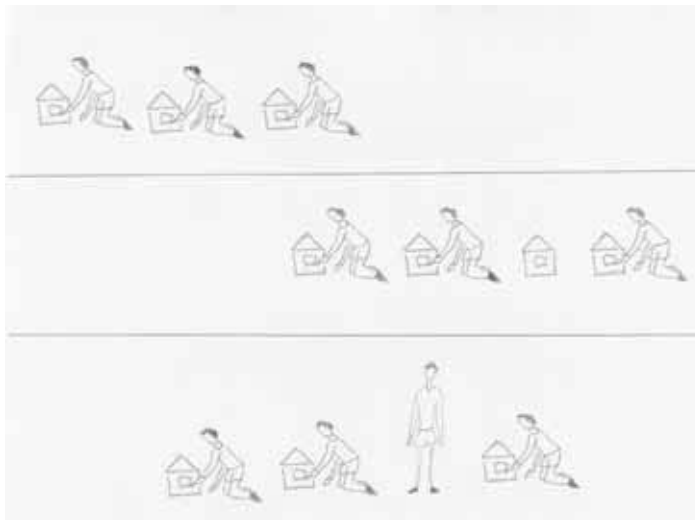
Universal quantifier in object position

- b. Mal'čik neset vse čemodany.  
 boy is.carrying all suitcases  
 'The boy is carrying all of the suitcases.'



Unmodified plural subject

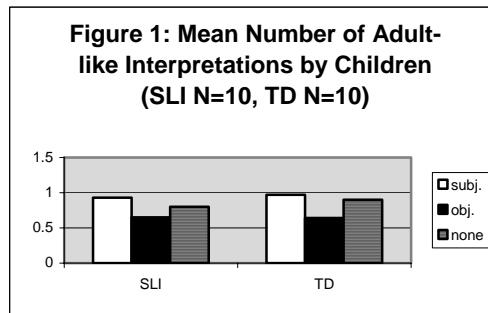
- c. Mal'čiki strojat doma.  
 boys are.constructing houses  
 'The boys are constructing houses.'



For each item the pictures represent the following responses: (1) the symmetrical response, (2) the asymmetrical (acceptable) response, and (3) a distracter, which is never acceptable. The symmetrical response is only acceptable for adults in the quantified subject and plural unmodified conditions. It is not acceptable in the quantified object condition. The asymmetrical response is always acceptable for adults. The distracter is used to ensure that the children are focusing on the task at hand and not just selecting pictures at random. The distracters still show the same subjects and objects, just in a context that is ungrammatical for adults and is not symmetrical.

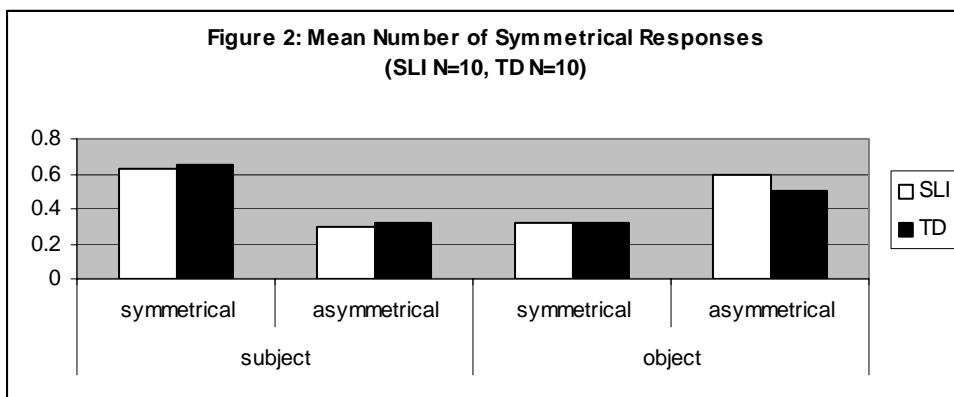
#### 4. Results

Our results show no significant difference between the number of adult-like interpretations for the SLI children and the TD children. This is shown below in figure 1<sup>2</sup>:



