

Not so peculiar after all: On the normal position of arguments of German experiencer-object verbs

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Abstract

The present paper provides evidence that apparently erratic linearisation patterns of experiencer-object verbs in German can be accounted for by integrating well-known linearisation constraints. We have carried out two Two-Alternative Forced-Choice experiments: One shows that experiencer-object verbs selecting a dative object prefer an object-before-subject linearisation with inanimate subjects while the ones selecting an accusative object lean towards subject before object. The other shows that with animate subjects, accusative-object experiencer-object verbs and accusative- and dative-object action verbs prefer subject before object, while there is no clear preference for dative-object experiencer-object verbs. An explorative investigation reveals verb-specific differences that call into question the case-based classes. We argue that linearisation preferences of experiencer-object verbs in German are best analysed assuming base generation coupled with violable linearisation constraints. The paper finishes with an analysis along these lines.

KEYWORDS: experiencer-object verb, psych verb, word order, experimental linguistics, forced-choice experiment, German

1 Introduction

In German clauses containing a subject and an object, both subject-object (SO) and object-subject (OS) serialisations are generally possible. However, the choice is not arbitrary: it is a standard assumption that there is a normal – or “unmarked” – order and that deviations from this order affect interpretation (see Höhle 2019). E.g., both

sentences in (1) are grammatical, but (1b) is restricted to contexts in which *Emma* bears focus.¹

(1)

- a. Der Peter hat gesagt, dass die Emma den Dieter vermöbelt
 the Peter has said that the.NOM Emma the.ACC Dieter beaten.up
 hat.
 has
 ‘Peter said that Emma beat up Dieter.’
- b. Der Peter hat gesagt, dass den Dieter die Emma vermöbelt
 the Peter has said that the.ACC Dieter the.NOM Emma beaten.up
 hat.
 has
 ‘Peter said that it was Emma who beat up Dieter.’

Unmarked order is often taken to be predicate-(class-)dependent (e.g., Haider & Rosengren 2003). For some classes (action verbs in particular), the unmarked order is rather non-controversial, but other classes give rise to dispute. The predicate class we will focus on in this article are experiencer-object (EO) verbs, the unmarked order of which has been discussed controversially in theoretical and experimental linguistics.

EO verbs are a subclass of so-called ‘psych verbs’, verbs that can be characterised by an entailment about the mental state of an experiencer,² namely those that realise their experiencer argument as an accusative (as in (2)) or dative (as in (3)) object. We will distinguish between “accusative EO verbs” and “dative EO verbs” accordingly. This distinction reflects an established classification of these verbs (cf. section 1.2). Dative EO verbs are considerably rarer than their accusative counterparts in German. The subject of EO verbs generally refers to the semantic stimulus of the psychological state, hence the less commonly used term “stimulus subject verbs”.

¹ German is an OV language bearing the verb-second (V2) property: In main clauses, the finite verb will follow the first constituent, while the underlying order is visible in embedded clauses. We will ignore this complicating factor in this article, using only examples where all constituents of interest occur in the so-called middle-field, i.e. the area between C and the verbal complex in embedded clauses or between the finite verb and the (remaining) verbal complex in main clauses. The area preceding the finite verb in V2 clauses is called prefield.

² This is to be taken as a working definition. Problems with it include the fact that many verbs usually classified as psych-verbs also have non-psych readings, and the fact that many verbs usually classified as non-psych may receive a psych-reading in appropriate contexts (see e.g. Bouchard, 1995). In our experiments, we only use verbs that occur only rarely or (preferably) not at all in non-psych readings.

- (2) NZZ_1994_05_06_a199_seg3_s14 in GerEO (Poppek & Masloch & Kiss 2022)
 Schon das hat ihn amüsiert.
 already this.NOM has him.ACC amused
 ‘Even that amused him.’
- (3) NZZ_1994_01_10_a105_seg6_s17 in GerEO (Poppek et al. 2022)
 Ihr behagen schwierige Strecken wie in Altenmarkt.
 her.DAT please difficult.NOM courses.NOM like in Altenmarkt
 ‘She is comfortable with difficult courses like the one in Altenmarkt.’

