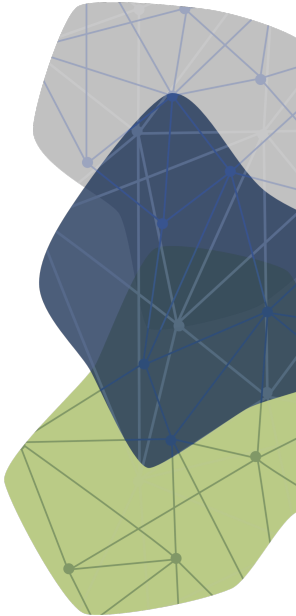
Syntax and Semantics Colloquium, Humboldt-Universität

The Normal Argument Order of German Experiencer-Object Verbs

Simon Masloch



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RUHR UNIVERSITÄT BOCHUM
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Appetiser: A Short Experiment

For those of you who feel confident providing judgments for German:

(1) Tim meinte, dass Maya Clara getreten hat.
Tim said that Maya Clara kicked has

Who kicked whom (according to Tim)?

☝: 

✋: 

Appetiser: A Short Experiment

(2) Tim meinte, dass Maya Clara gefallen hat.
Tim said that Maya Clara appealed.to has

Who liked whom (according to Tim)?

☝: 

✋: 

Appetiser

- Topic of talk: argument-ordering preferences with experiencer-object (EO) verbs in German, among them *gefallen* ‘appeal to’
- What we just saw: word order freezing effects that arise in absence of disambiguating formal marking.
- *gefallen* ‘to appeal to’ seems strange here. *I will argue that its behaviour is not so peculiar after all.*
- Behaviour of EO verbs has important ramifications for study of German clause structure as a whole

Much of what I will present today is joint work with Johanna Poppek, Tibor Kiss and Katharina Börner. Most parts are published in (Masloch & Poppek & Kiss 2024; 2025)

Experiencer-Object Verbs

Psych verbs loosely definable as verbs that indicate mental state of individual (the experiencer) (cf. Landau 2010: 137)

Since Belletti & Rizzi's (1988) work on Italian customary to distinguish three classes:

1. experiencer subject: *lieben* 'to love', *mögen* 'to like',...
2. accusative experiencer object (EO): *ärgern* 'to annoy', *erheitern* 'to amuse', *wundern* 'to wonder',...
3. dative EO: *gefallen* 'to appeal to', *imponieren* 'to impress',...

Experiencer-Object Verbs

Often linked with non-canonical behaviour (Landau 2010)

Dative and sometimes (some) accusative EO verbs argued to be unaccusatives (i.a Belletti & Rizzi 1988; Fanselow 1992; Landau 2010; Hirsch 2018): 'subject' originates in object position, is c-commanded by it at some point

I will show that one does not need to adopt this position to explain argument order preferences and reflexive binding behaviour of German EO verbs

The German Clause

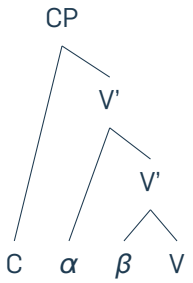
German is a verb-final verb-second language.

Topic Today:

- Midfield (area between position of complementiser / finite verb in verb-second clauses, and verbal position at end of clause)
- Full NPs, arguments

Assumption: Binary branching (Haider 2010)

(3)



Normal Order

Linearisation of (full NP) arguments in midfield rather free: All orders strictly speaking grammatical, but not equally felicitous in all contexts.

(4) a. Anna meinte, dass der Tim den Tom getreten hat.
Anna said that the.NOM Tim the.ACC Tom kicked has

b. Anna meinte, dass den Tom der Tim getreten hat.
'Anna said that Tim kicked Tom.'

Normal order: Ordering that is contextually least restricted (comparison set: clauses differing only in order and/or stress). The ordering used when the whole clause is in focus is the normal one (Höhle 2019)

Base Order

Base Order: Arises when theories assume that certain elements must combine with head in certain order
Additional mechanism needed to explain deviations from it

Frequently assumed that base order is predicate-specific and corresponds to normal order usually observed with predicate (i.a. Frey 1993; Haider & Rosengren 2003)

Not necessary: base order $\neq$ normal order (i.a. Müller 1999); free base generation (i.a. Fanselow 2001; 2003)

Standard view: base order, but Salzmann (2025) shows that many arguments for it inconclusive

I will argue that argument-ordering preferences with EO verbs pose problems for the idea of a predicate-specific base order and that data from reflexive binding into their subject do not suggest that anything but the surface order is relevant.

Outline of this Talk

- Forced-choice experiments show:
  - Accusative EO verbs have SO normal order
  - (Some) Dative EO: OS with inanimate subjects, (practically) no preference with animates. Animacy effect ⇒ Properties of elements ordered themselves can interact with thematic properties to determine linearisation

  ⇒ Problematic for approaches that identify normal order with predicate-specific base order (i.a. Frey 1993; Haider & Rosengren 2003)
- Can be captured in model that assumes weighted and potentially conflicting linearisation constraints
- Base order independent from normal order? Acceptability judgment study on reflexive binding into subject shows: surface linearisation decisive (⇒ no evidence for base-order found)

Free base generation in core configurational syntax + system that determines preferred choices by integrating several factors most economic choice

Three Experiments on the Normal Argument Order of EO Verbs

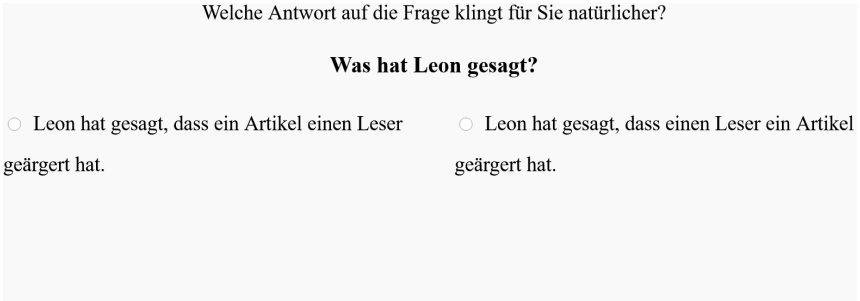
E^{NO}_{inanim} and E^{NO}_{anim} are study A and B from (Masloch & Poppek & Kiss 2024), on which this section is based, E^{NO}_{dat} is a pre-study originally intended for, but not used in (Kiss & Börner & Masloch 2025).

