

---

---

# Symmetry, postposition, and hydras: Experimental evidence against ATB-analysis of partial agreement in Russian\*

Lada Pasko (ladapasko@gmail.com)  
Lomonosov Moscow State University

KRE-TEL-WS-2023, 25–26 October 2023

---

---

\*This research is supported by Russian Science Foundation, RSF project 22-18-00037 realized at Lomonosov Moscow State University, <https://rscf.ru/en/project/22-18-00037/>.

# Roadmap

1. Russian: baseline
2. Data
3. Possible approaches
4. Predictions of ATB-approach
  - a. Predicate position
  - b. Predicate symmetricity
  - c. Hydras
5. Experimental study 1
6. Experimental study 2
7. Discussion

## Russian: baseline

- Finite verbs agree with the nominative subject in number and person / gender.

(1) *Ručk-a*                      *lež-it*                      *na stole.*  
pen-NOM.SG                  lie-PRS.SG                  on the table

'The pen lies on the table.'

- Word order is relatively free. What is important for us today, both SV and VS orders are possible (the choice depends on the information structure).

(2) a. *Ručka*    *ležit*                  *na stole.*                                  b. *Na stole*                  *ležit*                  *ručka.*  
pen                  lies                  on the table                                  on the table                  lies                  pen

'The pen lies on the table.'

## Russian: baseline

- Relative clauses are formed using relativizer *kotor-yj* 'which-M.SG.NOM' which agrees with the clause head in gender and number.

(3) *ručk-a*            *i*    *karandaš,*            *kotor-ye*            *ja*            *prinesl-a*  
pen.F-SG.NOM &    pencil.M.SG.NOM    which-PL.ACC    I.NOM            bring.PST-SG

'a pen and a pencil that I brought'

(4) *ručk-a*            *i*    *karandaš,*            *kotor-yj*            *ja*            *prinesl-a*  
pen.F-SG.NOM &    pencil.M.SG.NOM    which-M.SG.ACC    I.NOM            bring.PST-SG

'a pen and a pencil that I brought'

## Partial agreement in Russian: data

When the subject is coordinated, two strategies are possible:

### 1. Full agreement (FA)

Controlled by the coordinated DP, PL marker on the verb:

- (5) *Na stole lež-at [ručk-a i karandaš].*  
on the table lie-PRS.**PL** pen-SG.NOM & pencil.SG.NOM

'A pen and a pencil lie on the table.'

## Partial agreement in Russian: data

### 2. Partial agreement (PA; or conjunct-sensitive, first conjunct agreement)

Seemingly controlled by only one conjunct, SG marker if this conjunct is SG:

(6) *Na stole lež-it [ručk-a] i karandaš.*  
on the table lie-PRS.**SG** pen-SG.NOM & pencil.SG.NOM

'A pen and a pencil lie on the table.'

- There is no semantic difference between the strategies, the variation is morphological.
- PA is reported in many other languages (Krejci, 2020, 1): e.g. Brazilian Portuguese, Dutch, English, Hindi-Urdu, Irish, Serbo-Croatian.

# Analyses

There are two ways of analyzing PA in Russian:

## Analytical option 1

- Sannikov, 2008; Bošković, 2010; Pekelis, 2013
- The differences between FA and PA are derived solely by agreement controller choice.
- The syntactic structures of sentences with FA and PA are equal.
- Coordination occurs on the level of DPs.
- PA: linearly first / structurally higher DP controls agreement.

# Analyses

## Analytical option 2

- Krejci, 2020
- The differences between FA and PA are derived by the difference in syntactic structure.
- FA: coordination at DP-level
- PA: coordination at VP-level,  
two VPs with identical V-heads,  
V-heads are ATB\*-moved to Asp => only one V is pronounced

\*ATB = Across-the-board movement — matching elements in different conjuncts are moved out simultaneously



# Analyses

- (7) *Na stole lež-it ručk-a i karandaš.*  
on the table lie-PRS.**SG** pen-SG.NOM & pencil.SG.NOM

'A pen and a pencil lie on the table.'

- (8) *Na stole* [<sub>TP</sub> [<sub>AspP</sub> [<sub>VP0</sub> [<sub>VP1</sub> *lež-it ručk-a*] [<sub>&P</sub> *i* [<sub>VP2</sub> *lež-it karandaš*]]]]].

*Na stole* [<sub>TP</sub> [<sub>AspP</sub> *lež-it* [<sub>VP0</sub> [<sub>VP1</sub> ~~*lež-it*~~ *ruč-k-a*] [<sub>&P</sub> *i* [<sub>VP2</sub> ~~*lež-it*~~ *karandaš*]]]]].

- T-head agrees with the structurally higher DP.
- EPP triggers movement of DP to Spec,TP, but it is covert.

