Verb class effects on word order
Evidence from corpora

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Introduction

Object experiencer verbs with a [–agentive] stimulus behave like unaccusative verbs, i.e., they have a lower stimulus:

e.g. Belletti & Rizzi 1988, Landau 2010

(1)   [agent   [patient   V]]
          (NOM)   (–NOM)

(2)   [experiencer   [stimulus   V]]
          (–NOM)   (NOM)

Only **bracketing** (not **labeling**) is relevant for the predictions on linearization.

Syntactic phenomena supporting these assumptions:

properties of experiencer verbs in nominalization, reflexivization, passivization, extraction possibilities, binding

(see e.g. Bayer 2004, Fanselow 2000, Grewendorf 1989, Wunderlich 1997 on German)

Predictions for linearization

These assumptions about constituent structure motivate predictions for the linearization. Under neutral contextual conditions (i.e., if operations due to discourse features such as ‚topic' do not apply,) we expect:

(1) $\text{Nom} \prec -\text{Nom}$

      for transitive verbs (including experiencer-object verbs with *agentive* stimuli)

(2) $-\text{Nom} \prec \text{Nom}$

      for unaccusatives (including experiencer-object verbs with *non-agentive* stimuli)

These hypotheses are confirmed by intuitive judgments:

      - for dative experiencer verbs such as *gefallen*
      (see Lenerz 1977, Hoberg 1981, Primus 2004 on German)
      - with some controversies for accusative experiencer verbs such as *interessieren*
      (see in particular Fanselow 2000, 2003, Haider & Rosengreen 2003)

Empirical challenge

Can we use the methodological advances of current empirical reseach (corpus, experiment) in order to resolve controversies involved in singular observations/intuitive judgments?

The motivation is apparent:

> corpus/experimental approaches offer techniques
>
> to eliminate bias (of the observer) and to warrant replicability of the empirical findings.

This program is a challenge:

> corpus/experimental data involve *variation* coming from sources that are irrelevant for the question at issue (e.g., contextual variation, speaker variation, variation due to speech production factors such as avoiding ambiguity risks).

However, this program is promissing:

> It promises empirically precise statements, disentangling the role of several related factors (e.g., animacy or context) and observation of exact behaviour of single verbs/verb classes.

Experiencer-first

Experiencer-first effects are reported in several empirical studies
(sentence processing, speech production, acceptability judgements, corpus)

Scheepers 1997; Scheepers et al. 2000; Haupt et al. 2008, Ferreira 1994, Lamers & De Hoop 2014, Bader & Häussler 2010

Relevance of corpus frequencies

- Basic assumption

  deviations from the canonical order of the *arguments* must be motivated by discourse features; the canonical order is expected to be **contextually unrestricted**, i.e., to **appear in a larger array of contexts** than the triggered alternatives. This expectation applies to the order of the arguments and not to every deviation from the basic order (see, e.g., head-movement in V2)

- Limits of the inferences from frequencies to structure

  contexts triggering movement may be particularly frequent in discourse (e.g., subject topicalization, etc.).

Experiencer-first: questions

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Independency of experiencer-first

Are the experiencer-first effects in speech production independent from the intervention of other semantic and pragmatic factors?

We know the following dependencies:

experiencer ~ topic & topic ~ first

experiencer → animate & animate ~ topic & topic ~ first

A part of the experiencer-first effects in speech production can certainly be explained by the correlation with topics. Is there another part of experiencer-first that is not reducible to its preference for particular discourse properties?

Experiencer-first: questions

Previous empirical studies do not address the distinction between agentive and non-agentive EO verbs, which is however crucial for the syntactic analysis

Experiencer-first and agentivity

Do the experiencer-first effects in speech production relate to the totality of experiencer-object verbs or to the subset of non-agentive EO verbs?

Contents

Method: Corpus study (German)

Question A: Independency of experiencer-first effects

Question B: Experiencer-first effects and agentivity

Method

German: Corpus study

corpus   W-öffentlich of COSMAS database, Written Language, 2.291.520.000 word forms

extracted   10 verbs for every verb class (four verb classes)

1000 tokens per verb (randomized): total 40000 tokens (background: verb as random factor)

valid tokens   main clauses with two realized arguments (pronouns excluded due to particular rules in German)

total: 40 000; valid: 4319

decoding   order: SO vs. OS

voice: active vs. non-active

field: $XV_{fin}Y$ (prefield), $V_{fin}XY$ (middlefield)

animacy: animate vs. inanimate

definiteness: definite vs. indefinite

Verb classes

Dative Experiencer-Object verbs

imponieren 'impress', *gefallen* 'please', *widerstreben* 'be reluctant', etc.