3 forced-choice (FC) experiments: participants shown two linearisation variants (SO and OS), had to choose preferred one:

- E^{NO}_{inanim}: Dative and accusative EO verbs, inanimate subjects
- E^{NO}_{anim}: Dative and accusative EO and action verbs, animate subjects
- E^{NO}_{dat}: Dative EO verbs, inanimate and animate subjects

Three Experiments on the Normal Argument Order of EO Verbs

- Target clauses embedded ⇒ no prefield effects (cf. Frey 2006)
- Introductory question making embedded clause answer focus ⇒ Whole target clause in focus ⇒ Normal order (per definition, Höhle 2019)
- Other factors influencing linear order (definiteness, weight,...) controlled for.



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Literature

	SO	OS	no preference
ACC	*(Scheepers & Hemforth & Konieczny 2000; Temme & Verhoeven 2016; Verhoeven & Temme 2017; Ellsiepen & Bader 2018)*, (Ellsiepen & Bader 2018; Verhoeven 2015: anim), (Fanselow 1992; Hirsch 2018: eventive)	(Lenerz 1977; Haider & Rosengren 2003)	(Verhoeven 2015: animate S), (Primus 2004; Hirsch 2018: stative)
DAT		*(Temme & Verhoeven 2016; Fanselow & Häussler & Weskott 2016:* aux *sein)*, (Verhoeven 2015: inanim), (Lenerz 1977; Fanselow 1992; Wegener 1999; Haider & Rosengren 2003; Hirsch 2018)	*(Fanselow & Häussler & Weskott 2016:* aux *haben)*, (Verhoeven 2015: anim), (Lötscher 1981: anim; Barðdal & Eythórsson & Dewey 2014)

experimental study, CORPUS STUDY, theoretical work

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Verbs Used

Goals:

1. Avoiding noise: Not violating usage preferences etc.
2. Cover potential subclasses (cf. i.a. Hirsch 2018)

- Using GerEO (Poppek & Masloch & Kiss 2022; Masloch et al. 2021) to check for compatibility with (in-)animate subjects, non-psych usages etc.
- Among candidates verbs that take part in different argument structure alternations, have different morphological structures, belong to different classes according to Hirsch (2018) chosen.
- For E^{NO}_{anim} only verbs scoring low on agentivity tests in (Verhoeven 2014; Hirsch 2018).

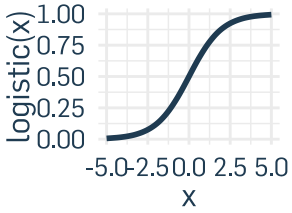
Statistics

I will use Bayesian models (introductions aimed at linguists: Vasishth 2023; Franke 2023; Nicenboim & Schad & Vasishth 2025) fit with `Stan` in `R` via `brms` (Stan Development Team 2022; R Core Team 2023; Bürkner 2017):

- Probability distribution on parameters. Posterior distribution computed from prior (How likely are parameter values a priori?) and likelihood function (How likely are data under parameter value)
- Notational conventions description posteriors:
  - $\hat{\beta}$: mean of marginal posterior for parameter β
  - 95 % credible interval (CrI): 2.5^{th} and 97.5^{th} percentile of posterior distributions
- Hypothesis testing: Bayes Factors
  - 'BF_{12} indicates the evidence that the data provide for $\mathcal{M}_1$ over $\mathcal{M}_2$ [...], which of the two models is more likely to have generated the data' (Schad et al. 2023: 1406)
  - One of models compared will always be null model here: parameter of interest set to point 0.
  - BF_{10}: $> 1 \Rightarrow$ evidence *against* 0
  - BF > 3 / $< \frac{1}{3}$: moderate evidence; > 10 / $< \frac{1}{10}$: strong evidence (Jeffreys 1939)

Statistics

- Advantage: Possible to quantify evidence *for* 0
- Conditional effects (e.g. value for cell a2,b2 on the right) often interesting
- Computed using `emmeans`, BFs for them with `bayestestR` (Lenth 2023; Makowski & Ben-Shachar & Lüdecke 2019)



- Reminder: Conditional effect of 0 in logistic model corresponds to 50/50 distribution

B \ A	a1	a2
b1	$\alpha_{a1,b1}$	$\alpha_{a1,b1} + \beta_{A:a1 \rightarrow a2}$
b2	$\alpha_{a1,b1} + \beta_{B:b1 \rightarrow b2}$	$\alpha_{a1,b1} + \beta_{B:b1 \rightarrow b2} + \beta_{A:a1 \rightarrow a2} + \beta_{int}$

E^{NO}_{inanim}: Inanimate Subjects

Which argument order is preferred with inanimate subjects in a neutral setting once all other factors are controlled for with accusative and dative EO verbs?

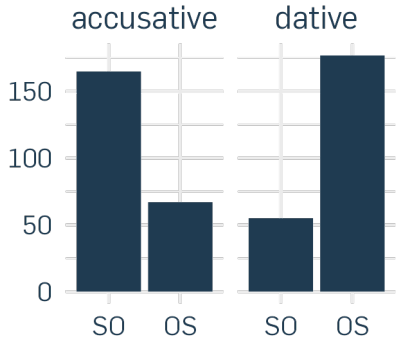
(5) FC(ORDER) ~ CASE

- 16 test items (8 lexicalisations for each of the two conditions)
- 6 calibration items, 6 control items, 10 attention items, 34 other filler

(6) Predictions E^{NO}_{inanim}:
   a. Accusative: SO preferred
   b. Dative: OS preferred

Temme & Verhoeven (2016) performed similar study (other factors tested, verb-second clauses, definite NPs): 59 % SO with accusative, 68 % OS with dative.
40 participants, 11 surveys excluded

E^{NO}_{inanim}: Results



- **Moderate SO preference with accusatives**: $\hat{\alpha}_{acc} = -0.91$ [−1.46, −0.35], corresponding to ca. 70 % of choices [59.8 %, 85 %]. $BF_{10} = 27$ ($BF_{10} < 1$ for some models with priors assuming that all EO verbs have OS preference in sensitivity analysis.)
- **Difference between classes**: $\hat{\beta}_{CASE:ACC \rightarrow DAT} = 2.18$ [1.42, 2.93]. $BF_{10} > 1000$. ⇒ **OS with dative**: ca. 78 % [66.9 %, 87.6 %]. Model with dative as reference level has $\hat{\alpha}_{dat} = 1.18$ [0.62, 1.75], $BF_{10} = 139$

```
Order ~ 0 + Intercept + case + (1 + case | workerId) + (1 | ITEM_ID)
```

Relatively broad priors based on Temme & Verhoeven's (2016) results.

E^{NO}_{anim}: Animate Subjects

How do verbs behave once *all* factors equalled out?