# Analyses

Krejci's analysis makes predictions about ungrammaticality of PA in these contexts, among others:

1. when the verb follows the subject;
2. when the verb is a symmetrical predicate;
3. when the coordinated subject is the head of a relative clause.

# Analyses

- Under Krejci's analysis, the ungrammaticality originates from structural factors.
- Proponents of the first approach (Sannikov, 2008; Pekelis, 2013) argue that PA is degraded in contexts 1 and 2 as well. However, their explanation uses semantic factors, which are less strict and could be more easily adjusted.
- Further we will focus on Krejci's predictions and prove if they conform to experimental data.

## Factors: verb position

ATB-analysis implies that PA is impossible, if the verb follows the subject:

- V-heads are moved to a structurally higher position (Asp), which results in that V linearly precedes initial coordinated VP, as Russian is a right-branching language.

(9) *Na stole* [<sub>TP</sub> [<sub>AspP</sub> *lež-it* [<sub>VP0</sub> [<sub>VP1</sub> ~~*lež-it*~~ *ručk-a*] [<sub>&P</sub> *i* [<sub>VP2</sub> ~~*lež-it*~~ *karandaš*]]]]].

- Coordinated subject cannot overtly move to Spec,TP and linearly precede V, as in fact it is not a constituent.

=> Orders like *pen-SG.NOM & pencil.SG.NOM lie-PRS.3.SG* cannot be derived.

## Factors: symmetry

Symmetrical predicates have at least two arguments bearing the same theta-role:  
e.g. *sravnivat'sja* 'to be compared to each other', *slivat'sja* 'to merge'.

(10) *V novom kurse*      *sovmeša-et-sja*      *teori-ja*      *i praktik-a.*  
In the new course    combine-PRS.SG-REFL    theory-SG.NOM    & practice-SG.NOM

'Theory and practice are combined in the new course.'

— predicted \*

## Factors: symmetry

This prediction is explained by the fact that there is only one argument in each of the conjoined symmetrical VPs.

=> Locality of Selection requirement is violated, cf. (12) without coordination.

(11) *V novom kurse* [<sub>TP</sub> [<sub>AspP</sub> *sovmešaetsja* [<sub>VP0</sub> [<sub>VP1</sub> *sovmešaetsja teorija*]  
[<sub>&P</sub> *i* [<sub>VP2</sub> *sovmešaetsja praktika*]]]]].

'Theory and practice are combined in the new course.'

(12) \**V novom kurse* [<sub>VP</sub> *sovmešaetsja teorija*].

\*'Theory is combined in the new course.'

## Factors: hydras

Relative clauses with coordinated heads are called *hydras* (see e.g. Link, 1984; Bobaljik, 2017).

Krejci argues that PA is impossible with heads of hydras:

1. Linear coordinate subject in sentences with PA does not form a constituent:

(11) *Na stole* [<sub>TP</sub> [<sub>AspP</sub> *lež-it* [<sub>VP0</sub> [<sub>VP1</sub> ~~*lež-it*~~ *ručk-a*] [<sub>&P</sub> *i* [<sub>VP2</sub> ~~*lež-it*~~ *karandaš*]]]]].

2. DPs cannot be a head of a relative clause unless they form a constituent  
=> ungrammaticality

The second assumption is actually not true, we will talk about it later.

## Factors: hydras

(13) 'The scarf and the mitten that mother knit sank in the pond.' (Krejci 2020, (532))

- a. *V prudu*      *utonul-i*      *šarf*      *i*      *varežk-a,*  
In the pond      sink.PST-**PL**      scarf.SG.NOM      &      mitten-SG.NOM  
*kotor-ye*      *mat'*      *svjazal-a.*  
which-PL.ACC      mother.SG.NOM      knit.PST-SG.

— FA, predicted **OK**

- b. *V prudu*      *utonul*      *šarf*      *i*      *varežk-a,*  
In the pond      sink.PST.M.**SG**      scarf.SG.NOM      &      mitten-SG.NOM  
*kotor-ye*      *mat'*      *svjazal-a.*  
which-PL.ACC      mother.SG.NOM      knit.PST-SG.

— PA, predicted \*



## Experimental study

The data in (Krejci, 2020), as well as in the works of the other approach, are mostly based on introspection and contradict some corpus data:

(14) *Inogda posle glikolevogo pilinga vznikaeet otek i krasnota, kotorye dolžny sojti v tečenie sutok.* (RNC)

... *voznika-et*                      *otek*                      *i*                      *krasnot-a,*                      *kotor-ye* ...  
emerge-PRS.SG                      swelling.SG.NOM                      &                      redness-SG.NOM                      which-PL.NOM

‘Sometimes swelling and redness, which should subside within 24 hours, emerge after a glycolic peel’.

— PA with head of hydra, expected \*

# Experimental study

We conducted two linguistic experiments to test these judgements on a sufficient sample of Russian native speakers.