We argue that previous research on this topic has neglected the heterogeneity of the class. Our proposal approaches this heterogeneity already by considering the behaviour of individual verbs in corpus data, which influences the design of the experiments reported here.

We conducted two Two-Alternative-Forced-Choice experiments that target the linearisation preferences of German EO verbs, both with inanimate (Experiment A) and animate (Experiment B) subjects. Both experiments indicate that a small number of verbs deviates from the general behaviour of the case-based subclass they belong to. Among other aspects, Experiment B shows that certain EO verbs with a dative object do not prefer a linearisation at all if the subject equals the object in animacy. This is hard to reconcile with accounts of German constituent order that assume that the normal order is directly reflected in the configurational structure of a sentence.

Based on our experimental results, we will sketch an account that uses free base generation combined with violable linearisation constraints to explain the observed patterns. Our account explains the observed heterogeneity among the traditional case-based classes by making use of a classification based on the presence of a semantic causer proposed by (Pesetsky 1995).

1.1 Normal constituent order in the German middle field

Research on word order variability in German is abundant and cannot be reviewed with due appreciation here (see e.g. Abels 2015; Frey 2015 for an overview). Approaches differ mostly along two lines: The first question is whether there is a specific order in which arguments have to be combined with the verbal projections (e.g. Frey 1993; G. Müller 1999; Haider & Rosengren 2003 among many others) or whether a head introduce its arguments in any order (e.g. Fanselow 2001). The second question is whether marked orders involve movement or not.

Researchers who opt for the first options (e.g. Haider & Rosengren 2003) have proposed analyses that identify the unmarked order with the simplest configurational structure meeting the necessary requirements, modelling deviations from this order as scrambling through movement (re-merger to the left). We note that on such an account there will only be one base order. The base order for transitive verbs may differ from verb to verb, but either the object is bound to merge first or the subject; and if they are found in a different order, one element must have moved. If unmarked orders reflect the base order (in a setting where there are no relevant differences between subject and object), there should thus only be one unmarked order.

Müller (1999) provides an optimality-theoretic account, which also assumes a base order, but is markedly different from the aforementioned proposals. He assumes that the base order is always *subject* << *direct object* << *indirect object*, but that a “scrambling criterion” constraint outranks the faithfulness constraint. This scrambling criterion encompasses a subhierarchy of constraints, which encode some of the factors that can be argued to influence constituent order in German from a descriptive perspective, such as animacy, definiteness or case. A considerably long research tradition aims for identifying and modelling these factors. Usually, a set of weighted (e.g., Keller 2000) or ranked (e.g., Uszkoreit 1985; Hoberg 1997) constraints is postulated. In a recent contribution, Ellsiepen & Bader (2018) provide an overview of this literature and perform a series of experiments designed to establish a ranking / set of weights. They arrive at the following hierarchy:³

- (4) NOMINATIVE << ACCUSATIVE >
 ANIMATE << INANIMATE >
 DEFINITE << INDEFINITE >
 AGENT << NON-AGENT⁴ >
 NOMINATIVE << DATIVE >
 DATIVE << ACCUSATIVE >
 RECIPIENT/GOAL/BENEFECTIVE << THEME

They particularly assume the dominance of a constraint that places *nominative* << *accusative*. The decisive experiment taken to show that case is more important than thematic roles involves accusative EO verbs. In view of our experiments and some

³ In fact, they propose a constraint ranking as well as an ordering of constraint weight (p. 28). (4) follows the latter one, omitting the weights and replacing Ellsiepen & Bader’s (2018) constraint names by the notation we will use in section 4.3. > is used for the order of constraints here, << for linear precedence within a constraint.

⁴ As used in Ellsiepen & Bader’s (2018) experiments, agents can also be non-intentional, inanimate causers. We would refer to them as “causers” and distinguish them from agents.

considerations on the semantic nature of the subjects of these verbs, we will argue that postulating case-based constraints is not necessary to explain their behaviour.