- Possible to include agent-patient verbs (animate subjects) as comparison class
- Agentive readings to be avoided: Only verbs scoring low on agentivity tests in (Verhoeven 2014; Hirsch 2018) used

(7) FC(ORDER) ~ AGENTIVITY × CASE

- ORDER: SO / OS
- AGENTIVITY: EO / action
  - within participants
  - between items
- Object CASE: accusative / dative
  - within participants
  - between items

E^{NO}_{anim}: Animate Subjects

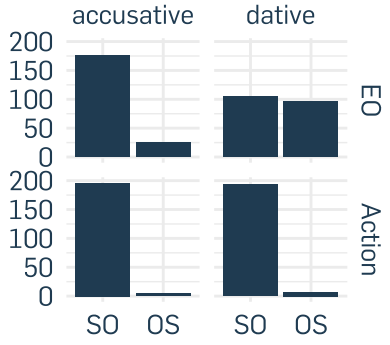
8 lexicalisations per condition, 32 test items in total.

Low number of suitable verbs ⇒ Each used in *two* test items

(8) Predictions E^{NO}_{anim}:
   a. Accusative EO: SO
   b. Dative EO: OS.
   c. Action: SO

32 participants, 25 surveys entered analysis

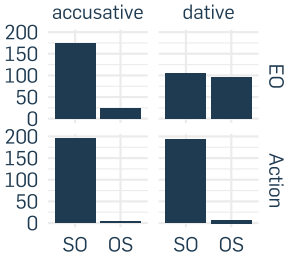
E^{NO}_{anim}: Animate Subjects



- **No preference with dative EO verbs**: $\hat{\alpha}_{dat,EO} = 0.04$ [−0.79, 0.86] corresponding to 50.9 % [31.1 %, 70 %] predicted SO choices. $BF_{10} = 0.25$ (ca. 0.5 to 0.25 in sensitivity analysis): anecdotal to moderate evidence for *absence* of an ordering preference
- **Clear difference between acc and dat EO**: $\hat{\beta}_{CASE:DAT \rightarrow ACC} = 2.4$ [1.33, 3.53], $BF_{10} = 176$. Strong **SO preference** for **accusative EO**: 91.2 % [83.1 %, 97.8 %], $BF_{10} > 1000$

`answer ~ 0 + Intercept + case * agentivity + (1 + case * agentivity | workerId) + (1 | verb/ITEM_ID)` Mildly informative priors based on E^{NO}_{inanim}.

E^{NO}_{anim}: Animate Subjects

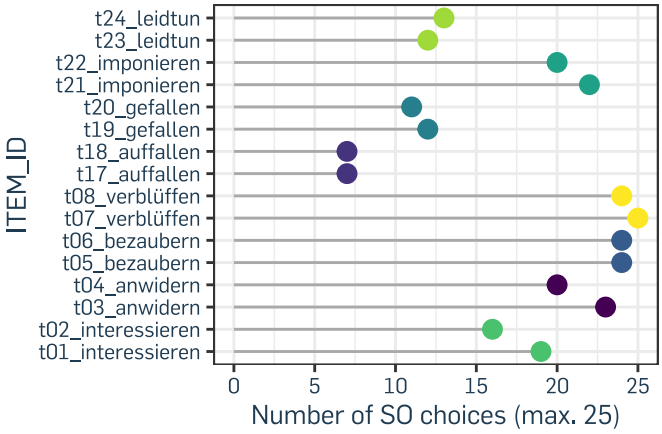


- **Clear difference between dative EO and action verbs**: $\hat{\beta}_{AG:EO \rightarrow ACT} = 3.74$ [2.57, 4.95], $BF_{10} > 1000$. Clear **SO preference with dative action verbs**: 97.4 % [94.3 %, 99.6 %] predicted, $BF_{10} > 1000$
- Wide credible intervals and BF around 1 for interaction. Clear **SO preference with accusative action verbs**: 98.7 % [96.8 %, 99.9 %], $BF_{10} > 1000$
- **Strong evidence for a difference between accusative EO and action verbs**: BF_{10} based on comparison of conditional means: 22 (> 9 for all models in sensitivity analysis)
- Large SD of verbs' group-level intercept: $\hat{\sigma} = 1$ [0.52, 1.64], but SD for items nested within them much smaller: $\hat{\sigma} = 0.24$ [0.01, 0.76].

`answer ~ 0 + Intercept + case*agentivity + (1 + case * agentivity | workerId) + (1 | verb/ITEM_ID)` Mildly informative priors based on E^{NO}_{inanim}.

E^{NO}_{anim}: Animate Subjects

Individual Items



- Items containing same verb behave similarly
- *gefallen* 'to appeal to' and *leidtun* 'to feel sorry for' lack preference, *Imponieren* 'to impress' SO preference (agentive reading!), *auffallen* 'to strike' OS (perfect tense auxiliary *sein*, cf. Fanselow & Häussler & Weskott 2016)
- Not (solely) due to variation between speakers (but maybe for *imponieren*, *interessieren*)

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E^{NO}_{dat}: Individual Verbs

Are there really verbs that lack an ordering preference with animate subjects and does animacy really make a difference?

Differences between verbs: Individual verb as factor

(9) FC(ORDER) ~ ANIMACY × VERB

- ORDER: SO / OS
- ANIMACY: animate / inanimate subject
  - within participants
  - between items
- VERB: *gefallen* ‘to appeal to’, *missfallen* ‘to displease’, *behagen* ‘to please’, *fehlen* ‘to miss’
  - within participants
  - between items

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E^{NO}_{dat}: Individual Verbs

4 lexicalisations per condition, 32 test items in total, 2 lists ⇒ each participant saw each verb twice in each animacy condition (4 times in total).

64 filler items, among them 6 calibration, 10 attention, 10 control

Verbs chosen from nonagentive dative EO verbs selecting *haben* as perfect tense auxiliary by lowering inclusion criteria. *Leidtun* 'to feel sorry' not used: May be different predicate with inanimate (≈ 'to regret') than with animate subjects (≈ 'to feel sorry for')

59 participants whose data passed eligibility screening (30 rejected)

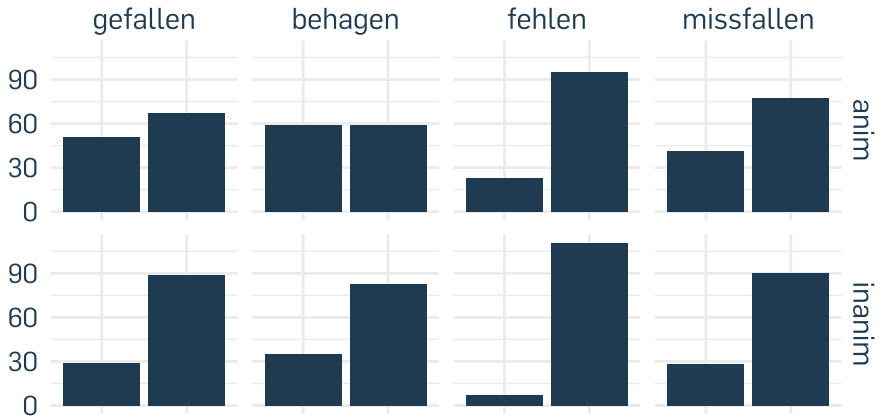
E^{NO}_{dat}: Individual Verbs

(10) Predictions E^{NO}_{dat}:

a. No preference in animate condition for all verbs

b. Effect of animacy (ca. 1 on logit scale)