Accusative Experiencer-Object ±agentive verbs

nerven 'bother', *überraschen* 'surprise', *ärgern* 'annoy', etc.

Accusative Experiencer-Object non-agentive verbs

interessieren 'concern', *wundern* 'astonish', *freuen* 'give pleasure' , etc.

Canonical transitive verbs

beeinträchtigen 'impair', *behindern* 'hinder', *schützen* 'protect', etc.

(particular subclass of canonical verbs with include animacy configurations similar to EO verbs; the question is whether EO effects are restricted to experiencers and not to achieve generalizations about the behaviour of all canonical transitive verbs)

Acceptability study

Agentivity test frame with control verbs:
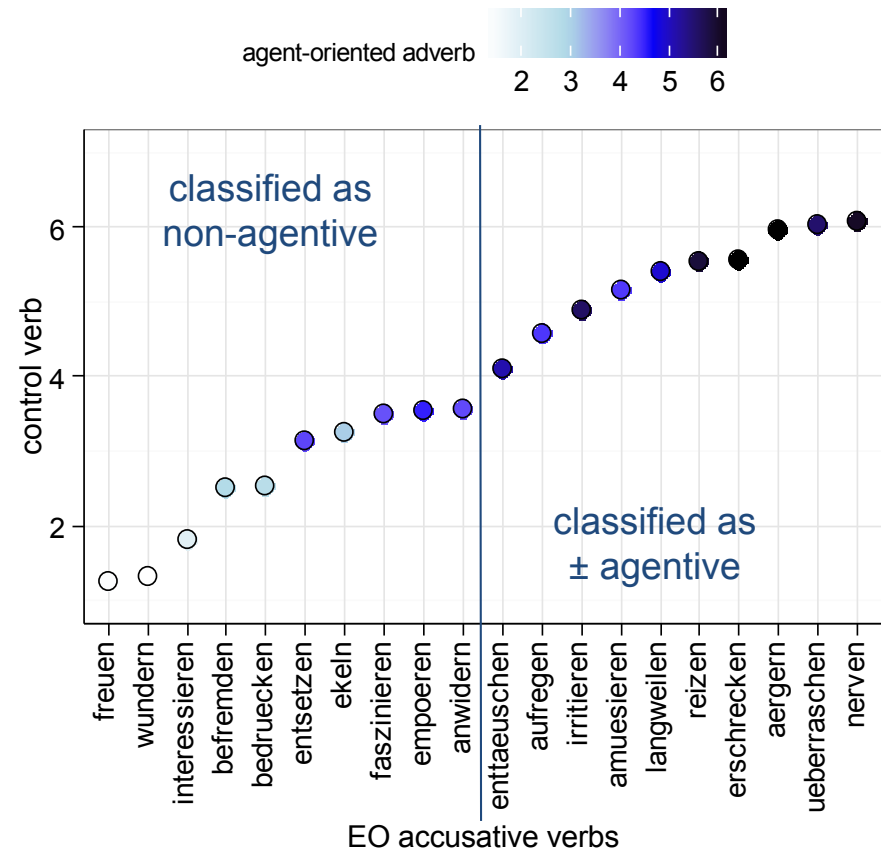
X entschied, Y zu V ‚X decided to V Y'

Agent-oriented adverb:

X V Y absichtlich ‚X V Y on purpose'

scalar acceptability judgments
(*1*: non-acceptable; *7*: acceptable)

n of speakers: 32

Acceptability study

Where does the gradience
in this data come from?

Agentivity is not scalar. A verb either
allows for an agentive reading or not.

The scalar judgments reflect the
possibility to imagine a context in which
the verb is used as agentive. If this is true,
the gradience should correlate
with the likelihood of such contexts
in speech production.

