

L1 and L2 processing of different word orders

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Abstract

We compared how Russian L1 speakers and Mandarin Chinese speakers learning Russian as an L2 process Russian sentences with SVO and OVS word orders in isolation and in context. Reading times and question-answering accuracy showed that non-canonical orders were difficult for L2 participants, but not for L1 participants. However, L1 participants gave them lower ratings in isolation. Some context effects are universal for L1 and L2 processing: all participants read given NPs faster than new ones and preferred sentences with a ‘given–new’ word order. However, L2 readers are not sensitive to more subtle contextual requirements of different word orders.

Key words: word order, context, information structure, L2 processing, Russian

Introduction

In many languages, different word orders are possible in a sentence. Such alternations are primarily associated with the information structure. One word order (the most frequent, with the least specific information-structural requirements) is termed the canonical or basic. Many studies are dedicated to processing sentences with different word orders, both by native (L1) speakers and by second language (L2) learners, for whom acquiring the rules underlying word order alternations was shown to be particularly difficult in various languages.

In many processing experiments with L1 readers, different orders were presented in isolation (e.g. Frazier, Flores d’Arcais 1989; Hyönä, Hujanen 1997, Sekerina 1999). Non-canonical orders were found more difficult to process than canonical ones, although these differences did not always reach significance — presumably, because non-canonical orders are very widespread in some languages. However, since the choice of word orders depends on information structure, some subsequent studies presented them in contexts (e.g. Bornkessel et al. 2003; Gattei et al. 2021, Kaiser, Trueswell 2004, Slioussar 2011). L2 processing experiments are still not very numerous, and those using contexts are extremely rare (e.g. Laleko 2022). However, it is important to find out whether L2 readers are sensitive to various contextual requirements of different orders, and how they differ from L1 readers. This was the goal of the present study. We compared how native speakers of Russian and speakers of Mandarin Chinese learning Russian as an L2 process Russian sentences with

different word orders (SVO vs. OVS). In Experiment 1, these sentences were presented in isolation, while in Experiment 2, we used one-sentence contexts satisfying or violating information-structural requirements of these sentences, similar to (Gattei et al. 2021; Kaiser, Trueswell 2004, Slioussar 2011).

Experiment 1

Method

We had 39 L1 and 39 L2 participants. 16 sets of target sentences, like (1a-b), were constructed (sentences were presented segment-by-segment, so these segments are marked below). It was impossible to guess the grammatical roles of the NPs based on the semantics alone. We also had 10 filler sentences. All materials in our study had A1-A2 level vocabulary.

- (1) a. Russkij prepodavatel' / slušaet / kitajskogo studenta / i smotrit v okno.
(SVO)
Russian_{NOM.SG} teacher_{NOM.SG} / listens / Chinese_{ACC.SG} student_{ACC.SG} /
and looks in window
- b. Kitajskogo studenta / slušaet / russkij prepodavatel' / i smotrit v okno.
(OVS)
Chinese_{ACC.SG} student_{ACC.SG} / listens / Russian_{NOM.SG} teacher_{NOM.SG} /
and looks in window

We used segment-by-segment self-paced reading methodology to measure reading times. To assess interpretation accuracy, we constructed two questions for each sentence set directed at the subject and at the object and asked participants to type in their answers in a window to avoid guessing. In the second part of the study, L1 participants were also asked to evaluate target sentences they saw and some fillers on the 1 to 5 naturalness scale.

To capture online and offline effects, we analyzed participants' RTs, question answering accuracy and L1 sentence ratings. In the L2 group, we excluded participants who gave less than 60% correct answers to filler sentences. Then RTs that exceeded a threshold of 2.5 standard deviations, by segment and by condition, were excluded. For the statistical analysis, we used mixed-effects linear, logistic or ordinal regressions.

Results and discussion

In the L1 group, no significant RT differences were found, and the average answering accuracy was above 85% in all conditions (although OVS sentences were slightly worse: $\beta = 0.78$, $SE = 0.31$, $p = 0.013$). However, OVS orders were rated much lower in the second task ($\beta = 2.59$, $SE = 0.75$, $p < 0.001$). This is because in real texts, they are used only in particular contexts.

