The roles of givenness and type of referring expression in the comprehension of word order in Russian-speaking children

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1. Introduction

1.1 Comprehension of non-canonical word orders

Information structure concerns the way in which information is linguistically expressed in discourse (Chafe 1976, Vallduví & Engdahl 1996). Givenness, for instance, influences the prosodic and lexical realization because given (recoverable) information is deaccented and realized as a pronoun whereas new information is usually accented and realized as a lexical noun phrase (NP) (Chafe 1976, Krifka 2008). Givenness is also expressed syntactically because given information is usually placed before new information (Haviland & Clark 1974). However, languages differ in the linguistic devices they use to express information structure (Krifka 2008, Vallduví & Engdahl 1996). Accordingly, children need to acquire a variety of language-specific devices that are used in their ambient language (Dimroth & Narasimhan 2012, Höhle et al. 2016).

Research on the comprehension of word order has revealed that preschool-age children usually have problems understanding non-canonical constructions or sentences in the non-canonical word orders (Hirsch & Wexler 2006, Slobin & Bever 1982). Thus, when presented with a passive construction like (1), they may identify the tiger as the agent or choose randomly.

(1) The tiger was chased by the lion.

These problems, also visible during online processing in adults and may occur because non-canonical sentences are less frequent than canonical sentences (MacDonald et al. 1994, Trueswell & Tanenhaus, 1994), more complex (Frazier 1987), and are not felicitous without an appropriate context (Crain & Steedman 1985). Moreover, children may have problems relying on morphological information or may weight this information differently from adults (Bates & MacWhinney 1987, Slobin & Bever 1982).

In our study, we examined the influence of contextual factors on child sentence comprehension. Previous experimental settings have usually presented the test sentence without an appropriate context and tested sentences in which the arguments were realized as lexical NPs. In natural situations, however, sentences occur with a context and usually at least one referent is realized as a pronoun (de Marneffe et al. 2012, Dyakonova 2004, Sauermann 2016). When these issues are addressed, sentence comprehension has been found to improve. A facilitating context and contrastive prosody may enhance the comprehension of OVS (object-verb-subject) sentences in German- and Danish-speaking children (Grünloh et al. 2011, Boeg Thomsen & Poulsen 2015). Moreover, realizing one of the referents as a personal pronoun has been found to ease the comprehension of OVS sentences (Sauermann & Höhle 2016).

Our study builds upon work by Sauermann & Höhle (2016), who investigated the impact of the topic-first context and the type of referring expression on OVS sentence comprehension in German-speaking 4- and 5-year-olds. In the topic-first context, an introductory sentence as in (2) presented the sentence-initial object as the topic. The topic was either realized as a lexical NP (2a) or as a personal pronoun (2b).

(2) Now you will hear a story about the tiger.

a) Ich wette, **den** **Tiger** kitzelt gleich das Schwein.
I bet the.acc tiger tickles soon the pig
"I bet the pig will tickle the tiger soon."

b) Ich wette, **ihn** kitzelt gleich das Schwein.
I bet he.acc tickles soon the pig
"I bet the pig will tickle him soon."

The topic-first context did not influence comprehension accuracy compared to the all-new context when both arguments were realized as lexical NPs, i.e., in both conditions OVS comprehension was around the 50% chance level. However, accuracy rates were above the chance level (65–69%) when the topic was realized as a personal pronoun (2b).

The realization of the topic as a personal pronoun may have improved OVS sentence comprehension because pronominal referents reduce processing demands that may arise from the interference or memory costs in non-canonical sentences containing two lexical NPs (Friedmann et al. 2009, Gordon et al. 2001) and/or increase discourse coherence and ease discourse integration (Grosz et al. 1995, Warren & Gibson 2002).

Yet, the question remains why the topic-first context itself did not improve comprehension accuracy in children. Online studies have demonstrated that the topic-first order eases OVS sentence processing in German-speaking adults (Burmester et al. 2014, Schumacher & Hung 2012), and the given-before-new order (which corresponds to the topic-first order in the child experiment) has been linked to a general processing advantage (Haviland & Clark 1974, Jaeger & Tily 2011). Accordingly, children ought to profit from the topic-first or given-before-new order as well.