## Experiment 1

1. Verb follows the subject => PA is ungrammatical
2. Verb is a symmetrical predicate => PA is ungrammatical

## Experiment 2

3. Coordinated subject is the head of a relative clause => PA is ungrammatical

# Experiment 1

# Exp. 1: variables

## Independent variables

- 1) Agreement strategy:  
PL (FA) / SG (PA)
- 2) Predicate symmetry:  
SYM / NONSYM
- 3) Predicate position with respect to  
the subject:  
PRE / POST

## Dependent variable

Acceptability judgement on  
Likert scale 1-7

## Controlled variables

- Word order
- Subjects are inanimate
- Each conjunct is in SG
- Verbs are in PRS
- Predicate: balanced decausative  
/ passive
- Conjunct gender: balanced  
matching / not matching
  
- $2*2*2*4 = 32$  stimuli, 32 fillers
- 4 training sentences
- Latin square

## Exp. 1: stimuli examples

(15) [NONSYM, PRE, SG]

*Na staroj fotografii stira-et-sja lic-o i fon.*  
In the old photo erase-PRS.SG-REFL face-SG.NOM & background.SG.NOM

'The face and the background are erased in the old photo.'

(16) [SYM, POST, PL]

*Lic-o i fon sliva-jut-sja na staroj fotografii.*  
face-SG.NOM & background.SG.NOM merge-PRS.PL-REFL in the old photo

'The face and the background merge in the old photo.'

# Exp. 1: ATB-analysis predictions

[PL, NONSYM, PRE]      **OK**

[PL, NONSYM, POST]      **OK**

[PL, SYM, PRE]      **OK**

[PL, SYM, POST]      **OK**

[SG, NONSYM, PRE]      **OK**

[SG, NONSYM, POST]      \*

[SG, SYM, POST]      \*

[SG, SYM, PRE]      \*

## Exp. 1: fillers

32 fillers

- Grammatical and ungrammatical
- The structure resembles one of the stimuli
- Coordinated DP in object position
- Case mistakes in ungrammatical fillers

(17) *Ljudi*      *pokuSG-jut*      *zlot-u*      *i*      *serebr-o*      *v juvelirnom magazine.*  
people      buy-PRS.PL      gold-SG.**DAT(!)** &      silver-SG.ACC      at the jewelry store

'People buy gold and silver at the jewelry store'.

## Exp. 1: data collection

- Distribution via crowdsourcing platform Toloka (<https://toloka.ai/>)
- 75 respondents (without outliers)
- List distribution:

| A  | B  | C  | D | E  | F  | G | H |
|----|----|----|---|----|----|---|---|
| 10 | 10 | 11 | 9 | 10 | 10 | 8 | 8 |

### Sample characteristics:

- Age: 19–68, mean 37.93
- Gender: 27 F (36%), 47 M (63.7%), 1 NA (1.3%)
- Native languages apart from Russian: English (4), Tatar (2), Ukrainian (1)
- With linguistic education: 4



## Exp. 1: statistic analysis

- The data were analyzed in R (methodology from Gerasimova, 2023).
- Linear mixed effects model — for factor significance

Model formula:

$$\begin{aligned} z\text{-scores} \sim & 1 + \textit{agreement} + \textit{position} \\ & + \textit{agreement} : \textit{position} + \textit{symmetry} \\ & + (1 \mid \textit{sentence}) \\ & + (1 + \textit{agreement} + \textit{position} \mid \textit{respondent}) \end{aligned}$$

- Tukey's multiple pairwise comparisons — for difference in pairs of conditions
- Student's t-test — for difference between stimuli and fillers

# Exp. 1: results

## Linear mixed effects model summary

| fixed effects  | $\beta$ | p-value          |
|--|---------|------------------|
| intercept  | 0.47    | <0.001           |
| symmetricity (SYM $\nabla$ NONSYM)                       | -0.06   | 0.131            |
| position (PRE $\nabla$ POST)                             | -0.01   | 0.895            |
| agreement (SG $\nabla$ PL)                               | -0.58   | <b>&lt;0.001</b> |
| agreement (SG $\nabla$ PL): position (PRE $\nabla$ POST) | 0.36    | <b>&lt;0.001</b> |

- Position of the predicate affects acceptability.
- Symmetricity does not.