In the L2 group, OVS orders took significantly longer to read ($\beta = -481.77$, $SE = 84.46$, $p < 0.001$ for the first segment; $\beta = -252.24$, $SE = 73.73$, $p < 0.001$ for the last segment). For the answering accuracy, two factors were significant:

the word order and the NP position, while the NP role was not. It was easier to answer questions about SVO sentences ($\beta = 0.62$, $SE = 0.07$, $p < 0.001$) and about the first NP in the sentence, which was apparently better memorized ($\beta = -0.99$, $SE = 0.07$, $p < 0.001$).

Experiment 2

Method

We had 50 L1 and 44 L2 participants. We used target and filler sentences and questions from Experiment 1 and constructed context sentences for them, as in (2a-b). Otherwise the procedure and analysis were the same as in Experiment 1.

- (2) a. Russkij preodavatel' / provodit / zanjatie v auditorii.
 Russian_{NOM,SG} teacher_{NOM,SG} / conducts / lesson in classroom
 b. Kitajskij student / prišel / na zanjatie v auditoriyu.
 Chinese_{NOM,SG} student_{NOM,SG} / came / to lesson in classroom

If we present (1a) after (2a) and (1b) after (2b), target sentences will start with a given NP followed by a new one (*G-N contexts*). This is characteristic for languages with a free word order, including Russian. If we present (1a) after (2b) and (1b) after (2a), target sentences will start with a new NP followed by a given one (*N-G contexts*). These contexts can be considered inappropriate, or not satisfying the information-structural requirements of target sentences. The canonical SVO order is compatible with a wider range of contexts, while other orders, like OVS, have much stricter context requirements.

Results and discussion

In L1 RTs, first segments in the G-N contexts were significantly read faster ($\beta = -147.09$, $SE = 27.49$, $p < 0.001$). This may be explained, at least partially, by the fact that given NPs are read faster than new ones. The context factor also reached significance on the third segment, and this was definitely due to NP givenness: given NPs in N-G contexts were read faster ($\beta = 72.80$, $SE = 29.99$, $p = 0.02$). The interaction between the context and word order factors was significant as well: OVS sentences in the N-G context were read slower than SVO ones ($\beta = -69.5$, $SE = 29.9$, $p = 0.02$). This is most probably due to the fact that OVS sentences have much stricter context requirements.

On the final segment, both factors were significant. SVO sentences and sentences in the G-N context were read faster ($\beta = -137.18$, $SE = 40$, $p < 0.001$; $\beta = -105.78$, $SE = 40.17$, $p < 0.01$). There was also a significant interaction, like in the third segment ($\beta = 192.3$, $SE = 56.41$, $p < 0.001$).

There were no significant effects in answering accuracy. In the rating task, SVO orders and G-N contexts were rated significantly higher ($\beta = 1.65$, $SE = 0.22$, $p < 0.001$; $\beta = 3.33$, $SE = 0.25$, $p < 0.001$, respectively). The interaction was also significant: like with the RT data, the effect of context was more pronounced for OVS sentences ($\beta = -1.72$, $SE = 0.32$, $p < 0.001$).

In L2 RTs for the first segment, given NPs in the G-N context were read much faster ($\beta = -906.56$, $SE = 57.77$, $p < 0.001$). SVO was also significantly easier ($\beta = -201.54$, $SE = 57.95$, $p < 0.001$), and this effect was more pronounced for given NPs ($\beta = -214.01$, $SE = 82.37$, $p < 0.01$). This may be because NPs introduced in context sentences were always in the nominative.

On the third segment, given NPs in N-G contexts were read significantly faster ($\beta = 640.79$, $SE = 62.33$, $p < 0.001$). This was similar to the L1 group, but other patterns were not. The effect of word order was more pronounced in the N-G context, i.e. for given NPs ($\beta = -170.62$, $SE = 88.71$, $p = 0.05$). This was also observed on the first segment. Notably, L1 participants read OVS sentences in N-G contexts more slowly, being sensitive to their stricter context requirements. We do not see this sensitivity in L2 readers.

L2 accuracy data were difficult to analyze due to a technical problem. In general, we can conclude that some context effects are universal for L1 and L2 processing: all participants read given NPs faster than new ones and preferred sentences with a 'given-new' word order. However, L2 readers are not sensitive to more subtle contextual requirements of different word orders. But the word order factor is much more important for them than for L1 readers.

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