Can we predict the frequencies of OS
by means of the agentivity judgments?
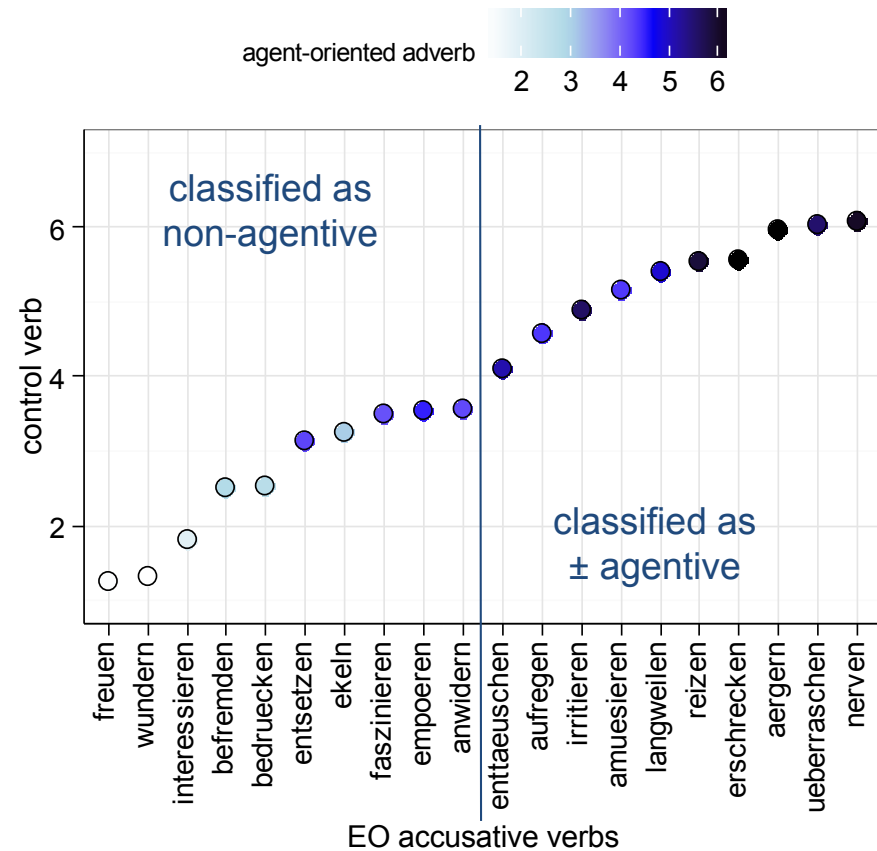
Independency of experiencer-first

Questions

A. Do **verb classes** have an **influence on word order?**

A1. (If yes) is this influence independent from other factors (animacy/definiteness)?

A2. (If yes) where is the locus of the influence?

    - thematic relation of the **undergoer**: patient vs. experiencer

    - thematic properties of the **actor**: agentive/non-agentive

    - **case**: dative vs. accusative

patient	experiencer		
accusative			dative
±agentive		non-agentive	
canonical	E.ACC ±ag	E.ACC –ag	E.DAT