E^{NO}_{dat}: Individual Verbs



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E^{NO}_{dat}: Individual Verbs

- **Animacy effect has expected size**: $\hat{\beta}_{\text{ANIMACY:ANIM}\rightarrow\text{INANIM}} = -1.04\ [-1.58, -0.54], BF_{10} > 1000$

VERB	ANIMACY	estimate	CrI	BF_{10}	sensitivity
gefallen	*animate*	41.4 %	[31.8 %, 50.9 %]	1.85	0.2–3.7
behagen	*animate*	49.5 %	[38.1 %, 61 %]	0.26	0.05–0.32
missfallen	*animate*	37 %	[26.1 %, 48.2 %]	3.5	0.93–5.13
fehlen	*animate*	16.4 %	[9.4 %, 23.8 %]	> 1000	all > 1000
gefallen	*inanimate*	19.8 %	[12.1 %, 27.9 %]	> 1000	all > 847
behagen	*inanimate*	25.6 %	[15.6 %, 35.7 %]	272	all > 10
missfallen	*inanimate*	17.1 %	[9.7 %, 24.9 %]	> 1000	all > 635
fehlen	*inanimate*	6.5 %	[2.9 %, 10.3 %]	> 1000	all > 1000

`answer ~ 0 + Intercept + animacy + verb + (1 + animacy + verb | workerId) + (1 | ITEM_ID)`, Informative priors based on E^{NO}_{inanim} and E^{NO}_{anim}. Ref. lev. *gefallen*, animate

E^{NO}_{dat}: Individual Verbs

- OS preference with inanimate subjects (all verbs)
- Evidence *against* preference with *behagen* ‘to please’ with animate subjects
- Data do not provide evidence for or against existence of *some* preference with *gefallen* ‘to appeal to’, but only values corresponding to an at most very small preference are plausible
- *fehlen* ‘to miss / lack’: Issue with some items
- *Weak* preference for OS with *missfallen* ‘to displease’, but evidence anecdotal at best

Normal Order vs. Base Order

Challenge for approaches assuming predicate-dependent base-order corresponding to normal order (e.g. Haider & Rosengren 2003; Frey 1993):

- Animacy, a feature of elements ordered independent of predicate, influences linearisation in neutral setting
- No (strong) preference at all with animate subjects for some verbs (two base orders to be expected under certain well-defined circumstances in Haider 2000: but these do not hold here and there should be no animacy effect then)
- Differences in strength of linearisation preference even between classes with same general tendency (accusative EO vs. action)

⇒ Results fit better with theories that do not assume ordering preference in neutral context to be determined by predicate-dependent base order, but where properties of elements ordered themselves are can influence even normal order.
Possible while assuming fixed base-order (as in i.a. Müller 1999) or free base-generation.

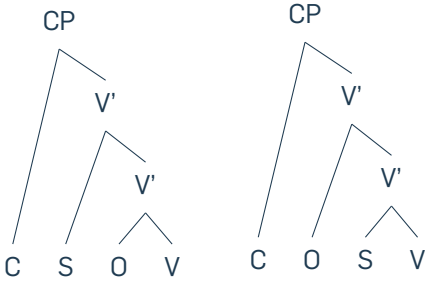
Analysis

Ordering preferences are determined by violable and interacting linearisation constraints (cf. i.a. Uszkoreit 1986; Jacobs 1988; Müller 1999; Ellsiepen & Bader 2018)

Background assumptions:

- No functional projections between V and C (Haider 2010)
- Binary branching (Haider 2010)
- No fixed base order

(11) a. b.



Analysis

Maximum-Entropy Grammar

Maximum-Entropy Grammar (Goldwater & Johnson 2003; Hayes 2022) is a probabilistic variant of Optimality Theory / Harmonic Grammar.
Harmony Values are compared across candidates to compute probabilities:

(12) (Goldwater & Johnson 2003: 114)

$$P(y|x) = \frac{1}{Z(x)} exp\left(\sum_{i=1}^{m} w_i f_i(y, x)\right), \text{ where}$$

$$Z(x) = \sum_{y \in \mathcal{Y}(x)} exp(\sum_{i=1}^{m} w_i f_i(y, x))$$

x: context, $\mathcal{Y}(x)$: a set of candidates, m: number of constraints w_i: weight of constraint f_i, $f_i(y, x)$: number of violations of f_i by candidate y in x

Analysis

Constraints

Long research tradition on factors influencing linearisation in German (i.a. Lenerz 1977; Lötscher 1981; Uszkoreit 1986; Jacobs 1988; Hoberg 1997; Müller 1999; Ellsiepen & Bader 2018)

Constraints here:

AG	agent ≺ non-agent
CAUS	causer ≺ non-causer
ANIM	animate ≺ inanimate
SEIN	object of verb selecting *sein* as its perfect tense auxiliary ≺ subject of verb selecting *sein* as its perfect tense auxiliary

- Subject is agent with action verbs
- Subject is causer with accusative (except for *betrügen* 'to deceive'), but not dative action verbs (but this will not really make a difference)

Analysis

Causers / Objects of Emotion

German accusative but not dative EO verbs are causative (i.a. Rothmayr 2009; Marelj 2013; Hirsch 2018)
Causers and objects of emotion to be distinguished (Kenny 1963; Pesetsky 1995)

(13) Die Nachrichtensendung hat Anna gefallen.
the news.broadcast.NOM has Anna.DAT appealed.to
'Anna liked the news broadcast.' [news broadcast is object of the emotion]

(14) Die Nachrichtensendung hat Anna geängstigt.
the news.broadcast.NOM has Anna.ACC frightened
'The news broadcast frightened Anna.' [news broadcast can be mere causer of the emotion]

- For (14) to be true, Anna need not be afraid of news broadcast. Suffices if she fears coming of war after watching news.
- Anna needs to evaluate news broadcast itself in (13) (see also Fanselow 1992: 292).