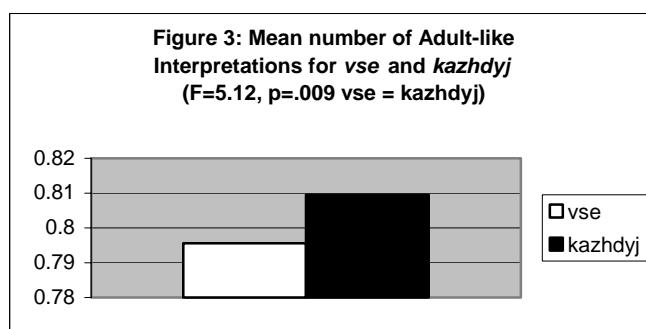
In addition, our results show no significant difference in the preference for the symmetrical response between SLI and TD children. This is shown below in figure 2:

<sup>2</sup> The comparison between the two groups of children was completed with a sample from each group.



Since there are no significant differences, the remainder of our results will use all of the children as one group.

Furthermore, our results show no significant difference in the children's ability to interpret sentences in an adult-like manner with the two quantifiers tested. This is illustrated by figure 3 below:



This finding is similar to the findings of a follow-up study discussed in Drozd (1996). Drozd initially found differences between the number of correct responses by Dutch-speaking children for *iedere* 'each' and *alle* 'all' in his yes/no question experiment. A follow-up experiment that was the same in methodology, but with a different set of items, provided evidence that these differences were due to the pictures used. Our results, as well as Drozd's results, are interesting in that previous studies have concluded that there are differences between the ability of children to interpret *each* and *all*. Gil (1992) states that unlike *all*, *every* has two potential roles. It can either be quantificational or scopal. When quantificational it applies only to the nominal it modifies, but when scopal, it is distributive. One of the predictions of Gil's hypothesis is that children should make more errors with *every* than *all* due to its multiple functions and inherent complexity. Furthermore Brooks and Braine (1996) found evidence that children were better able to restrict a quantifier to the noun it modifies when the quantifier was *all* rather than *each*. They conclude that this is a result of the potentially distributive nature of *each* and the collective nature of *all*.

Our data provides evidence that children do not have more difficulty with either quantifier and suggests that if children treated these quantifiers differently in previous experiments that there is a separate explanation for this behavior. Since there is no evidence of any difference in our data, the remainder of our results will group both quantifiers together.

The only condition in which the children's responses differ significantly from those of the adults is the quantified object condition. In both the quantified subject and unmodified plural condition, the response of adults and children were not significantly different. In the quantified object condition, the adults never selected a symmetrical response, but the children selected this response 21% of the time. Since the symmetrical response is not acceptable for adult speakers in this condition, it is not surprising that they did not choose this interpretation. Although the children use the symmetrical strategy significantly less often in the object condition than the subject condition, it is striking that they

continue to select the symmetrical response up to 21% of the time even though the interpretation is not acceptable for adults.

#### 4.1 Significant Results

Our results show that the children have a stronger preference for the symmetrical response when the quantifier was in subject position than when it was in object position. This is shown below in table 1:

Table 1: Total Picture Selections by Response<sup>3</sup>

	Symmetrical Response	Asymmetrical Response	Distracter	Total
Universal quantifier in subject position	147=58% Correct for adult	78=31% Correct for adults	28=11% Incorrect for adults	253
Universal quantifier in object position	36=21% Incorrect for adults	103=60% Correct for adults	33=19% Incorrect for adults	172
Unmodified plural subject	122=81% Correct for adults	16=11% Correct for adults	13=9% Incorrect for adults	151

These data demonstrate that children produce adult-like responses in the unmodified plural condition and the quantified subject condition. In the quantified object condition, however, the children produced significantly fewer adult-like responses (ANOVA,  $F=24.97$ ,  $p<.001$ ). This difference results from the children's use of the symmetrical strategy in the quantified object condition, even though symmetrical interpretations are unacceptable in this condition for adults.