V-classes:
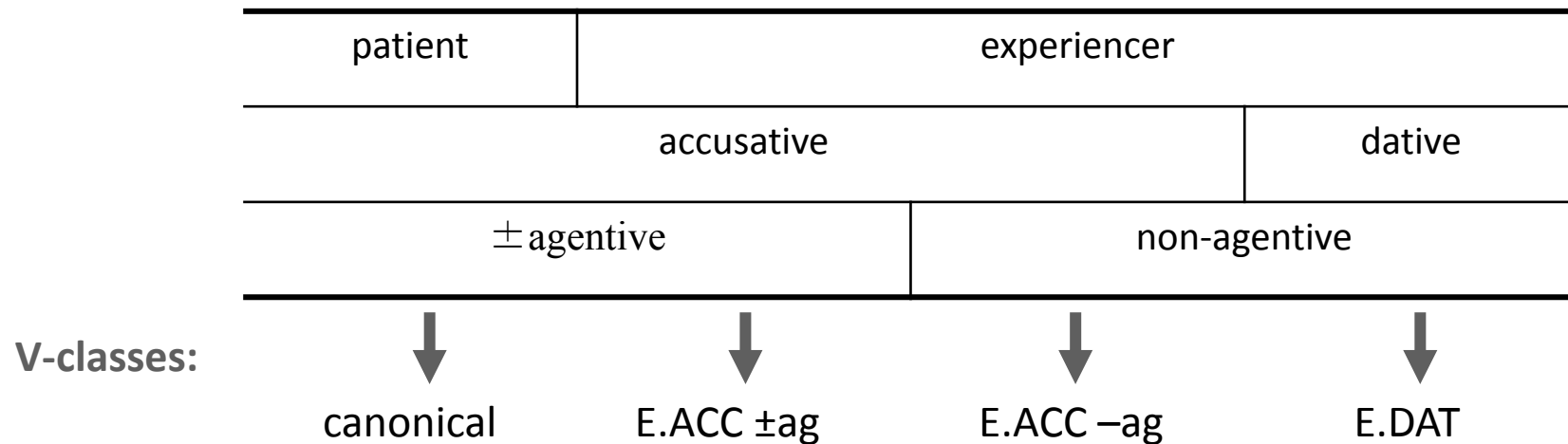
Examined factors

verb class   canonical

E.ACC ±agentive

E.ACC non-agentive

E.DAT

clausal domain   middlefield (basic configuration)

prefield (derived configuration)

animacy   disharmonic (animate O & inanimate S)

other permutations

definiteness   disharmonic (definite O & indefinite S)

other permutations

random factor   verb

Cases of interest

SX order, prefield

Der Versuch reizt den Trainer jedenfalls.

'The attempt appeals to the trainer anyway.' (NUN06/APR.02092)

SX order, middlefield

Und jedes Mal entsetzten die jugendlichen Täter die Richter mit ihrer Kaltschnäuzigkeit.

'And every time the adolescent delinquents appalled the judges with their coolness. (RHZ01/MAI.13687)

XS order, prefield

Den Regisseur interessiert von nun an eine Frage.

'From now on, the director is interested in one question.' (SOZ06/AUG.00423)
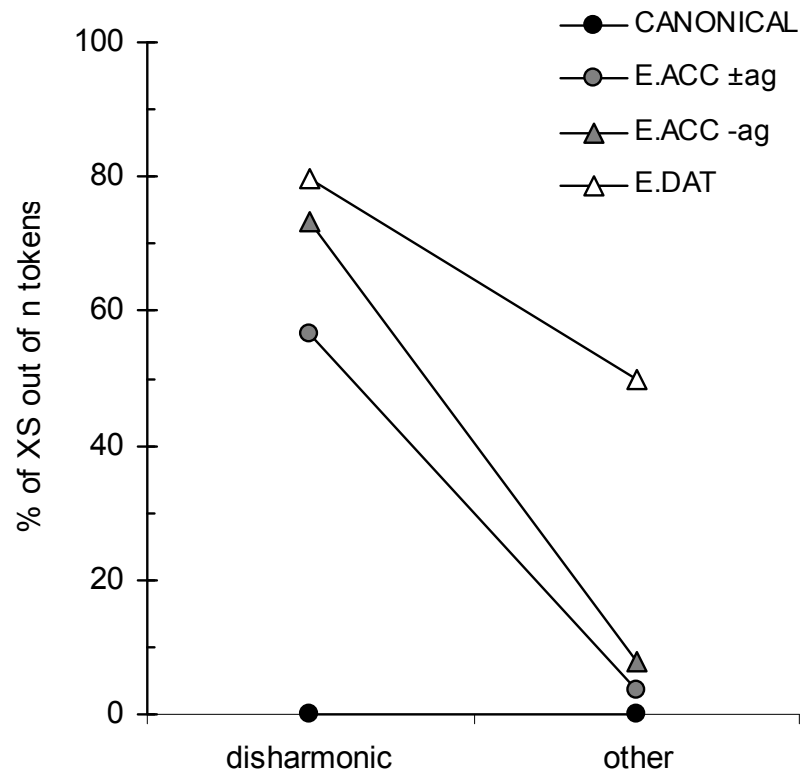
XS order, middlefield

Und ohnehin interessierten das erfreulich junge Publikum weniger die Ehrengäste...