Analysis

Determining Constraint Weights

A Maximum-Entropy Grammar is essentially a multinomial / binomial logistic regression model

Weights computed based on experimental data (without data for *imponieren* 'to impress', *interessieren* 'to interest', *fehlen* 'to miss') with Bayesian logistic regression model (mildly informative priors):

```
answer ~ -1 + agent + causer + sein + anim + (0 + agent + causer + sein + anim
| workerId) + (1 | example)
```

(15) AG: −3.34 [−4.32, −2.62]
CAUS: −2.43 [−2.88, −2.02]
ANIM: −1.2 [−1.53, −0.9]
SEIN: −0.99 [−1.77, −0.34]

- Group-level intercept items: idiosyncratic properties of items may influence linearisation
- Group-level slopes participants: participants may differ in constraint weightings ⇒ individual Maximum Entropy Grammar for everyone, model provides comparison of variation: only for ANIM serious ($\hat{\sigma}_{u_3} = 0.90$ [0.58, 1.24])

Analysis

Simple Example Order Determination

(16) dass ein Artikel einen Leser geärgert hat
that a.NOM article a.ACC reader annoyed has
'that an article annoyed a reader'

	AG −3.34	CAUS −2.43	ANIM −1.2	SEIN −0.99	Σ	e^{Σ}	P
dass ein Artikel einen Leser geärgert hat			1		−1.2	0.3	0.77
dass einen Leser ein Artikel geärgert hat		1			−2.43	0.09	0.23

Analysis

Predictions

Condition	marginal estimate	lower CrI	upper CrI	%	lower CrI	upper CrI	% observed
accusative action	5.77	4.87	6.73	99.69	99.24	99.88	98
dative action	3.34	2.55	4.21	96.59	92.75	98.54	96.5
accusative EO animate	2.43	2.01	2.86	91.91	88.19	94.59	93.33
accusative EO inanimate	1.23	0.79	1.67	77.35	68.72	84.13	74.88
dative haben EO animate	0			50			43.83
dative haben EO inanimate	−1.20	−1.52	−0.90	23.11	17.91	28.97	25.85
dative sein EO animate	−0.99	−1.72	−0.31	27.05	15.17	42.29	28
dative sein EO inanimate	−2.19	−2.97	−1.49	10.03	4.86	18.47	15.52

Excursus: ‘Word Order Freezing’

We (hopefully) saw that in sentences without formal marking, interpretational ambiguities arise with *gefallen* ‘to appeal to’, while there is a preference to interpret two NPs unmarked for case as SO with *treten* ‘to kick’.

Fanselow (2015): Where ambiguities might arise due to case syncretism, preferred order is the one that would also be preferred without it

(There are other judgments in the literature (i.a. Vogel 2004) + quantitative tendency: order that would otherwise be used is favoured even more (Berdicevskis & Piperski 2020), but they may receive a pragmatic explanation.)

Binding

This section is based on (Masloch & Poppek & Kiss 2025)

Argument order may be fixed in configurational syntax, but additional mechanism determines preferred order (cf. Reape 1994; Müller 1999)

I will use data from reflexive binding to argue against that

Will binding data be helpful?

- Usual assumption: Scrambling does not reconstruct for binding ⇒ surface position counts (Haider 2017)
- Minority opinion: Scrambling reconstructs for binding, a c-command requirement can be fulfilled at an early (or any) (Müller 1999; Grewendorf & Sabel 1999)

Müller (1999), who assumes that there is fixed base order, uses binding data to argue for it.

Backward Binding with EO verbs

EO verbs may be special:

Long-standing debate about so-called backward binding into the subject of EO verbs (i.a. Belletti & Rizzi 1988; Bouchard 1995; Pesetsky 1995; Pollard & Sag 1992; Cheung & Larson 2015).

(17) Italian (Belletti & Rizzi 1988: 312)

a. Questi pettegolezzi su di sé preoccupano Gianni più di ogni altra cosa.
'These gossips about himself worry Gianni more than anything else.'

b. * Questi pettegolezzi su di sé descrivono Gianni meglio di ogni biografia ufficiale.
'These gossips about himself describe Gianni better than any official biography.'

Backward Binding with EO verbs

Explanations in the literature:

- Unaccusativity of (some subclasses of) EO verbs: (i.a. Belletti & Rizzi 1988; Cheung & Larson 2015)
  - Subject originates *below* object
  - C-command *does* hold at some level of representation / during derivation
  - This suffices for c-command constraint to be fulfilled
- Logophoric / point-of-view-based binding, exempt anaphors:
  Reflexives in the relevant examples are not subject to the classical Principle A, but this is *not* due to a special property of EO verbs. (e.g. Pollard & Sag 1992; Bouchard 1995)

Logophoric binding or exemption from Principle A not attested with German reflexive *sich* (Kiss 2012).

Backward Binding with German EO Verbs

- If Backward binding with EO verbs only due to logophoricity/exemption ⇒ *not* possible in German.
- If it *is* possible, unaccusativity (⇒ OS base order) could provide an explanation if reconstruction is possible

Predictions for acceptability of binding into subject in SO clause:

	unaccusative	not unaccusative
base-generation or no reconstruction	×	×
fixed base-order OS + reconstruction	✓	×

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Backward Binding with German EO Verbs

- Acceptability of examples analogous to (17a) disputed (cf. Kiss 2012; Platzack 2012; Fischer 2015; Temme & Verhoeven 2017).
- Fischer (2015): effect of linear order

(18) (Kiss 2012: 161) (b. acceptable according to Fischer (2015))

a. * Ich glaube, dass die Bilder von sich den Kindern gefielen.
I believe that the.NOM pictures.NOM of REFL the.DAT children.DAT appealed.to

b. */✓ Ich glaube, dass den Kindern die Bilder von sich gefielen.
I believe that the.DAT children.DAT the.NOM pictures.NOM of REFL appealed.to

'I believe that the children liked the pictures of themselves'

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E^B

Is reflexive binding into subject of EO verbs possible in German?

2 × 2 Acceptability rating study

- ORDER: SO, OS (within items, between participants)
- CASE: of object. Accusative or dative. (between items, within participants)

Participants see each item in one ordering condition only, but each of them rates the same number of SO and OS sentences.

Materials

Criteria items:

- Verb-final clause of interest embedded in matrix clause
- Inanimate NP subject containing embedded PP containing *sich*
- NPs selected based on analysis of frequent NP-PP combinations
- Object as only possible antecedent

Materials

- 8 test items containing accusative-object EO verb, 8 containing dative EO verb
- 64 (related and unrelated) filler items:
  - 6 calibration items
  - 16 control items
  - 10 attention items

Hypotheses and Predictions

- Given sentence structure assumed, possible antecedent can only c-command reflexive if it precedes it in linear order.
- Reflexive is always embedded in subject and object is only possible antecedent.