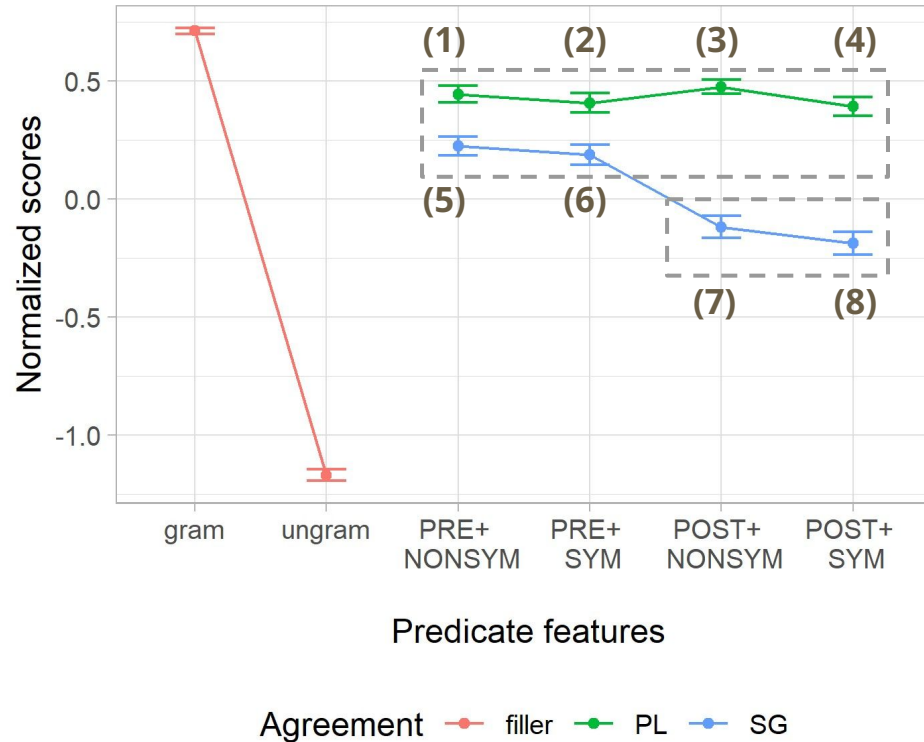
# Exp. 1: results

Tukey's multiple pairwise comparisons results

| <b>condition 1</b> | <b>condition 2</b> | <b>estimate</b> | <b>p-value</b>   |
|--------------------|--------------------|-----------------|------------------|
| PL                 | SG                 | 0.40            | <b>&lt;0.001</b> |
| POST + SG          | PRE + SG           | -0.35           | <b>&lt;0.001</b> |
| POST + PL          | PRE + PL           | 0.01            | 0.999            |
| POST + PL          | POST + SG          | 0.58            | <b>&lt;0.001</b> |
| PRE + PL           | PRE + SG           | 0.22            | 0.012            |

## Exp. 1: results

- No significant difference in the gray frames
- **(6)**, **(7)** and **(8)** were predicted to be ungrammatical



## Exp. 1: conclusion

We tested these predictions of Krejci (2020) and got the following results:

1. Verb follows the subject => PA is ungrammatical
  - No: such sentences receive significantly higher grades, than ungrammatical fillers.
  - However, PA is graded significantly higher in preposition, than in postposition.
2. Verb is a symmetrical predicate => PA is ungrammatical
  - No: PA of symmetrical predicates is graded just as high, as PA of non-symmetrical ones.

# Experiment 2

## Exp. 2: problem

We test the following prediction of Krejci (2020):

Coordinated subject is the head of a relative clause => PA is ungrammatical

- This prediction comes from the assumption that DPs cannot be a head of relative clause unless they form a constituent.

## Exp. 2: problem

We test the following prediction of Krejci (2020):

Coordinated subject is the head of a relative clause => PA is ungrammatical

- This prediction comes from the assumption that DPs cannot be a head of relative clause unless they form a constituent.
- This is not true:  
head of split antecedent relative clause (SARC) consists of two separate DPs.
- See e.g. Perlmutter & Ross, 1970; Grosz, 2015; Conrod & Woo, 2018; Cinque, 2019; Citko, 2021



## Exp. 2: problem

(18) a. *A man entered the room and a woman went out who were quite similar.*  
(Perlmutter & Ross 1970: 350)

b. [<sub>VP1</sub> A man entered the room] and [<sub>VP2</sub> a woman went out] who were quite similar.

(19) a. *Na stole sto-it stakan i lež-it salfetc-a,*  
On the table stand-PRS.SG glass.SG.NOM & lie-PRS.SG napkin-SG.NOM  
*kotor-ye Maš-a dostal-a iz škafa.*  
which-PL.ACC Masha-SG.NOM take.out.PST-SG from the cupboard

'On the table there stands a glass and lies a napkin, which Masha took out of the cupboard.'

b. ... [<sub>VP1</sub> *stoit* stakan] i [<sub>VP2</sub> *ležit* salfetka], *kotorye* ...