It might be that children do not fully consider the contextual information during sentence processing. Indeed, it is debated whether children's performance is strongly influenced by contextual factors (Crain & Thornton 1998, Song & Fisher 2005) or not (Arnold et al. 2007, Trueswell et al. 1999).

Moreover, the topic-first order may not have an impact because German-speaking preschoolers have problems processing OVS sentences with full lexical NPs per se. That is, the topic-first order may merely ease the integration of information (Schumacher & Hung 2012) but does not provide an additional cue to the non-canonical word order (because topic-first is also compatible with the SVO word order). In this way, the topic-first context differs from contexts in which information structure (e.g., focus-first) could be used as a cue to the non-canonical word order (Grünloh et al. 2011) or thematic roles could be inferred due to (discourse) topic maintenance (Grünloh et al. 2011).

To clarify why the topic-first context did not ease comprehension in German and whether children may profit from a general given-before-new order, it is necessary to look at a language in which children have fewer problems comprehending non-canonical sentences and word order is more strongly influenced by the given-before-new principle.

Accordingly, we examined the role of givenness in Russian. In the next section, we compare Russian with German and discuss previous research on Russian word order variation. Then, we

report on our experimental study on the comprehension of SVO and OVS sentences in Russian-speaking preschoolers and adults.

1.2 Comparisons between Russian and German

Both German and Russian permit SVO and OVS sentences, but the two languages differ with respect to morphology and information structure. Generally, Russian has a richer morphology and allows for more word order variability than German (Eisenberg 2006, Švedova 1980). Russian does not have articles and case is marked on nouns by word-final inflection. In German, case is marked on the preceding article and only for some forms on the noun as well. Table 1 illustrates the parts of the morphological systems, i.e., the marking of femine nouns in Russian and masculine nouns in German, which are relevant to our study. The rich nominal and verbal morphology in Russian (Švedova 1980) and the higher transparency of the case marking in Russian compared to German (Kempe & MacWhinney 1999) allow case marking in Russian to be acquired earlier (before age 2, Gagarina & Voeikova 2009) than in German (between age 2 and 3, Eisenbeiss et al. 2006, Tracy 1986). The earlier acquisition of the case system may lead to higher comprehension accuracy of word order variation in Russian-speaking children (Kempe & MacWhinney 1999).

<Insert Table 1 about here>

With respect to information structure, word order in Russian is strongly influenced by the given-before-new preference: new information is placed after given information and towards the end of the sentence (Bailyn 2012, King 1995). In German, however, the OVS word order may occur in several contexts, i.e., when the object is topic or focus (Fanselow & Lenertová 2011, Frey 2010). Thus, we may expect a stronger impact of the given-before-new order on sentence comprehension of OVS sentences in Russian than in German.

1.3 Acquisition of word order in Russian

Studies on the production of word order have mainly dealt with naturalistic data: corpus studies have demonstrated that children produce non-canonical word orders in the early multi-word utterances, around age 1;6 and 1;11 (Ceytlin 2000, Dyakonova 2004, Heaman 1988). Dyakonova (2004) showed a gradual increase in the impact of information structure (definiteness) on the production of OV and VO utterances, with the adult-like pattern being shown by age 2;10. However, a production study by Mykhaylyk et al. (2013) demonstrated that 4-year-olds prefer the basic word order of ditransitive sentences and only 5- to 6-year-olds showed a clear impact of givenness on word order. With respect to comprehension, Russian-monolingual children were shown to master the comprehension of OVS sentences by age 4;2 (Janssen et al. 2015, Pléh et al. 1987), with accuracy rates ranging from 70% to 80%.

Nevertheless, OVS sentences also impose difficulties compared to SVO sentences: Russian-monolingual preschoolers have higher comprehension accuracy rates for SVO than OVS sentences (Pléh et al. 1987) and show higher accuracy for SVO than OVS sentences in sentence repetition tasks (Bailyn 1995). Moreover, online processing studies with adults revealed longer reading times for non-canonical compared to canonical sentences when the sentences were presented in an all-new context (Fedorenko & Levy 2006, Sekerina 2003).