(19) Main Hypothesis
In the German midfield, the object of an experiencer-object verb cannot bind a reflexive embedded in a subject preceding it.

Hypotheses and Predictions

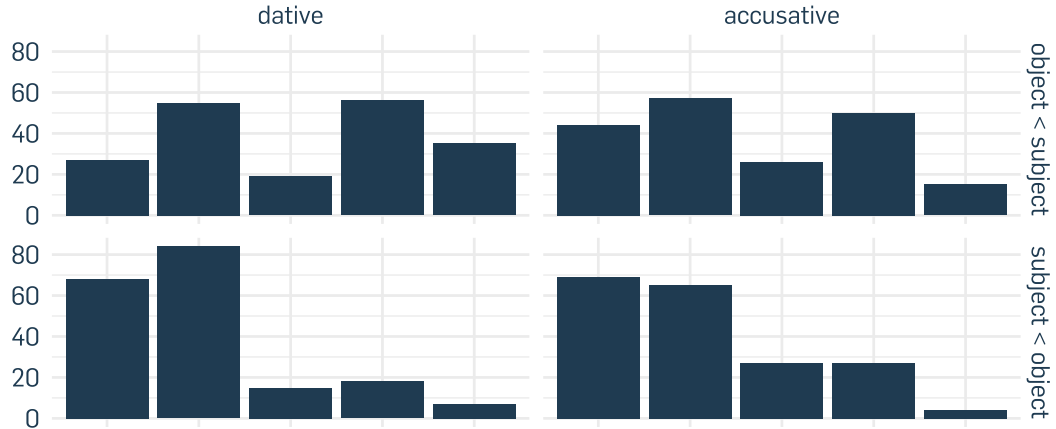
	dative	accusative
OS	high	medium
SO	low/medium	low

- OS: Reflexive c-commanded by antecedent. Linearisation preference violated with accusative verbs
- SO: Reflexive *not* c-commanded. Maybe cooperative participants are willing to give a mediocre rating if example would be grammatical in 'correct' order (dative EO)

If base order OS and c-command constraint can be fulfilled anywhere: Everything should be acceptable (but order may have influence).

Results

90 participants, 48 surveys entered analysis



Results

The Model

- Bayesian cumulative generalised linear mixed model with logit link and flexible thresholds
  `ANSWER ~ case * order + (1 + case * order | workerId) + (1 + order | ITEM_ID)`
- Factors sum-coded: *dative* and *OS* as 1, *accusative* and *SO* as −1:
  - β_{ORDER}: overall effect of ORDER
  - β_{CASE}: overall difference between accusative and dative
  - $\beta_{\text{ORDER}\times\text{CASE}}$: positive value would correspond to preference for normal order irrespective of other factors including binding constraints (−1 for *dative SO*, *accusative OS*; 1 for *dative OS* and *accusative SO*)
- Mildly informative priors

Results

Model parameters

- Population-level effects:
  - $\hat{\beta}_{\text{ORDER}} = 0.79$ [0.47, 1.12], $\text{BF}_{10} = 126.7$: **Ratings are better if binding not backward**
  - $\hat{\beta}_{\text{CASE}} = 0.16$ [−0.24, 0.57], $\text{BF}_{10} = 0.074$: Evidence against effect of CASE.
  - $\hat{\beta}_{\text{ORDER} \times \text{CASE}} = 0.23$ [−0.06, 0.52], $\text{BF}_{10} = 0.138$. Evidence against interaction effect.
- Group-level intercepts:
  - **Participants differ strongly**: 1.57 [1.22, 2]. (Explorative investigation of data: 12 Participant reject (almost) all test items.)
  - Items also seem to differ: 0.74 [0.45, 1.18]. (Explorative investigation: Some items receive almost only low scores in *both* conditions)

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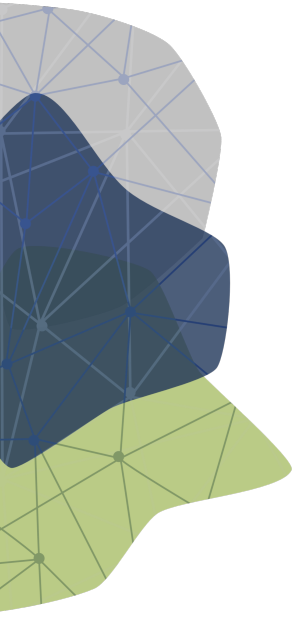
Discussion

- Main Hypothesis confirmed:
  Binding into the subject of German of EO verbs is licit only if it is *not* backward
  ⇒ No need to postulate a peculiar syntactic structure for German EO verbs to account for their (reflexive) binding behaviour.
- No evidence for reconstruction. Binding patterns follow surface order.
  ⇒ No need to assume fixed base order to explain patterns.
  (Caveat: If fixed base-order is SO and Principle A anywhere condition, data compatible)

Conclusion

- Linearisation preferences with EO verbs in German even more complex than previously assumed
- Pose challenges for accounts of German clausal syntax that assume predicate-dependent fixed base-orders and equate them with normal order (influence of animacy, lack of preference for some verbs, fine-grained differences)
- Data can be explained using violable weighted constraints
- Data from reflexive binding do not provide evidence for fixed base order or unaccusativity



The Normal Argument Order of German Experiencer-Object Verbs

Thank you for your attention

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Verbs Used in E$^{\text{NO}}_{\text{inanim}}$

accusative object	dative object
anwidern ‘to disgust’	*auffallen* ‘to strike’
ängstigen ‘to frighten’	*behagen* ‘to please’
ärgern ‘to anger’	*einleuchten* ‘to be evident to’
bezaubern ‘to charm’	*gefallen* ‘to appeal to’
interessieren ‘to interest’	*imponieren* ‘to impress’
nerven ‘to bother’	*missfallen* ‘to displease’
verärgern ‘to annoy’	*nahegehen* ‘to afflict’
verblüffen ‘to baffle’	*widerstreben* ‘to oppose’

Verbs Used in E^{NO}_{anim}

accusative EO	dative EO
anwidern ‘to disgust’	*auffallen* ‘to strike’
bezaubern ‘to charm’	*gefallen* ‘to appeal to’
interessieren ‘to interest’	*imponieren* ‘to impress’
verblüffen ‘to baffle’	*leidtun* ‘to feel sorry for’
accusative action	**dative action**
betrügen ‘to deceive’	*applaudieren* ‘to applaud’
anrufen ‘to call’	*antworten* ‘to answer’
informieren ‘to inform’	*danken* ‘to thank’
verhaften ‘to arrest’	*zujubeln* ‘to cheer’

Items E^{NO}_{dat} *missfallen*

Possible explanation for stronger OS:

- Number of lexicalisations per condition rather low for design reasons
- Constituent weight as in E^{NO}_{inanim} and E^{NO}_{anim} operationalised as 'number of syllables of whole NP'
- (20) test item in *missfallen animate* with strongest preference for OS (18/23)
- (21) comparable item from *gefallen animate* with slightly more SO than OS choices (15/36).
- Perceived weight of constituent in visual stimulus may be influenced by other factors, e.g. physical space occupied.
- Given enough participants, such accidental features may lead to detectable deviation, given low number of items, individual items have strong influence.

