Choosing a position for an object pronoun in German — the role of individual differences

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Object pronouns in German occur after and before the subject:

(1) *Der Mann stürzte dadurch zu Boden, so dass der Detektiv ihn*
the man   fell   thereby to ground so that the detective him
überwältigen und bis zum Eintreffen der Polizei festhalten konnte.
overpower   and until the arrival   the police retain   could
'Thereby, the man fell to the ground so that the detective could overpower him
and retain him until the police arrrived.'
https://www.rheinpfalz.de/pfalz,artikel,-kaiserslautern-ladendieb-z

(2) *Beim Sprung über einen Maschendrahtzaun verletzte sich   der Mann,*
at   jump over a   chain-wire fence   hurt   himself the man
so dass ihn der Detektiv einholen und festhalten konnte.
so that him the   detective catch and   retain   could
'When jumping over a chain-wire fence, the man hurt himself, so that the
detective could catch and retain him.'
https://www.come-on.de/luedenscheid/mann-jagt-raeuber-durchs-stern-center-luedenscheid-wegen-schutzmasken-
13809523.html

As with other syntactic alternations, the variable position of object pronouns
raises the following question:

> *. . . if we itemize all the factors that can play a role in the actual*
> *choices speakers make when grammar offers them alternatives, could*
> *we eventually eliminate all semblance of freedom? (Cappelle, 2009,*
> *183)*

A selection of linguistic hierarchies proposed to affect word order (see overviews in Allan, 1987; Siewierska, 1993):

(3) *The weight hierarchy*
     short > long

(4) *The Definiteness Hierarchy*
     Personal pronoun > Proper name > Definite NP > Indefinite specific NP
     > Nonspecific NP
     (Aissen, 2003, 437)

(5) *Semantic role hierarchy*
     Agent > Benefactive > Recipient/Experiencer > Instrument >
     Theme/Patient > Location
     (Bresnan & Kanerva, 1989, 23)

(6) *Extended animacy hierarchy*
     First/Second person pronoun > Third person pronoun > Proper name >
     Human common noun > Nonhuman animate common noun > Inanimate
     common noun
     (Croft, 2003, 130)

Bader (2020): Corpus study of the position of object pronouns in German

- The following hierarchies were found to affect the position of object pronouns:
    - Weight hierarchy
    - Definiteness hierarchy
    - Animacy hierarchy
    - Semantic role hierarchy
    - Case hierarchy (reverse effect)
- Overall, the object pronoun occurred in 67.0% of all cases in front of the non-pronominal subject.
- A logistic regression based on the above hierarchies predicts the observed order in 76.7% of all cases.

Question

Can further factors be identified that account for some or all of the 24.3% cases for which the logistic regression model makes false predictions?

Variables not taken into account in the corpus study of Bader (2020)

- Syntactic priming: What order of subject and object occured in preceding sentences?
- Speaker/writer related variables:
  - working memory
  - processing speed

Overview

- Experiment 1:
  Does syntactic priming affect the position of object pronouns relative to the subject?
- Experiment 2:
  Do SO and OS order involving object pronouns differ in acceptability?
- Experiment 3:
  Do working memory capacity and processing speed affect the choice of a word order?

Question 1

- Does syntactic priming affect the position of an object pronoun?

Experimental procedure: variant of "production from memory"
- Participants reads out a main clause presented on the computer screen.
- When finished reading, participants presses the space bar.
- A matrix clause + complementizer appears on the screen.
- Participants reads out the matrix clause and the complementizer and recalls the memorized main clause in the form of an embeddedd clause.

(7) TARGET: (Display 1)
SO *Der   (sehr faule) Mann hat   den   Regisseur gelangweilt.*
   the.NOM very lazy   man   the.ACC director has   bored
OS *Den   Regisseur hat der   (sehr faule) Mann gelangweilt.*
   the.ACC director   has the.NOM very lazy   man   bored

(8) *PROMPT: Der Regisseur hat gesagt, dass . . .*
   (Display 2) the director   has said   that

(9) Two correct continuations:
   a. *der (sehr faule) Mann ihn gelangweilt hat.*
   b. *ihn (sehr faule) Mann gelangweilt hat.*

Questions 2 & 3

- Does the animacy of the subject NP affect the position of an object pronoun relative to the subject?
- Does the length of the subject NP affect the position of an object pronoun relative to the subject?