## Exp. 2: problem

(20) PA, coordinated subject is a head of relative clause

|                                 |                              |                                    |               |                                       |
|---------------------------------|------------------------------|------------------------------------|---------------|---------------------------------------|
| <i>Na stole</i><br>On the table | <i>lež-it</i><br>lie-PRS.SG  | <i>knig-a</i><br>book-SG.NOM       | <i>i</i><br>& | <i>salfetk-a,</i><br>napkin-SG.NOM    |
| <i>kotor-ye</i><br>which-PL.ACC | <i>Maš-a</i><br>Masha-SG.NOM | <i>dostal-a</i><br>take.out.PST-SG |               | <i>iz škafa.</i><br>from the cupboard |

'On the table there lies a book and a napkin, which Masha took out of the cupboard.'

There are two analyses possible for sentences like (20):

1. Hydra, ATB-movement is impossible

(21) ... *ležit* [*kniga i salfetka*], *kotorye* ... — predicted \*

2. SARC, ATB-movement is possible

(22) ... *ležit* [~~*ležit*~~ *kniga*] *i* [~~*ležit*~~ *salfetka*], *kotorye* ... — predicted **OK**

## Exp. 2: problem

- Consequently, whatever result we get, we will be able to account for it using a version of ATB-analysis.
- However, we can test Krejci's empirical generalization: hydras with PA in the matrix clause are ungrammatical.
- We can as well include 'unambiguous' hydras and SARCs in experimental design and see whether the configuration we are interested in groups with either of them.

# Exp. 2: variables

## Independent variables

- 1) Agreement in matrix clause
  1. PL (FA)
  2. SG (PA)
  3. 2 different verbs in SG
- 2) Relative clause head
  1. 1 DP
  2. 2 DPs

## Dependent variables

- 1) Acceptability judgement on Likert scale  
1–7
- 2) {Reading time (self-paced reading task) of  
word *kotoryj* ‘which’}

## Controlled variables

- Word order
- Subjects are inanimate
- Each conjunct is in SG
- Verbs are in PRS
- *Kotoryj* ‘which’ in direct object position
- Gender of conjuncts does not match
  
- $3*2*4 = 24$  stimuli, 24 fillers
- 4 training sentences
- Latin square

## Exp. 2: stimuli examples

(23) [PL, 1 DP]

*V vannoj*      *sohn-ut*      *kurtk-a*      *i*      *šarf,*  
In the bath      dry-PRS.PL      jacket-SG.NOM      &      scarf.SG.NOM

*kotor-yj*      *Miš-a*      *ispačkal*      *v grjazi.*  
which-SG.ACC      Misha-SG.NOM      soil.PST.SG      in the mud

'In the bathroom, the jacket and the scarf that Misha soiled in the mud are drying.'

(24) [2 verbs, 2 DP]

*V vannoj*      *sohn-et*      *kurtk-a*      *i*      *otmoka-et*      *šarf,*  
In the bath      dry-PRS.SG      jacket-SG.NOM      &      soak-PRS.SG      scarf.SG.NOM

*kotor-ye*      *Miš-a*      *ispačkal*      *v grjazi.*  
which-PL.ACC      Misha-SG.NOM      soil.PST.SG      in the mud

'In the bathroom, the jacket is drying and scarf is soaking, that Misha soiled in the mud.'

## Exp. 2: ATB-analysis predictions

|                  |           |   |   |
|------------------|-----------|---|---|
| [PL, 2 DPs]      | <b>OK</b> | — | FA, both conjuncts are the heads of RC (hydra)          |
| [SG, 2 DPs]      | <b>*</b>  | — | PA, both conjuncts are the heads of RC (hydra / SARC?)  |
| [2 verbs, 2 DPs] | <b>NA</b> | — | separate VPs, both conjuncts are the heads of RC (SARC) |
| [PL, 1 DP]       | <b>NA</b> | — | FA, only one conjunct is the head of RC                 |
| [SG, 1 DP]       | <b>NA</b> | — | PA, only one conjunct is the head of RC                 |
| [2 verbs, 1 DP]  | <b>NA</b> | — | separate VPs, only one conjunct is the head of RC       |

## Exp. 2: fillers

24 fillers

- Grammatical and ungrammatical
- The structure resembles one of the stimuli
- Coordination in embedded clause
- Case mistakes in ungrammatical fillers

(25) *Po radio igra-et pesn-ja,*  
On the radio play-PRS.SG song-SG.NOM  
*kotor-uju Žann-a i Ljud-a vyučil-i v molodosti.*  
which-SG.ACC Zhanna-SG.NOM & Lyuda-SG.NOM learn.PST-PL when young

'A song that Zhanna and Lyuda learned when they were young is playing on the radio.'