(20) *Was hat Tim mitbekommen?* 'What did Tim notice?'

Items E^{NO}_{dat} *missfallen*

a. Tim hat mitbekommen, dass ein Schnulzensänger einer Jurorin missfallen hat.
   Tim has noticed that a.**NOM** crooner.**NOM** a.**DAT** female.juror.**DAT** displeased has

b. Tim hat mitbekommen, dass einer Jurorin ein Schnulzensänger missfallen hat.
   'Tim noticed that a crooner displeased a judge[1].'

(21) *Was meinte Pia?* 'What did Pia say?'

a. Pia meinte, dass eine Sängerin einem Kritiker gefallen hat.
   Pia said that a.**NOM** female.singer.**NOM** a.**DAT** critic.**DAT** appealed.to has

b. Pia meinte, dass einem Kritiker eine Sängerin gefallen hat.
   'Pia said that a singer appealed to a critic.'

Items E^{NO}_{dat} *fehlen*

OS preference *fehlen* animate subjects:

- *Fehlen* has psych 'to miss' as well as non-psych 'to lack' reading
- Relational nouns used to avoid a non-psych reading by making emotional link plausible: In some items subject, in some object
- These groups seem to differ
- (22a) ambiguous (relative of deceased person or relative of Pia?)
- For (22b), matrix subject as antecedent more salient.
- May follow from general preference for anaphora over cataphora under assumption that implicit argument of relational noun stands in need of ante/postcedent
- While matrix subject is possible antecedent in both variants for (22), not the case for (23) since *einem Heimkind* 'an institutionalised child' is much more plausible antecedent for *Spielgefährte* 'playmate' than *Uwe*

Items E^{NO}_{dat} *fehlen*

(22) *Was hat Pia mitbekommen?* 'What did Pia notice?'

a. Pia hat mitbekommen, dass eine Verstorbene einem Angehörigen gefehlt hat.
Pia has noticed that a.NOM deceased.woman.NOM a.DAT relative.DAT missed has

b. Pia hat mitbekommen, dass einem Angehörigen eine Verstorbene gefehlt hat.

'Pia noticed that a relative missed a deceased woman.' / 'Pia noticed that a deceased woman was missed by a relative of hers.'

(23) *Was meinte Uwe?* 'What did Uwe say?'

a. Uwe meinte, dass ein Spielgefährte einem Heimkind gefehlt hat.
Uwe said that a.NOM playmate.NOM a.DAT institutionalised.child.DAT missed has

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Items E^{NO}_{dat} *fehlen*

b. Uwe meinte, dass einem Heimkind ein Spielgefährte gefehlt hat.
'Uwe said that an institutionalised child missed a playmate.'

Agentivity *imponieren*

Passivises (24), forms *lassen*-middle (core feature of middles that implicit argument agentive, Pitteroff 2014) (25). Change-of-state reading indicated by ability to form adjectival passive (cf. Gehrke 2015), at least for some speakers (some reject (26))

(24) Süddeutsche Zeitung, 26/06/2007, U07/JUN.04350 in DeReKo (Kupietz et al. 2010)

Wem soll wohl damit imponiert werden?
who shall MP with.this impressed become

'Who is supposed to be impressed by this?'

(25) Neue Zürcher Zeitung, 23/02/1996, NZZ_1996_02_23_a187_seg4_s4 in GerEO

[...] Mit ihnen lässt sich trefflich imponieren.
with them lets REFL splendidly impress

Agentivity *imponieren*

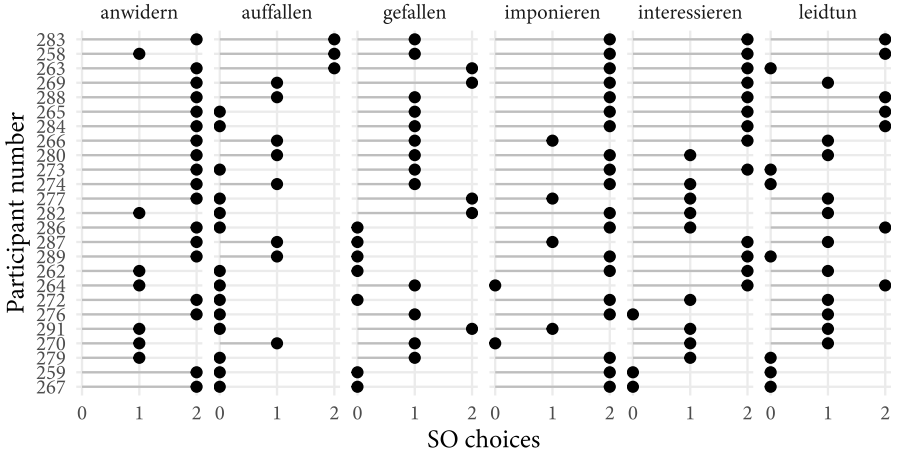
'With them, it's easy to impress.'

(26) Neue Zürcher Zeitung, 25/05/1994, NZZ_1994_05_25_a98_seg7_s13 in GerEO

[...] dass Vertreter der Europäischen Union [...] von der Wahlfreiheit
that representatives the.**GEN** European.**GEN** Union.**GEN** by the freedom.of.choice
imponiert gewesen seien.
impressed been were.**SBJV**

'that representatives of the European Union were impressed by the freedom of choice'

Choices Participants E^{NO}_{anim}



Case-based Constraints

Case, grammatical function and thematic roles highly correlated: Accounts assuming linearisation constraints differ in what they take to be decisive (cf. i.a. Lötscher 1981; Uszkoreit 1986; 1987; Jacobs 1988; Hoberg 1997; Müller 1999; Ellsiepen & Bader 2018)

Ellsiepen & Bader (2018) use data from experiment with accusative EO verbs to argue that case-based constraints are needed

If distinction drawn between objects of emotions and causers and accusative EO verbs are causative, not necessary.

Model using Ellsiepen & Bader's (2018) constraints such as nominative $\prec$ accusative, has similar predictive performance to the one presented here (as measured by elpd_{LOO}, Vehtari & Gelman & Gabry 2017)

So does model with intercept (corresponding to dative $\prec$ nominative).

Thematic Notions and Linear Order

When predicate-specific base-order is assumed, one usually tries to relate it to thematic notions.