Research on the impact of information structure on the comprehension of word order in Russian is sparse. With respect to adults, Fedorenko & Levy (2006) demonstrated that the given-before-new principle influenced online sentence processing but did not reduce the reading time differences between OVS and SVO sentences. To our knowledge, no study so far has examined the impact of information structure on comprehension in Russian-speaking children, thus we aim to fill this gap.

1.4 The current study

We report on a study on the impact of givenness and type of referring expression on sentence comprehension in monolingual Russian-speaking 4- to 5-year-olds and adults. We selected this age range for two reasons. First, this age group will allow a comparison with the previous studies on German-speaking children, which tested these age groups. Second, Russian-speaking children of this age range have shown OVS comprehension accuracy rates of around 75-80% (Janssen et al. 2015). That is, they are able to process OVS sentences but do not perform at ceiling. Thus, they may profit from discourse-related factors of the given-before-new order (cf. Schumacher & Hung 2012) in contrast to younger children, whose OVS comprehension may be more fragile.

The comprehension of SVO and OVS sentences was investigated in three contexts (see Table 2). The context condition captured the impact of (discourse) givenness and of the type of the referring expression realizing the given (previously mentioned) referent. In the *newNP* context both referents of the subsequent SVO/OVS sentence were discourse new and lexical NPs. In the *givenNP* context, the first referent of the SVO/OVS sentence was given and realized as a lexical NP, so that a comparison between the newNP and givenNP condition will reflect the effect of the given-before-new order. In the *givenPr* context, the first referent was given and realized as a personal pronoun. This condition will reflect the combined effects of givenness and the type of referring expression.

<Insert Table 2 about here>

Given that adults usually have fewer problems comprehending OVS sentences and processing difficulties are possibly only visible using online methods, we restrict our predictions to the children. Based on the previous research (Janssen et al. 2015, Pléh et al. 1987), we expect 1) children to perform above the 50% chance level on SVO and OVS sentences in all conditions, and 2) to have higher accuracy rates for SVO compared to OVS sentences in the newNP context, which are reflected by an effect of word order in the statistical models. 3) If children profit from a general processing advantage related to this given-before-new order (Haviland & Clark 1974), we predict higher accuracy in OVS sentences in the givenNP context compared to the newNP context. In the statistical models, this should be indicated by an interaction between word order and givenNP context reflecting a reduction in the word order effect in the givenNP context. 4) If pronominal referents ease comprehension (Sauermann & Höhle, 2016), we expect higher accuracy in OVS sentences in the givenPr context than in the newNP context. In the models, this should be indicated by an interaction between word order and the givenPr context which results from a reduction in the word order effect in the givenPr context.

2. Method

2.1 Participants

Twenty-nine monolingual typically developing Russian-learning children (mean: 5;3, range 4;7-5;11, 10 boys) were tested in two kindergartens in St. Petersburg, Russia.

Twenty monolingual native speakers of Russian, students of the St. Petersburg State Transport University, were tested as a control group (mean age: 20.9 years, age range: 18-23, 6 men).

2.2 Design and materials

The experiment employed a 2 x 3 repeated measures design with Word Order and Context as independent variables (see Table 2) and comprehension accuracy as dependent variable. Word order was modified by presenting the target transitive sentences in the SVO or OVS word order. Context was modified by a preceding introductory sentence and the type of referring expression realizing the sentence-initial referent of the target sentence. In the newNP context, both referents were not mentioned in the introductory sentence (*Look what will happen here.*) and were realized as lexical NPs in the target sentence. In the givenNP context, the first referent was mentioned in the introductory sentence (*And now let us watch a story about the monkey.*) and realized as a lexical NP. In the givenPr context, the first referent was mentioned in the introductory sentence and realized as a personal pronoun. During each trial, both referents were visually depicted and thus contextually given. Therefore, we manipulated only givenness with respect to the spoken discourse.