## Exp. 2: data collection

- Distribution via crowdsourcing platform Toloka (<https://toloka.ai/>)
- 84 respondents (without outliers)
- List distribution:

| A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|
| 14 | 14 | 15 | 15 | 14 | 12 |

### Sample characteristics:

- Age: 18–74, mean 39.4
- Gender: 40 F (47.6%), 44 M (52.4%)
- Native languages apart from Russian: English (2), Ukrainian (1)
- With linguistic education: 5



## Exp. 2: statistic analysis

- The data were analyzed in R (methodology from Gerasimova, 2023).
- Linear mixed effects model — for factor significance

Model formula:

$$\begin{aligned} zscores \sim & 1 + head + agreement + head:agreement \\ & + (1 \mid sentence) \\ & + (1 + head \mid respondent) \end{aligned}$$

- Tukey's multiple pairwise comparisons — for difference in pairs of conditions
- Student's t-test — for difference between stimuli and fillers

## Exp. 2: results

### Linear mixed effects model summary

| fixed effects                                  | $\beta$ | p-value          |
|--|---------|------------------|
| intercept                                      | 0.23    | <0.001           |
| head (2 DPs ↘ 1 DP)                            | 0.13    | 0.13             |
| agreement (PL ↘ 2 verbs)                       | -0.32   | <b>&lt;0.001</b> |
| agreement (SG ↘ 2 verbs)                       | -0.34   | <b>&lt;0.001</b> |
| head (2 DPs ↘ 1 DP) : agreement (PL ↘ 2 verbs) | 0.36    | <b>&lt;0.001</b> |
| head (2 DPs ↘ 1 DP) : agreement (SG ↘ 2 verbs) | 0.19    | 0.06             |

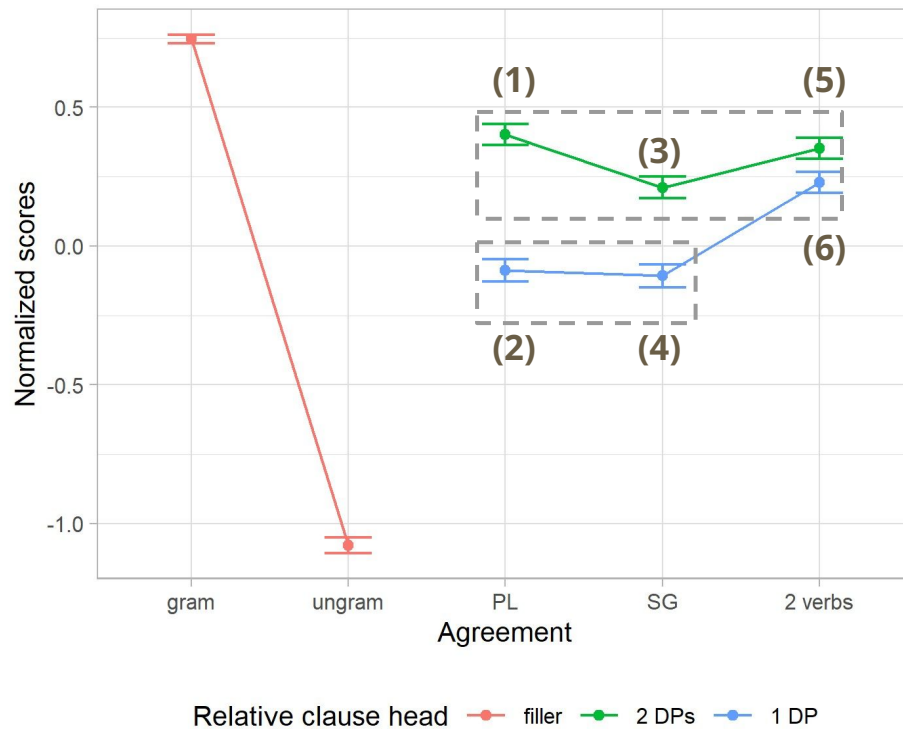
## Exp. 2: results

Tukey's multiple pairwise comparisons results

| condition 1    | condition 2    | estimate | p-value           |
|----------------|----------------|----------|-------------------|
| 2 verbs, 1 DP  | SG, 1 DP       | 0.341    | <b>0.0001</b>     |
| 2 verbs, 1 DP  | PL, 1 DP       | 0.318    | <b>0.0004</b>     |
| PL, 1 DP       | SG, 1 DP       | 0.024    | 0.9995            |
| 2 verbs, 2 DPs | SG, 2 DPs      | 0.148    | 0.3326            |
| 2 verbs, 2 DPs | PL, 2 DPs      | -0.044   | 0.9906            |
| PL, 2 DPs      | SG, 2 DPs      | 0.192    | 0.0971            |
| 2 verbs, 1 DP  | 2 verbs, 2 DPs | -0.125   | 0.6619            |
| SG, 1 DP       | SG, 2 DPs      | -0.318   | <b>0.0025</b>     |
| PL, 1 DP       | PL, 2 DPs      | -0.487   | <b>&lt;0.0001</b> |

## Exp. 2: results

- No significant difference in the gray frames
- **(3)** was predicted to be ungrammatical, and **(1)** — grammatical
- No evidence in favor of either analysis of **(3)** — it groups with both **(1)** and **(5)**
- Unexpected results for **(2)** and **(4)**



## Exp. 2: conclusion

We tested the prediction of Krejci (2020):

Coordinated subject is the head of a relative clause => PA is ungrammatical

- According to our data, this prediction does not hold.
- Such sentences are just as acceptable as ones with FA or SARC.