Our data show that children prefer to use the symmetrical response; however, children are sensitive to the acceptability of the symmetrical response. Aside from position, the crucial difference between the condition with the quantifier in subject position and the quantifier in object position is the availability of the interpretation for adults. As noted above, when the quantifier is in subject position, the symmetrical response is an acceptable interpretation, but when the quantifier is in object position, the symmetrical response is not an acceptable interpretation. When the symmetrical response was an acceptable adult interpretation, the children selected it more frequently than the asymmetrical response. When the symmetrical response was not an acceptable interpretation it was selected less frequently, but still 21% of the time.

In the unmodified plural condition, the children selected the symmetrical response (81%) at a higher frequency than the asymmetrical response (11%) even though both are possible adult interpretations. Brooks and Braine (1996) also tested an unmodified construction in a picture-selection task. They found evidence that both children and adults prefer an exhaustive interpretation. In this exhaustive interpretation, there is asymmetry in the number of subjects and objects; however, all of the subject and object items are engaged in the activity named by the verb. Our experiment differs from Brooks and Braine's experiment in that we did not give the children an exhaustive picture as a possible choice. When the exhaustive choice is removed from the set of potential choices, it is possible to test if the children have an additional interpretation. Our results show that the children have a preference for the symmetrical response under these conditions.

<sup>3</sup> This methodology allows us to test children's preference for the symmetrical response. For the quantified subject condition, it is possible that the children have more than one interpretation, as do adults. For the quantified object condition, it is possible that the children who chose the symmetrical response also have the asymmetrical response, which is acceptable for adults. We are currently running a follow-up experiment that, among other things, investigates the possibility that children have more than one acceptable interpretation for sentences with quantification.

## 5. Discussion

Philip's Event Quantification Account would predict that the position of the quantifier should not affect the use of the symmetrical strategy. Furthermore, under the EQA the symmetrical strategy should not be employed when there is no quantifier present. Like Philip's, our results show that children have a strong preference for the symmetrical response and use it whenever possible, sometimes even when it does not match an acceptable adult interpretation. However, our results are also evidence that children are sensitive to the acceptability of adult interpretations. Although Philip also found some evidence of asymmetry in his work, the EQA does not provide an explanation for the asymmetry. Furthermore, the EQA provides no explanation for why the symmetrical strategy is employed even when there is no quantifier.

The Full Competence View can account for the children's adult-like responses in both sentential positions since it states that children have adult-like abilities to interpret quantification. Like adults, children use the symmetrical strategy less often in the quantified object condition; however, they differ from adults in that they still produce some unacceptable symmetrical responses in this condition. In addition, the FCV does not apply to our experiment since it is not limited to yes/no responses and includes a distracter to test for children's re-interpretation of the task. The FCV is left unable to account for the non-adult-like symmetrical responses in object position and the use of the symmetrical strategy in the unmodified plural condition.

A potential analysis for our data is proposed by Sauerland (2003). Sauerland argues that there is a silent *always* present in child grammar. This *always* is the same silent *always* that surfaces in the generic interpretation in adult grammar. Below are examples (Roeper et al. 2004: 6):

- (4) a. When one sleeps, the other wakes up.  
       'it is always the case that when one sleeps, the other wakes up'  
       b. A guide insures that every tour is a success.  
       'it is always the case that a guide insures that every tour is a success'

Sauerland proposes that children cannot interpret universal quantifiers so they discard them and are left with generic sentences with silent *always*.

Further work is needed to explore the use of this analysis to account for the acquisition of universal quantifiers. This type of analysis would better account for the use of the symmetrical strategy with in the unmodified plural condition. However, some modification is necessary for this analysis to account for the asymmetry found between the use of the symmetrical strategy with quantifiers in subject position and quantifiers in object position.

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