Twelve experimental items were created. Each item consisted of an introductory sentence and a subsequent transitive sentence (see Table 2). The two arguments of the transitive sentence (subject and object) were feminine animal names. The grammatical role of the arguments and thus word order were indicated by unambiguous case marking on each animal name, with the inflection (suffix) –**a** indicating nominative case (and subject status) and the inflection (suffix) –**u** indicating accusative case (and object status). In the givenPr condition, the first mentioned protagonist was realized by an unambiguous personal pronoun, with *ona* (‘she’) indicating nominative case and *eë* (‘her’) indicating accusative case. The second animal name was always realized as a lexical NP. The sentence was presented together with two actions, *pojmat'* (‘to catch’) and *poščekotat'* (‘to tickle’).

2.3 Procedure

The experimental movies were presented on a laptop using Microsoft PowerPoint. Participants were involved in a betting game in which a cartoon character would predict what the two animals shown in each scene would do. Each animal pair was shown on the screen for 1000 ms before the onset of the introductory context sentence. Each prediction was formulated using the target sentences and was followed by a movie showing the correct or the reversed action. Half of the trials in each condition showed the correct action and the other half the reversed action. The participants had to say whether the prediction of the cartoon character was right or wrong.

Participants were shown 4 practice items and 24 movies, 12 movies in the newNP context and 6 in each of the given contexts (givenNP, givenPr). The movies in the newNP context were shown in the first half of the experiment and movies in the given contexts in the second part. The animal

pairs in the second part were the same pairs as those in the first half. The repetition was due to the restricted set of female animal names in the regular declination. Each participant saw 6 items in each of the word orders in the newNP context and 3 items in each word order in the givenNP and givenPr contexts.

The experimental items were arranged in blocks of 6 movies, but participants could take breaks after each trial. A longer break was inserted after the first two blocks (12 newNP movies).

2.4 Data analysis

Logit linear mixed effects models (Baayen 2008, Jaeger 2008) were used to conduct inferential statistical analyses in the R environment. We calculated separate models for the child and adult data to estimate the fixed effects of Word Order, Context, and their interaction on the comprehension accuracy, and a model assessing the differences between children and adults. Participants and Items were treated as random factors. The contrast coding of Word Order resembled that of traditional ANOVA analyses. The contrast coding of Context was the treatment contrast, comparing the newNP condition (baseline) with the givenNP and the givenPr conditions. Contrast coding of the factor Group in the conjoined model was the treatment contrast, with the children as baseline.

Model fitting was performed in a stepwise fashion, starting with the most complex model that included the full factorial set of random effects (random slope-adjustment for all fixed effects and their interactions for both Participants and Items). The complex model was trimmed down in a stepwise fashion using log-likelihood tests for model comparisons (Baayen 2008). The procedure always resulted in the choice of the simplest model that included only the intercept adjustment.

3. Results

Overall inspection of the data revealed that one child gave 18 out of 24 yes-responses regardless of the accuracy of the movie. This yes-bias child was excluded from further analyses.

Figure 1 shows the mean accuracy of the responses in each condition for adults (left panel) and children (right panel). Children and adults showed high comprehension accuracy in all conditions (with t-tests confirming above 50% performance in each condition).

<Insert Figure 1 about here>

Table 3 gives the fixed effects of the statistical models for adults (left panel), children (middle panel), and the conjoined model (right panel).

<Insert Table 3 about here>

The model for the adult data did not reveal effects of Word Order, Context, or the interactions. That is, despite the numerical differences in the accuracy, adults performed well on SVO and OVS sentences regardless of the context.

The model for the child data revealed an effect of Word Order resulting from higher accuracy in SVO compared to OVS trials. Accuracy was not influenced by Context, although the mean accuracy in Figure 1 indicates a numerical increase in the accuracy for OVS sentences from the newNP to the givenNP context and givenPr context.