'And anyway, the young public was less interested in the guests of honor...'
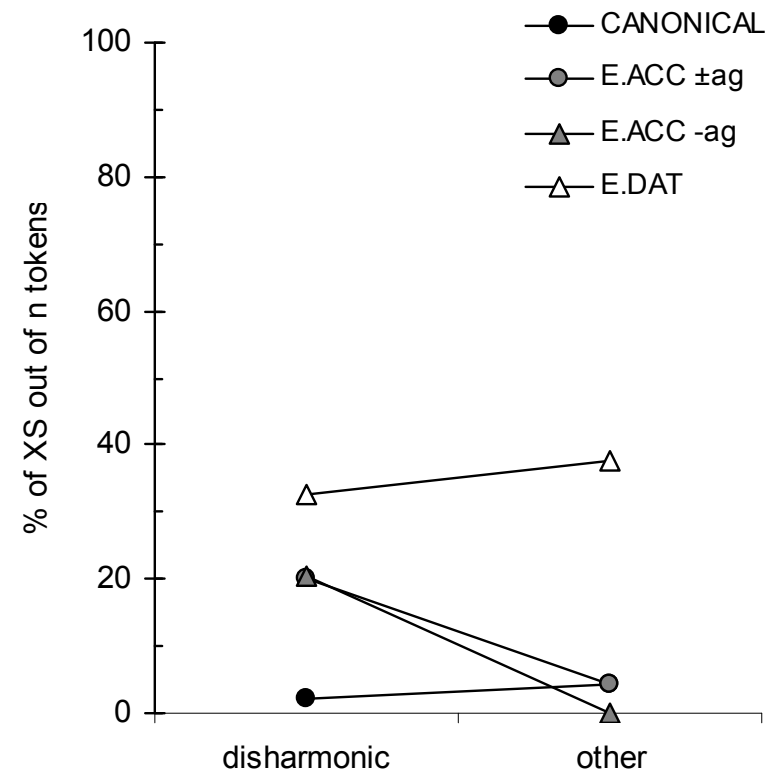
Animacy and clausal domain

middlefield

(total = 452 clauses)

prefield
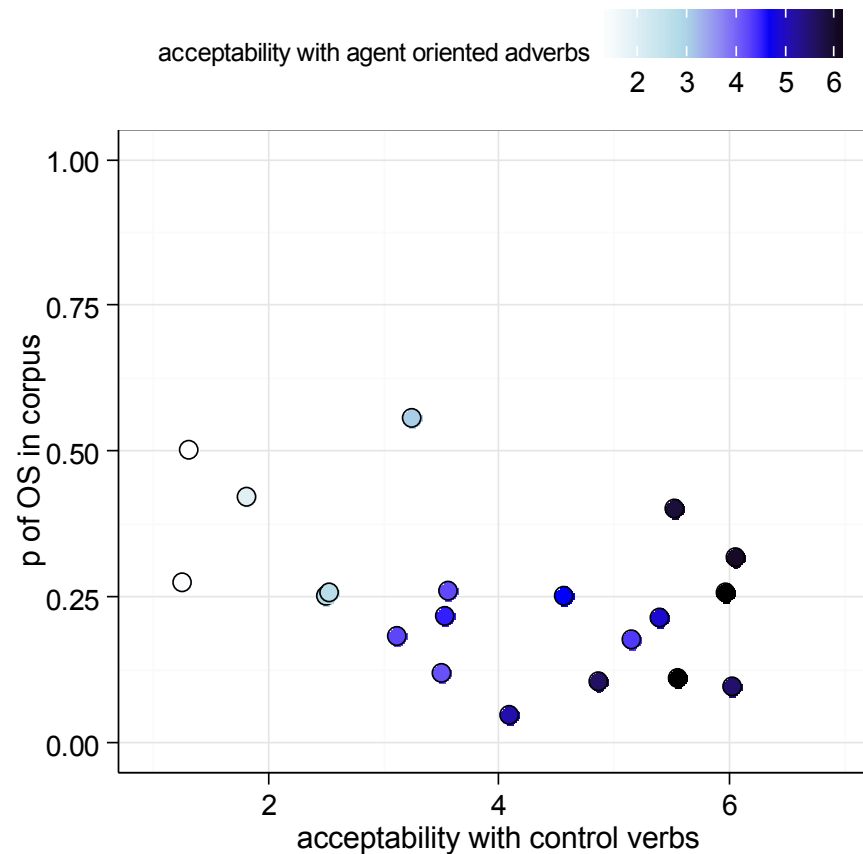
(total = 2424 clauses)

Agentivity and OS

Is agentivity a good predictor for the choice of OS in the middle field?