Also important in the present analysis. Difference: Thematic factors may *interact* with others

Desirable because animacy may influence normal order.

But: Notions like agentivity also relevant for behaviour of adjuncts: Some comitatives favour position left of object when internal argument understood agent, but right if not (Kiss & Pieper & Börner in preparation)

Thematic Notions and Linear Order

Assuming that agentivity relevant directly ⇒ natural account for cases like (27), where a. is preferred.

(27) (Turgay 2017: 37)

a. Vielleicht wollte der Student dem Lehrer auffallen.
perhaps wanted the.NOM student the.DAT teacher strike

b. Vielleicht wollte dem Lehrer der Student auffallen.
'Perhaps the student wanted to catch the teacher's eye.'

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Focus Projection and Normal Order

Way Haider's (1993; 2000; 2003; 2010; 2017) approach presented a bit of a simplification. Relates base order and normal order via a theory of focus projection:

- Focus projection to the whole clause only possible from the deeply embedded stressable position (end of midfield)
- Traces not stressable. In case of scrambling, focus projection from this position not possible.
- ⇒ Whole clause can only be in focus where element bearing nuclear stress is in base-position at end of midfield

Work on relation of information structure and prosody has shown that basic assumptions not tenable (see i.a. Jacobs 1993; Truckenbrodt 2017).

Focus Projection and Normal Order

In (28) subject of verb with (presumably) SO base-order stressed, wide focus possible.

(28) (Jacobs 1993: 77), presentation (including indication of stress) adapted

weil mich ein VerWANDter anrief.
because me a relative called

'because a relative called me'

While Haider assumes OS for *gefallen*, *fehlen*, *imponieren*, he does not discuss examples with focus projection potential for them (but always the same *dass Balladen Linguisten interpretieren/interessieren* 'that linguists interpret/are interested in ballads')

Focus Projection and Normal Order

Situation seems quite complex with dative EO verbs: Höhle (2019: 143) claims whole clause can be in focus in (29). What about (30)? What about (31)?

(29) Es heißt, dass die Theorie den Fachleuten geFALlen hat.
it is.said that the theory the expertes appealed.to has
'It is said that the theory appealed to the experts.'

(30) Es heißt, dass den Fachleuten die TheoRIE gefallen hat.
'It is said that the theory appealed to the experts.'

Focus Projection and Normal Order

(31) a. Es heißt, dass die Sopranistin dem FACHpublikum gefallen hat.
it is.said that the soprano.singer the expert.audience appealed.to has

b. Es heißt, dass dem Fachpublikum die SopraNIStin gefallen hat.

c. Es heißt, dass die Sopranistin dem Fachpublikum geFALlen hat.

d. Es heißt, dass dem Fachpublikum die Sopranistin geFALlen hat.
'It is said that the soprano singer appealed to the expert audience.'

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Animacy, Topicality

Problems of analysis: SEIN ad hoc; experiencer-subject verbs uncontroversially SO (but no difference to dative EO here)

Temme & Verhoeven (2016) show that OS probability increases for accusative EO when object topical. Speculate that difference between accusative EO and action verbs even in neutral context due to an inherent difference in the likelihood to be aboutness topic between experiencers and patients: A statement is simply more likely to be about an experiencer than about a patient. (Supported by cross-linguistic patterns shown in their study.)

Difference explained if topics to be realised early (see i.a. overview in Siewierska 1993)

Animate entities more likely aboutness topics (Haspelmath 1999: 199)

Animacy, Topicality

Subjects usually topical, with the exception of the subjects of ‘ergative[s]’ (Jacobs 1992: 110, scare-quotes by him). Perfect tense auxiliary choice is an unaccusativity diagnostic.

- If experiencers approximately as likely to be aboutness-topics as subjects: practical lack of preference with (some) dative EO verbs explained.
- *auffallen*: nominative is unlikely aboutness topic and experiencer-object likely aboutness topic ⇒ experiencer precedes nominative
- inanimate subjects: animate experiencer-object more likely aboutness topic than subject ⇒ OS
- Accusative EO: Everything as before as long as CAUS is still stronger than topic ≺ comment

Experimental Work Backward Binding German

Only experimental study by Temme & Verhoeven (2017) shows that *quantificational* backward binding more acceptable with EO than with action verbs.

Corpus study by Webelhuth (2022): quantificational binding in German possible *without* c-command.
'topicality motivates wide scope and scope rather than c-command licenses [...] bound pronouns' (Webelhuth 2022: 387).

Temme & Verhoeven (2016): experiencers more likely to be aboutness-topics than patients
⇒ Alternative explanation for their (2017) results

Theories of Binding

Data problematic for predicate-based theories of binding (i.a. Pollard & Sag 1992; Reinhart & Reuland 1993), on which co-argumenthood decisive for binding (assuming with Reuland & Reinhart (1995); Reuland (2011) that German *sich* may be a SELF-anaphor):

- Predicate relevant to determine co-argumenthood is N (or P) and there is no co-argument/subject
- The case for *both* ordering variants, yet there is a difference between them
- ⇒ Some structural condition must be at play

Data compatible with theories in which reflexive has to be c-commanded by antecedent

Against SO

What would data have to look like that speak against SO base order + reflexive binding reconstructs?

- Binding into object that c-commands subject predicted to be possible
- Hard to test because OS order usually dispreferred for other reasons
- Additional complication: With EO verbs object has to be animate (or similar). NP easily overshadowed by possessive construction then (especially when definite. Depends a bit on headnoun, *Tante* 'aunt', *Cousin* 'cousin' etc. seem quite OK with indefinite article. Positoning not directly at end of midfield seems to improve them a bit, too (possibly for prosodic reasons), hence the adverbial in (33))
- (33a) sounds quite odd, especially in comparison to (33b)
- May improve under fallrise-fall intonation / I-topicalisation, but this is always the case

Against SO

(32) a. ?? der Bruder von sich
the brother of REFL

b. sein/ihr Bruder
his/her brother

c. ? ein Bruder von sich
a brother of REFL

d. einer seiner Brüder
a.GEN his.GEN brothers

Against SO

(33) a. ?* Maria hat erzählt, dass einer Cousine von sich$_1$ ein Bräutigam$_1$ auf einem Foto
Maria has told that a.DAT female.cousin of REFL a.NOM groom on a photo
nicht gefallen hat.
not appealed.to has

b. rather OK Maria hat erzählt, dass ein Bräutigam$_1$ einer Cousine von sich$_1$ auf einem Foto nicht gefallen hat.

intended: 'Maria has told that a groom did not appeal to a cousin of his on a photo'

Issue certainly requires more thorough treatment before something decisive can be said.