The model comparing children and adults revealed a main effect of Group, resulting from a general higher accuracy in adults than in children, and a main effect of Word Order, reflecting higher accuracy for SVO compared to OVS sentences. The interaction between Group and Word Order which might be expected on the basis of the single models was not significant, possibly because adults showed a numerically lower accuracy in OVS sentences.

Discussion

Our study aimed to examine the impact of givenness and the type of referring expression realizing the given referent on the comprehension of SVO and OVS sentences in Russian-speaking 4- to 5-year-old children and adults.

Adults' comprehension accuracies of SVO and OVS sentences were at ceiling, regardless of the context or the referring expression. With respect to the children, we found that children 1) understood SVO and OVS sentences above the 50% chance-level, and 2) showed lower accuracy rates in OVS compared to SVO sentences. Our study did not reveal that 3) the given-new order or 4) the use of a pronominal referent improved OVS sentence comprehension.

In accordance with the previous studies, we found that the Russian-speaking children understood SVO sentences well above the 50% chance level (Janssen et al. 2015, Pléh et al. 1987), and OVS sentences even above 80%. Nevertheless, they showed the expected word order effect. As mentioned in the introduction, SVO sentences may be easier because they follow the canonical or basic word order (Dyakonova 2004, Mykhaylyk et al., 2013) or because they are more frequent than OVS sentences (Bailyn 1995). Our study did not aim to test both alternatives but examined the role of discourse-related factors.

Our study revealed neither an effect of the givenness modification nor an effect of the type of referring expression. This differs from previous research demonstrating that already 2.5- and 3-year-olds are sensitive to the type of referring expression realizing topic referents (Song & Fisher 2005, 2007) and that personal pronouns compared to lexical noun phrases ease the comprehension of non-canonical sentences in children (Brandt et al 2009, Friedmann et al. 2009, Sauermann & Höhle 2016). Our results agree with the previous study on German (Sauermann & Höhle 2016), which did not find an effect of the topic-first context.

Given the general high accuracy performance of the children and adults in our study, we may not conclude that, in general, Russian-speaking 5-year-olds are not sensitive to both modifications. Rather, it is likely that children in the age range tested "were too good" for the experiment so that the effect of context and the pronoun may only be visible using online methods or in younger children. Moreover, our experiment may not have enough power to identify the discourse effects because, due to the restricted set of female animal names, there were only 3 items in these conditions.

So, why are the Russian-speaking children so good even in the all-new context? First, as specified in the introduction, in a language with a rich (and transparent) morphological system, children acquire this system quickly (Xanthos et al. 2011). Thus, they learn early to rely on inflectional cues during sentence processing (Slobin & Bever 1982, Bates & MacWhinney 1987). Second, case marking is less transparent in German than in Russian, and this impacts not only the timing of the production (Gagarina 2003, Xanthos et al. 2011) but also the comprehension

(Dittmar et al. 2008, Kempe & MacWhinney 1999). That is, even though German-speaking preschoolers are already sensitive to the morphological case marking at age 3, they do not fully rely on this information in most contexts (Schipke 2012, but see Özge et al. 2016).

In German, realizing the given referent as a personal pronoun eased comprehension; however, the German-speaking 4- and 5-year-olds performed less well (65-69%) compared to their Russian peers (90% correct). That is, even though pronouns ease comprehension by reducing memory costs and/or similarity-based interference (Friedmann et al. 2009, Gordon et al. 2001), or by easing discourse integration (Gagarina 2012, Warren & Gibson 2002), this difference between the languages needs to be explained.

First, differences in the materials may have influenced the results. Whereas the Russian material provided unambiguous case information on both referents, the German material provided only unambigous case marking on the initial referent. Fewer case marking cues may make OVS sentence comprehension more difficult (Schaner-Wolles 1989).

