



# Information structure and word order in Russian sentence comprehension

Ev Fedorenko (MIT) & Roger Levy (UCSD)

evelina9@mit.edu, rlevy@ucsd.edu



## BACKGROUND AND MOTIVATION

### Background

It has been claimed (e.g., Givon, 1984; Birner & Ward, 1998; Gibson et al., 2005) that *discourse-old entities tend to precede discourse-new entities* in a sentence. We will refer to this tendency as the **Old-New Constraint (ONC)**.

Kaiser & Trueswell (2004) investigated the effects of information structure on processing non-canonical word orders in Finnish. Specifically, Kaiser & Trueswell compared the processing of canonical word orders (Subject-Verb-Object; SVO) and non-canonical word orders (Object-Verb-Subject; OVS).

According to Kaiser & Trueswell, **canonical word orders** are felicitous in a variety of discourse contexts (Subject-Old / Object-Old, Subject-New / Object-New, Subject-Old / Object-New).

However, **non-canonical word orders** are only felicitous when they satisfy the ONC (Object-Old / Subject-New).

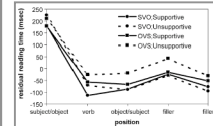
Kaiser & Trueswell presented critical sentences in context, manipulating:

(1) information structure (ONC satisfied / ONC violated) and (2) word order (SVO / OVS).

**Conditions:** *S-old V O-new (Sup)*  
*S-new V O-old (Unsup)*

*O-old V S-new (Sup)*  
*O-new V S-old (Unsup)*

**Results:** an interaction (at the post-verbal noun and later positions) between information structure and word order, such that the SVO-OVS difference was larger in the ONC-violated conditions than in the ONC-satisfied conditions.



### Interpretation:

The difficulty associated with processing non-canonical word-orders (e.g., OVS) is due to the violation of the ONC constraint.

### Motivation

#### Two ways to think about information structure and word order:

##### Kaiser & Trueswell:

Information structure and word-order (syntactic information) are two **non-independent** factors that affect sentence comprehension: specifically, information structure can alleviate the difficulty associated with the processing of non-canonical (syntactically more complex) word orders.

##### An alternative:

Information structure and word-order are **independent** factors that affect sentence comprehension.

#### Motivations for the current study:

(1) To replicate the pattern of results observed by Kaiser & Trueswell in a language similar to Finnish in terms of the case-marking system.

(2) To investigate the effects of information structure on the processing of non-canonical word orders in a language which is less subject to the case-marking ambiguity problem: in Russian for the initial object NP in OVS constructions (1) alternative interpretations are less available, and (2) a subject-interpretation is not possible.

#### FINNISH object marking

**Partitive** Object (=> pursue OVS interpretation) / Subject-experiencer (=> pursue SVO interpretation)

**Accusative** same ending as in the Genitive case

#### RUSSIAN object marking

**Accusative** same ending as in the Gen. case (only for masculine nouns) [24/32 nouns in our materials]

## EXPERIMENT

### Design & Materials

Self-paced moving-window reading paradigm (40 participants, 32 items).

**Participants:** native Russian speakers; mean age: 25.1 years.

Each trial consisted of a context sentence (presented all at once) followed by the target sentence (presented word-by-word). The materials were presented with 20 items from an unrelated experiment and with 20 fillers.

**Design:** 2 x 2 x 2

**Factors:** Context (Neutral / Supportive (mentioning one of the nouns in the critical sentence))  
The Old-New Constraint satisfaction (The Old-New Constraint satisfied / The ONC Violated)  
Word Order (Subject-Verb-Object / Object-Verb-Subject)

#### Neutral Context:

*At the police station an interrogation was taking place.*

#### Supportive Context:

*In the interrogation room a cop and a lawyer were discussing something.*

**ONC satisfied / SVO:** *During the interrogation, cop-NOM wounded suspect-ACC in the shoulder.*

**ONC satisfied / OVS:** *During the interrogation, cop-ACC wounded suspect-NOM in the shoulder.*

**ONC violated / SVO:** *During the interrogation, suspect-NOM wounded cop-ACC in the shoulder.*

**ONC violated / OVS:** *During the interrogation, suspect-ACC wounded cop-NOM in the shoulder.*

### Results

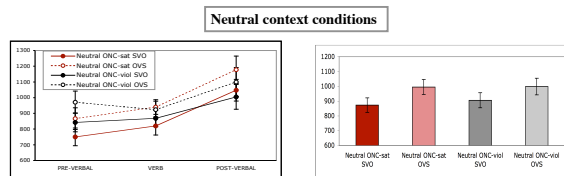
Raw reading times, no trimming.

The bar graphs present average RTs per word for the critical region.

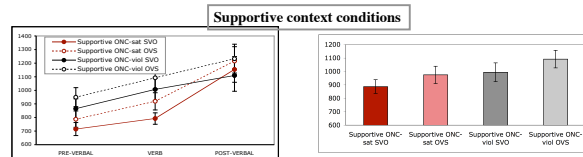
#### A context x ONC-satisfaction interaction:

F1(1,39)=4.69; MSE=177249; p<.05; F2(1,30)=3.61; MSE=196642; p=.067

[NB: One item was excluded from the analyses because due to a glitch in the program not all the conditions were presented.]



**A main effect of Word Order:**  
F1(1,39)=11.8; MSE=463596; p<.005  
F2(1,30)=10.4; MSE=486362; p<.005



**A main effect of ONC-satisfaction:**  
F1(1,39)=8.62; MSE=502134; p<.01  
F2(1,30)=5.85; MSE=440090; p<.05

**A main effect of Word Order:**  
F1(1,39)=5.89; MSE=341689; p<.05  
F2(1,30)=4.15; MSE=273442; p=.051

No trace of an interaction (Fs<1)

## SUMMARY AND CONCLUSIONS

### Summary

**Two independent effects of information structure (ONC satisfaction) and word order were observed with no interaction.**

The present experiment does not replicate the results of Kaiser & Trueswell (2004).

**Work in-progress:** Same design using only feminine nouns (no object-marking ambiguity).

For the subset of items with feminine nouns in the current experiment (8/32) the pattern of results is the same as for all the items.

### Conclusion

These results are consistent with a hypothesis whereby information structure and word order are **two independent factors** that affect online sentence comprehension.

#### References:

- Birner, B., & Ward, G. (1998). Information status and non-canonical word order in English. Amsterdam: John Benjamins Publishing Co.
- Givon, T. (1984). *Syntax: A Functional Typological Introduction, Vol. 1*. Amsterdam/Philadelphia: John Benjamins Publishing Co.
- Gibson, E. et al. (2005). Reading relative clauses in English. *Cognitive Linguistics*, 16(2).
- Kaiser, E. & Trueswell, J. (2004). The role of discourse context in the processing of a flexible word-order language. *Cognition*, 94(2).