(10) Animate subject, short or long
    a. Der Regisseur sagt, dass   der (sehr faule) Mann **ihn** gelangweilt.
    b. Der Regisseur sagt, dass **ihn** der (sehr faule) Manngelangweilt.

(11) Inanimate subject, short or long
    a. Der Regisseur sagt, dass   der (sehr tolle) Film **ihn** gelangweilt.
    b. Der Regisseur sagt, dass **ihn** der (sehr tolle) Film   gelangweilt.

Table: Sample materials for the first production experiment. The magnitude estimation experiment used the same stimuli, but with target and prompt combined (main clause followed by embedded complement clause.

|								
SO Inanimate	Das	(äußerst	wertvolle)	Buch	hat	den	Opa	erfreut.
	the-NOM	extremely	valuable	book	has	the-ACC	grandpa	pleased
Animate	Der	(äußerst	lustige)	Enkel	hat	den	Opa	erfreut.
	the-NOM	extremely	funny	grandson	has	the-ACC	grandpa	pleased
OS Inanimate	Den	Opa	hat	das	(äußerst	wertvolle)	Buch	erfreut.
	the-ACC	grandpa	has	the-NOM	extremely	valuable	book	pleased
Animate	Den	Opa	hat	der	(äußerst	lustige)	Enkel	erfreut.
	the-ACC	grandpa	has	the-NOM	extremely	funny	grandson	pleased
Prompt:	Der Opa	hat	gesagt,	dass . . .				
	the grandpa	has	said	that				

Participants

- 32 students of the Goethe University Frankfurt

Materials

- 48 sentences, each in 8 conditions
- Factor Animacy: Animacy of the subject – animate or inanimate
- Factor Length: Length of the subject – short (2 words) or long (4 words)
- Factor Prime: Word order in the target sentence – SO or OS
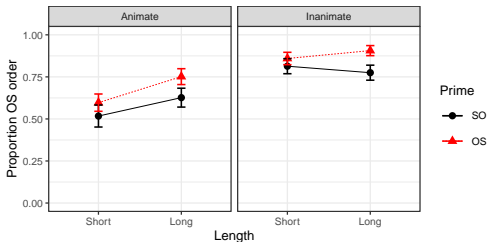
- Main effect of animacy: animate 59% vs. inanimate 82%
- Main effect of length: short 66% vs. long 75%
- Main effect of prime: SO 65% vs. OS 75%
- Interaction between animacy and length: animate 16% Diff versus inanimate 1% Diff
- Interaction between length and prime: short 7% Diff versus long 14% Diff

Mean values accross participants and sentences range from 51% to 91%:

- 51% when all factors favor SO order (short animate subject, SO prime)
- 90% when all factors favor OS order (long inanimate subject, OS prime)

$\rightarrow$ In the condition "short animate subject with SO prime", individual mean values range from 0 to 100%:
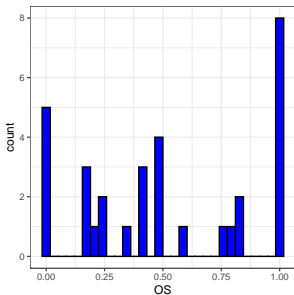
Conclusion

Individual participants have different preferences with regard to producing OS order.

Question addressed by Experiment 2

Are the proportions of SO/OS choices reflected in acceptability judgments?

To answer this question, Experiment 2 . . .

- ■ . . . tested the same sentences as Experiment 2, with the factor Prime replaced by the factor Order
- ■ . . . had participants rate sentences on a scale from 1 (completely unacceptable) to 7 (completely acceptable)

Participants

- 56 students of the Goethe University Frankfurt

Materials

- 40 sentences, each in 8 conditions
- Factor Animacy: Animacy of the subject – animate or inanimate
- Factor Length: Length of the subject – short (2 words) or long (4 words)
- Factor Order: Order between object pronoun and subject – SO or OS

Procedure

- Acceptability ratings on a scale from 1 (completely unacceptable) to 7 (completely acceptable)
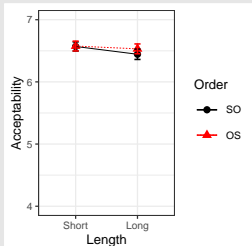- Experiment was run online via Ibex farm.