Statistic results

An effect of agentivity on word order is obtained in GLMM (−.4, i.e., increasing acceptability in the tests correlates with decreasing OS frequency). However, this effect does not reach the significance level.

Results I: verb-class contrasts

AIC	patient	experiencer		
		accusative		dative
		$\pm$ agentive	non-agentive	
2470.1	α	β		γ
2475.7	α	β	γ	δ

Comparison of all models (fourfold, threefold, twofold contrasts) reveals that the maximal goodness of fit is reached by "**Canonical vs. E.ACC vs. E.DAT**"
(Log-likelihood test comparing this model with the full model: not significant).

Calculations with the function *glmer* of the *R*-package *lme4* (Bates et al. 2011)

Results II: confirmed effects

definiteness

main effect and interaction effects not statistically confirmed (LLT : not significant).

verb class : animacy

log-likelihood test: $\chi^2(2) = 13.4$, $p < .01$

canonical verbs: no animacy effect
EO.ACC: experiencer fronting with disharmonic animacy
EO.DAT: experiencer fronting independent of animacy

source of the case effect: blocking effect with ACC&harmonic

verb class : field

log-likelihood test: $\chi^2(2) = 13.9$, $p < .001$

larger effects of class in the middlefield than in the prefield

relevance: assumptions about German syntax; previous findings (Bader & Häussler 2010)

animacy : field

log-likelihood test: $\chi^2(1) = 9.1$, $p < .01$

larger effect of disharmonic animacy in the middlefield.

Thematic role ambiguity

Is the difference between accusative and dative verbs due to the high potential of thematic role ambiguity of acc/nom?

- Relevant in this respect are the clauses without disharmonic animacy.
- Structural ambiguity is more frequent with accusative (25.2%) than with dative (2.9%) verbs
- All structurally ambiguous clauses are disambiguated in favour of a nom-first clause.
- However, the role of ambiguity does not explain the different frequencies of OS order: In the subset of nonambiguous clauses, the OS order is significantly more frequent with dative verbs (38.5%) than with accusative verbs (4.9%); χ^2=42.3, p<.001.

		SO		OS		total	
		n	%	n	%	n	%
EO.ACC	ambiguous	55	100.0	0	0.0	55	100
	non-ambiguous	155	95.1	8	4.9	163	100
EO.DAT	ambiguous	2	100.0	0	0.0	2	100
	non-ambiguous	40	61.5	25	38.5	65	100

Table 1. Ambiguity and word order (prefield & middlefield)

Conclusions

Agentivity (i.e. the distinction between ±agentive and non-agentive) does not have a significant impact on corpus frequencies:

The effect of agentivity does not relate to the lexical entry, but to the non-agentive reading!

disharmonic cases: non-agentive reading (for all EO verbs)

non-disharmonic cases: agentive and non-agentive readings are possible; an asymmetry in frequencies would be possible; however, almost exclusively NOM-ACC order (possibly for independent reason)

Experiencer-first and animacy

Experiencer-first and animacy

Independency of experiencer-first

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The analysis so far (*generalized mixed logit model*) confirmed the effect of ANIMACY and the effect of VERB CLASS. We also need to assess the effects of these factors *on each other,* in order to examine whether VERB CLASS has an effect that is independent from ANIMACY.

Dependencies between factors

Probabilistic dependency between VERB CLASS, ANIMACY, and WORD ORDER:

we fitted **Bayesian networks** in order to find the dependency model that displays the maximal goodness of fit.
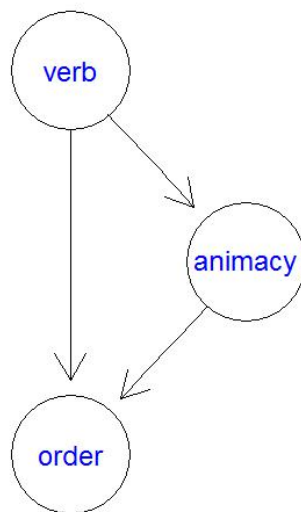
Method:

pairwise comparisons of each class of experiencer-object verbs with the baseline (canonical verbs): presentation of the middlefield data

(calculations made with the additive Bayesian network algorithm, Lewis 2013, R-package *abn*)
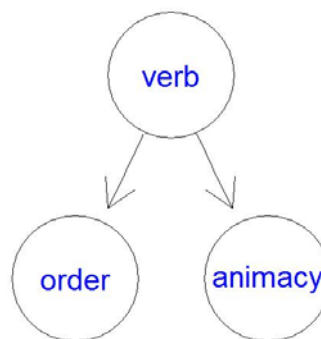
Possible models

Model 1	Model 2	Model 3
EO verbs and animacy influence word order independently of each other	Word order is only influenced by verb class.	The effect of EO verbs on word order is an epiphenomenon.