## Discussion

According to the results of our study, the constraints, following from ATB-analysis of partial agreement in Russian (Krejci, 2020) are...

- ... not met
  - PA of symmetrical predicates
  - PA with coordinated heads of relative clauses
- ... not fully met
  - although PA in postposition is indeed graded lower than in preposition, it is still more acceptable than ungrammatical fillers

## Discussion

- We argue that the analytical option, implying that coordination occurs on the level of DPs regardless of agreement strategy, is more empirically adequate.
- The fact of higher acceptability of PA in preposition will have to be accounted for differently.
- For example, Pekelis (2013) proposes a psycholinguistic explanation: when the predicate is in postposition to the coordinated subject, the speaker has already pronounced the semantically PL subject. Thus, they are more likely to choose the PL agreement strategy.

## Reading time

- Let us compare [PL, 2 DPs] and [SG, 2 DPs]

(26) 'In the bathroom, the jacket and the scarf that Misha soiled in the mud are drying.'

a. *V vannoj*      *sohn-ut*      *kurtk-a*      *i*      *šarf,*  
In the bath      dry-PRS.**PL**      jacket-SG.NOM      &      scarf.SG.NOM  
*kotor-ye*      *Miš-a*      *ispačkal*      *v grjazi.*  
which-PL.ACC      Misha-SG.NOM      soil.PST.SG      in the mud

— predicted **OK**

b. *V vannoj*      *sohn-et*      *kurtk-a*      *i*      *šarf,*  
In the bath      dry-PRS.**SG**      jacket-SG.NOM      &      scarf.SG.NOM  
*kotor-ye*      *Miš-a*      *ispačkal*      *v grjazi.*  
which-PL.ACC      Misha-SG.NOM      soil.PST.SG      in the mud

— predicted \*



## Reading time

- If [SG, 2 DPs] is indeed ungrammatical, the reader can understand this fact only when they are reading *kotorye* 'which.PL'
- At this point, the reader understands that PA occurred with a coordinated head of a relative clause.
- Consequently, we are expecting longer reading time of *kotorye* 'which.PL' in predictably ungrammatical [SG, 2 DPs] sentences:

- (26) a. **OK**      *V\_vannoj sohn**ut** kurtka i\_šarf, kotorye Miša ispačkal v\_grjazi.*      [PL, 2 DPs]  
                  ✓        ✓        ✓        ✓        ✓
- b. **\***            *V\_vannoj sohn**et** kurtka i\_šarf, kotorye Miša ispačkal v\_grjazi.*      [SG, 2 DPs]  
                  ✓        ✓        ✓        ✓        ✗

# Reading time: results

Model formula:

*readtime* ~ 1 + head + agreement  
+ agreement:head  
+ (1 + head | respondent)  
+ (1 | sentence)

| fixed effects                                     | $\beta$ | p-value          |
|---|---------|------------------|
| intercept   | 668.83  | <0.001           |
| agreement (PL ↘ 2 verbs)                          | 73.34   | <b>0.006</b>     |
| agreement (SG ↘ 2 verbs)                          | 80.82   | <b>0.003</b>     |
| head (2 DPs ↘ 1 DP)                               | 37.42   | 0.239            |
| agreement (PL ↘ 2 verbs) :<br>head (2 DPs ↘ 1 DP) | -127.36 | <b>&lt;0.001</b> |
| agreement (SG ↘ 2 verbs) :<br>head (2 DPs ↘ 1 DP) | -65.19  | 0.083            |