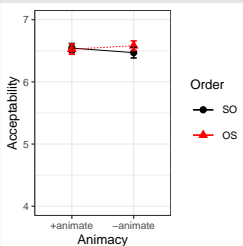## Mean acceptability in Experiment 2
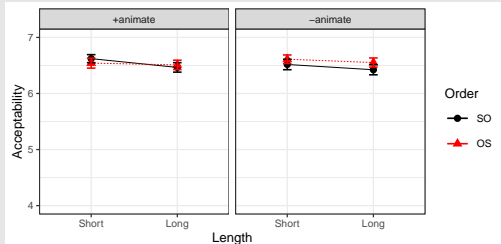
Order×Length: t=2.1, p<.05
Order×Animacy: t=2.1, p<.05

Interaction of Order and Length

Interaction of Order and Animacy

Summary of main findings

- Overall, acceptability was quite high.
- Some effects reflecting production frequencies were found, but the size of the effects was very small.

Conclusion

- SO and OS order are both equally acceptable with object pronouns.
- The choice between the two orders is not influenced by the grammar.

Question of Experiment 3

Do participants' working memory capacity and processing speed affect the choice of a word order?

Differences between Experiment 1 and Experiment 3

- Participants did a reading-span test before the experiment.
- In addition to subject prompts, Experiment 3 included object prompts.

48 sentences were constructed, each appearing in 8 versions.

- Factor Verb: subject-experiencer psych-verb versus object-experiencer psych-verb
- Factor Prime: SO order versus OS order
- Factor Prompt: Subject prompt versus object prompt

(12) Target sentences
    a. SO, ob-exp/sub-exp verb

Der	Enkel	hat	den	Opa	erfreut/bewundert.
The	grandson	has	the	grandpa	pleased/admired

       'The grandson pleased/admired grandpa.'

    b. OS, ob-exp verb

Den	Opa	hat	der	Enkel	erfreut/bewundert.
The	grandpa	has	the	grandson	pleased/admired

       'The grandson pleased/admired grandpa.'

(13) Prompt:
    a. Subject prompt: Der Enkel hat gesagt, dass ('The grandson said that')
    b. Object prompt: Der Opa hat gesagt, dass ('Grandpa said that')

Participants

55 students of the Goethe University Frankfurt

Procedure

Same procedure as Experiment 1

Reading-span task

Before the production experiment, the reading span of each participant was determined using the procedure recommended by Unsworth et al. (2005).

- Participants silently read sentences and had to judge whether the sentences were plausible or not.
- After each sentence, a letter appeared which participants had to memorize.
- After a set of sentence/letter pairs (n from 3 to 7), participants had to recall the letters in the correct order.
- Each letter recalled at the correct position was scored as correct. Participants had to recall a total of 75 letter ($3 \times$ each list from 3–7), and the memory score accordingly ranged from 0 to 75.

Table: Percentages of correctly recalled sentences produced with OS order in Experiment 3.

	Subject-experiencer verb		Object-experiencer verb	
	SO prime	OS prime	SO prime	OS prime
Subject prompt	0	0	0	0
Object prompt	32	32	44	48

Statistical analysis

- Percentage of OS order in sentences with object prompt: Significant effect of verb

Role reversals

Participants made a substantial number of role reversals errors (17% in total):

(14) Target: The grandson pleased grandpa.
Prompt: Grandpa said ...

    a. Correct recall: Grandpa said that the grandson pleased him.
    b. Role reversal: Grandpa said that he pleased the grandson.

Table: Percentages of role reversals in Experiment 3.

	Subject-experiencer verb		Object-experiencer verb	
	SO prime	OS prime	SO prime	OS prime
Subject prompt	6	27	16	31
Object prompt	6	26	9	16

Statistical analysis

- Significant effect of order in the target clause

Correlations with reading span

- Percentage of OS order and reading span: -0.15, $p > .1$
- Role reversals and reading span: $r = -0.55$, $p < .01$

Correlations with processing time

- Percentage (OS order) and Processing Time (sentence): 0.34, $p < .05$
- Percentage (OS order) and Processing Time (prompt): 0.32, $p < .05$
- Percentage (role reversals) and Processing Time (sentence): -0.26, $p = .056$
- Percentage (role reversals) and Processing Time (prompt): -0.13, $p > .1$

Individual factors and OS order

- Working memory capacity:
  correlates with number of errors, but not with word order choice
- Processing speed:
  correlates with word order choice, but only marginally with number of errors

Major Findings

- The choice between SO and OS with object pronouns is subject to syntactic priming.
- The choice between SO and OS with object pronouns is modulated by processing speed.

Conclusion

Even when individual properties are taken into account, some residual amount of free variation remains.

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