More importantly, information structure factors and input-related factors may also play a role. In Russian, the non-canonical OVS word order is felicitous in the given-new context (Bailyn 2012), and given objects preceding the verb are usually personal pronouns (Dyakonova 2004). German-speaking preschoolers are less likely to produce personal pronouns for third person referents compared to their Russian peers because they prefer d-pronouns (Bittner et al. 2011). Moreover, the initial object of OVS sentences tends to be realized as a d-pronoun in child language and child-directed speech (Sauermann 2016) so that OVS sentences may be more felicitous when the initial NP is a contrastive topic rather than an aboutness topic. Indeed, Grünloh et al. (2011) showed that OVS comprehension accuracy in German-speaking 5-year-olds is enhanced when the initial (lexical NP) object is contrastively stressed, that is, when an additional cue to the non-canonical word order (focus-first) is provided and the information structure requirements are satisfied.

5. Conclusion

Taken together, the cross-linguistic comparison between Russian and German suggests that the comprehension accuracy in German-speaking children appears to be more dependent on information structure factors because their comprehension is facilitated when the test sentences are closer to the input contexts. That is, German-speaking children rely less on case marking information. Accordingly, they need additional cues to the non-canonical word order and are more influenced by contextual factors (Grünloh et al. 2011), but possibly also by cognitive and structural factors (Schipke 2012). In contrast, Russian-speaking children, who acquire the case system earlier and consider morphological information in an adult-like fashion, appear to be less influenced by information structure and contextual factors.

These results are compatible with the view that children like adults consider several (though not necessarily the same) sources of information during sentence comprehension (Bates & MacWhinney 1987, Crain & Thornton 1998, Slobin & Bever 1982) and that contextual and input-related factors may have a strong(er) impact early in language development (Bates & MacWhinney 1987; Crain & Thornton 1998). Further studies will demonstrate whether this can be generalized to other languages.

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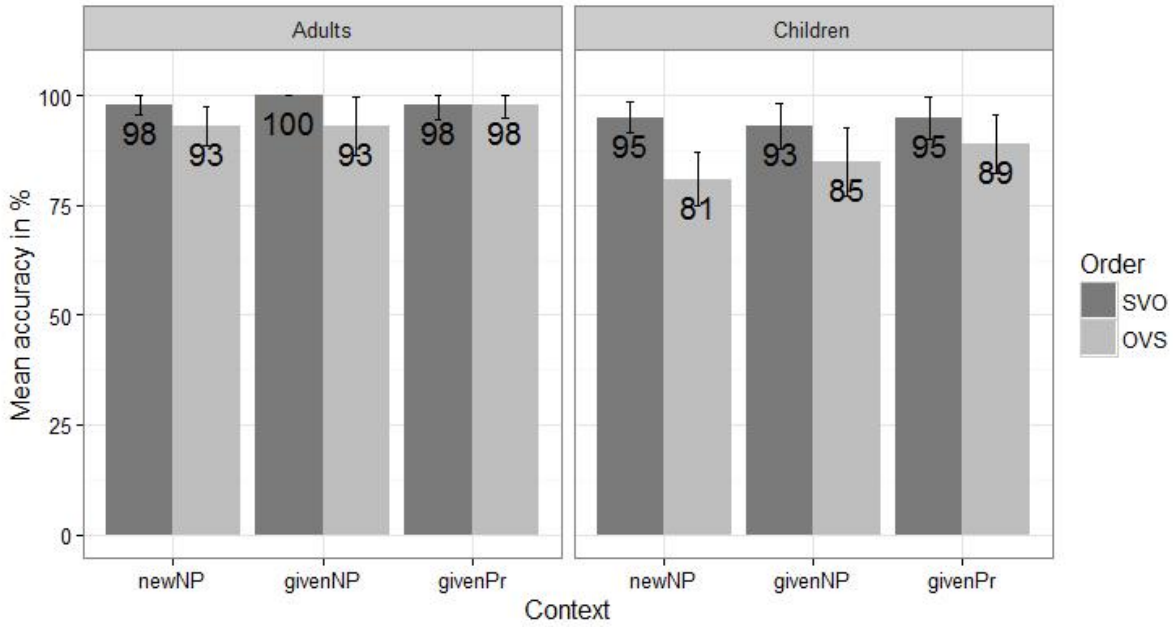

Figure 1: Mean accuracy (with 95%-CI) of SVO and OVS sentences (dark grey vs. light grey bars), in the three context conditions in children and adults (left vs. right panel)