Log-marginal likelihood (higher values indicate better fit)

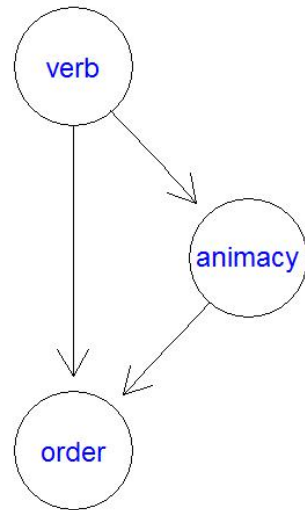|			
EO dat	−385.1	☞ −383.8	−415.9
EO acc (−ag)	☞ −240.5	−247.1	−251.6
EO acc (±ag)	☞ −336.3	−352.3	−343.9

EO acc, −ag

most probable

directed acyclic graph (DAG)

calculated with the additive Bayesian network
algorithm, Lewis (2013); *R: "abn"*

Model 1

log marginal likelihood
for model: −240,5

	verb	
	can	EO
	.72	.28

	dish. an.	
verb	T	F
can	.06	.94
EO	.78	.22

} V → A

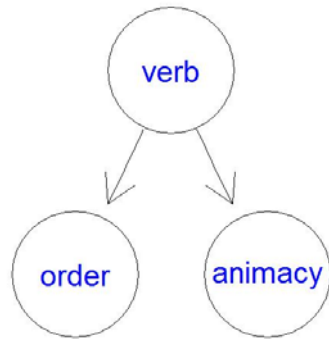|		OS	
verb	dish. an.	T	F
can	T	.00	1.0
EO	T	.73	.27
can	F	.00	1.0
EO	F	.08	.92

} V → O

} A → O

} V → O

EO dat

most probable

directed acyclic graph (DAG)

calculated with the additive Bayesian network
algorithm, Lewis (2013); *R: "abn"*

Model 2

	verb	
	can	EO
	.50	.50

	dish. an.	
verb	T	F
can	.06	.94
EO	.91	.09

$\}$ V → A

verb	dish. an.	OS	
		T	F
can	T	.00	1.0
EO	T	.80	.20

$\}$ V → O

verb	dish. an.	T	F
can	F	.00	1.0
EO	F	.50	.50

$\}$ V → O

log marginal likelihood
for model: –383,8

Conclusion

Independency of experiencer-first

Are the experiencer-first effects in speech production independent from the intervention of animacy?

- Yes, the experiencer-first effect in the middlefield is not reducible to animacy, i.e., it is not epiphenomenal.

- The fact that this also holds true for EO ±agentive verbs is in line with the view that these verbs most frequently occur as non-agentive in speech production.

- Difference between dative and accusative EO verbs:

  An effect of animacy is cumulated to the experiencer-first effect with accusative verbs.

  It is not necessary to assume an additional effect of animacy for dative EO verbs: precisely, such an effect is descriptively visible, but a model involving this effect does not have a better goodness-of-fit.

Conclusion

Implications for the syntax of EO verbs

Under the assumption that corpus frequencies are informative for the necessity of licensing noncanonical word order the results show:

- Dative psych verbs:

  Preferential experiencer < stimulus linearization with dative psych verbs (across animacy conditions) is compatible with assumptions about an unaccusative syntax of this verb group (see similar results in the acceptability study in Temme & Verhoeven 2014)

- Accusative psych verbs:

  No significant effect of agentivity

  Taking into account (a) that all verbs in the disharmonic data are non-agentive and (b) there are probably some independent reason banning ACC-NOM linearizations in the non-disharmonic data, the observed frequencies do not allow conclusions for the unaccusativity question.

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