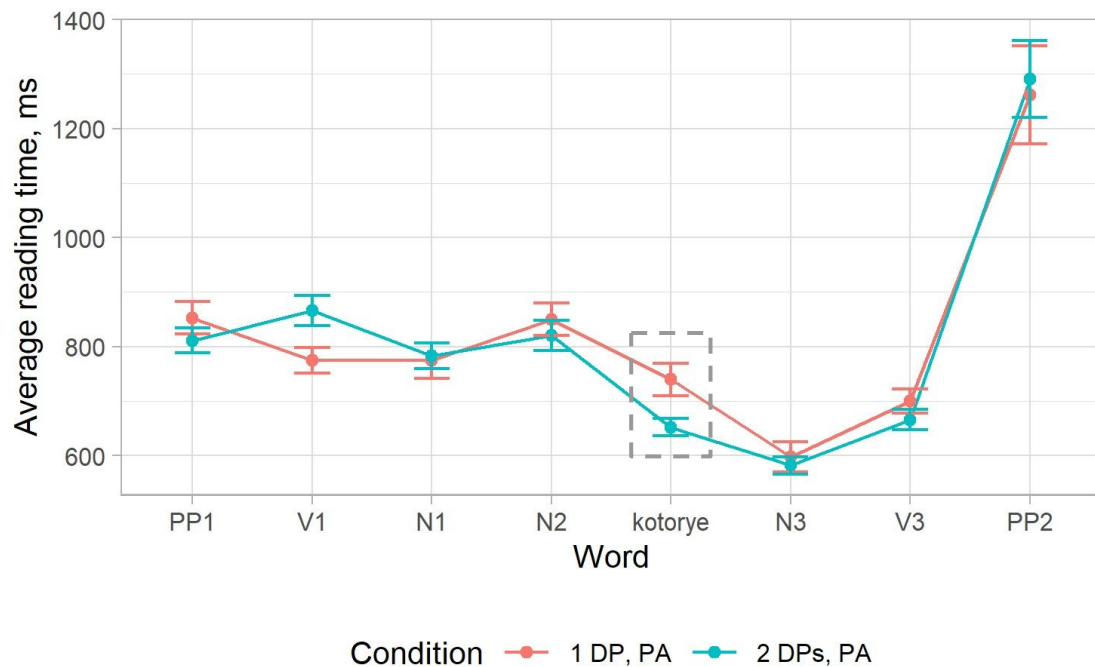
## Reading time: results

Tukey's multiple pairwise comparisons results

| condition 1    | condition 2    | estimate | p-value |
|----------------|----------------|----------|---------|
| 2 verbs, 1 DP  | SG, 1 DP       | -73.34   | 0.0666  |
| 2 verbs, 1 DP  | PL, 1 DP       | 80.83    | 0.0308  |
| PL, 1 DP       | SG, 1 DP       | -7.49    | 0.9997  |
| 2 verbs, 2 DPs | SG, 2 DPs      | -15.64   | 0.9913  |
| 2 verbs, 2 DPs | PL, 2 DPs      | 54.02    | 0.3200  |
| PL, 2 DPs      | SG, 2 DPs      | -69.66   | 0.0946  |
| 2 verbs, 1 DP  | 2 verbs, 2 DPs | -37.42   | 0.8449  |
| SG, 1 DP       | SG, 2 DPs      | 27.76    | 0.9516  |
| PL, 1 DP       | PL, 2 DPs      | 89.94    | 0.0568  |

## Reading time: results

- [PL, 2 DPs] vs. [SG, 2 DPs]
- No significant difference
- This goes in line with the acceptability judgement results



# References

- Bobaljik, J.D. (2017). Adjectival hydras: Restrictive modifiers above DP? *Wiener Linguistische Gazette*. No. 82. Pp. 13–22.
- Bošković, Ž. (2010). Conjunct sensitive agreement: Serbo-Croatian vs Russian. In Gerhild Zybatow, Philip Dudchuk, Serge Minor, & Ekaterina Pshehotskaya (Eds.), *Formal Description of Slavic Languages*. No. 7.5. Pp. 31–48.
- Cinque, G. (2019). A Note on Relative Clauses with Split Antecedents.
- Citko, B. (2021). Merge (Late and Parallel) and Agree (Closest and Multiple): A View from Relative Clauses with Coordinated Heads. Agreement in Multivaluation Constructions, Goethe-Universität Frankfurt am Main.
- Conrod, K., & Woo, B. (2018). Hydras: Split Heads and Light Heads. LSA 92, Salt Lake City.
- Grosz, P. (2015). Movement and agreement in right-node-raising constructions. *Syntax*. Pp.1–38.
- Krejci, B. (2020). *Syntactic and semantic perspectives on first conjunct agreement in Russian*. PhD thesis, Stanford University.

# References

- Link, G. (1984). Hydras: On the logic of relative constructions with multiple heads. *Varieties of formal semantics*. Pp. 245–257.
- Pekelis, O.Ye. (2013) *Sochinenie. Materialy dlya proekta korpusnogo opisaniya russkoj grammatiki* (<http://rusgram.ru/>) [Coordination. Materials for the project of corpus description of Russian grammar (<http://rusgram.ru/>)]. As a manuscript.
- Perlmutter, D. M., & Ross, J.R. (1970). Relative clauses with split antecedents. *Linguistic Inquiry*. No. 1. P. 350.
- Sannikov, V.Z. (2008) *Russkij sintaksis v semantiko-pragmaticeskom prostranstve* [Russian syntax in the view of semantics and pragmatic]. Moscow: Yazyki slavyanskix kul'tur.
- Shen, Z. (2019). The multi-valuation Agreement Hierarchy. *Glossa* 41:46.
- Zhang, N. N. (2007). The syntactic derivations of split antecedent relative clause constructions. *Taiwan Journal of Linguistics*. No. 5. Pp. 19–48.