Table 1. Case marking for the word ‘monkey’ in Russian (feminine) and German (masculine)

	Russian		**German**	
	Singular	***Plural***	***Singular***	***Plural***
Nominative	obez'an**a**	obez'an**y**	**der** Affe	**die** Affe**n**
Genitive	obez'an**y**	obez'an	**des** Affe**ns**	**der** Affe**n**
Dative	obez'an**e**	obez'an**am**	**dem** Affe**n**	**den** Affe**n**
Accusative	obez'an**u**	obez'an	**den** Affe**n**	**die** Affe**n**
Instrumental	obez'an**oj**	obez'an**ami**	-	-
Prepositive	obez'an**e**	obez'an**ah**	-	-

Table 2. Example of an item in the six experimental conditions

	Word Order	
	SVO O	***VS***
	Davaj posmotrim, čto tut sejčas prozyojdët.	
	(Look what will happen here.)	
	Ja dumaju (I think),	Ja dumaju (I think),
newNP	čto **obez'ana** sejčas pojmaet **myšku**.	čto **obez'anu** sejčas pojmaet **myška.**
	that **monkey.nom** now catch **mouse.acc**	that **monkey.acc** now catch **mouse.nom**
	"I think that the monkey will catch the mouse."	"I think that the mouse will catch the monkey."
	A teper' davaj posmotrim istoriju pro obez'anu.	
	(And now let us watch a story about a/the monkey.)	
	Ja dumaju (I think),	Ja dumaju (I think),
givenNP	čto **obez'ana** sejčas pojmaet **myšku**.	čto **obez'anu** sejčas pojmaet **myška.**
	that **monkey.nom** now catch **mouse.acc**	that **monkey.acc** now catch **mouse.nom**
	"I think that the monkey will catch the mouse."	"I think that the mouse will catch the monkey."
	A teper' davaj posmotrim istoriju pro obez'anu.	
	(And now let us watch a story about a/the monkey.)	
	Ja dumaju (I think),	Ja dumaju (I think),
givenPr	čto **ona** sejčas pojmaet **myšku**.	čto **eë** sejčas pojmaet **myška**.
	that **she.nom** now catch **mouse.acc**.	that **her.acc** now catch **mouse.nom**
	"I think that she will catch the mouse."	"I think that the mouse will catch her."

Table 3. Accuracy results (mixed-effect model statistical analysis). Left panel - adults, middle panel - children, and right panel - comparison of children and adults. (Significant effects are in boldface.)

	Adults				**Children**				**Children vs. Adults**			
Accuracy	***b S***	***E***	***z***	***p***	***b SE***		***z***	***p***	***b SE***		***z***	***p***
(Intercept)	3.950	0.692	5.705	< .001	2.376	0.264	8.983	< .001	3.018	0.286	10.549	< .001
Word Order	0.710	0.411	1.727	.0842	**0.766**	**0.208**	**3.687**	**< .001**	**0.732**	**0.229**	**3.198**	**< .01**
Context_givenNP	8.793	341.34	0.026	.9794	-0.033	0.327	-0.102	.9190	3.591	33.120	0.108	.9137
Context_givenPr	0.789	0.831	0.950	.3423	0.372	0.374	0.996	.3192	0.575	0.454	1.266	.2056
WO x Cont_ givenNP	8.821	341.33	0.026	.9794	-0.358	0.325	-1.093	.2744	3.446	33.120	0.104	.9171
WO x Cont_givenPr	-0.744	0.831	-0.895	.3706	-0.347	0.374	-0.929	.3527	-0.544	0.454	-1.197	.2313
Group									**0.632**	**0.261**	**2.421**	**< .05**
Group x WO									-0.042	0.229	-0.183	.8550
Group x givenNP									3.625	33.120	0.109	.9128
Group x givenPr									0.198	0.454	0.436	.6627
Group x WO x givNP									3.808	33.120	0.115	.9085
Group x WO x givPr									-0.193	0.454	-0.424	.6714