1.2 Experiencer-object verbs

1.2.1 Syntax and semantics

Despite their semantic characterisation, psych-verbs have often been argued to show *syntactic* peculiarities (see Landau 2010 for a crosslinguistic overview of such peculiarities and an influential analysis), although this did not remain unchallenged (see e.g. Grafmiller 2013; Żychliński 2016). A subclassification taken for granted by much of the subsequent literature has been introduced by Belletti & Rizzi (1988), who distinguish three classes of psych-verbs in Italian based on how thematic roles are linked to grammatical functions: Verbs with a nominative experiencer and an accusative theme (experiencer-subject (ES) verbs), verbs with a nominative theme and an accusative experiencer (accusative EO verbs), and verbs with a nominative theme and a dative experiencer (dative EO verbs). It is widely held that ES verbs are semantically stative and syntactically transitive, and dative EO verbs stative and unaccusative (their object is taken to c-command their subject on some level of syntactic representation), while the syntactic and aspectual nature of accusative EO verbs is debated (Rozwadowska & Nowak & Bondaruk 2020; cf. Belletti & Rizzi 1988; Pesetsky 1995; Arad 1998; Reinhart 2003; Landau 2010). However, in line with recent corpus analyses (Poppek et al. 2021) and theoretical work (Hirsch 2018), the outcome of our experiments suggests that a purely case-based subclassification is inadequate.

1.2.2 Constituent order with experiencer-object verbs

There is a broad consensus that the normal argument order in German in active sentences whose main verb is an action verb is SO (*subject* << *object*). The situation is less clear for EO verbs, but generally normal orders are attributed to classes which are based on the case of the object, at least implicitly. Concerning dative experiencer-object verbs, there is little controversy. Many authors assume that clauses with dative experiencer-object have OS (*object* << *subject*) normal order in German (see Lenerz 1977; Fanselow 1992; Wegener 1999; Haider & Rosengren 2003; Hirsch 2018 among others).

For accusative EO verbs, however, linearisation properties are heavily debated. Lenerz (1977), Haider & Rosengren (2003), and Primus (2004) exclude agentive readings of

some accusative EO verbs from consideration (as these are analysed to follow the same linearisation as prototypical action verbs etc., thus SO) and do not propose differences between accusative and dative EO verbs on the non-agentive reading. From Fanselow's (1992) analysis it follows that accusative EO verbs should have an SO normal order (given standard assumptions), while Fanselow (2003: 204 seq.) proposes that *both* orders are normal for accusative EO verbs (although he argues for OS with *interessieren* 'to interest' (p. 203)). Hirsch (2018) adopts this view for a subclass of accusative EO verbs, namely those he considers stative, and assumes an SO normal order for the others. Primus (2004) assumes a free order for non-causal EO verbs (both accusative and dative).

Previous experimental studies point towards OS for dative verbs and SO for accusative verbs. Most studies agree that accusative EO verbs tend towards SO (although to a lesser extent than action or ES verbs) (Scheepers & Hemforth & Konieczny 2000; Temme & Verhoeven 2016; Verhoeven & Temme 2017; Ellsiepen & Bader 2018) and dative EO verbs towards OS (Temme & Verhoeven 2016). However, Fanselow & Häussler & Weskott (2016) find that OS is preferred with dative EO verbs whose perfect tense auxiliary is *sein* 'to be', but both orders are acceptable with those whose perfect tense auxiliary is *haben* 'to have'. The animacy of the subject is regarded as a decisive factor with animate subjects pushing towards SO (Scheepers et al. 2000). In Verhoeven's (2015) corpus study the OS rate was above 50 % for all active sentences with subject and object in the middle field for all kinds of EO verbs (around 80 % for dative EO) if the subject was inanimate, but it dropped to less than 10 % if the subject was animate with accusative EO verbs (dative around 50 %). This also holds for accusative EO verbs that do not have an agentive reading, which she lists separately. However, the number of sentences in these categories is rather small. In a corpus study presented by Ellsiepen and Bader (2018: 30), accusative EO verbs occur primarily with an SO order.

We notice three remarkable aspects in all previous experimental studies: First, there is no empirical study in which accusative and dative EO verbs are compared directly in the same experiment. Given that experimental data are not independent from one another both in terms of the participants and the items presented in a study, this appears to be a major methodological drawback. Secondly, the case-based classification is taken for granted, although recent studies (Hirsch 2018, Poppek et al. 2021) point to the heterogeneity of verbs assumed to be in the same class. We are aware that if hypotheses are formulated with the classes in mind, the classes must be

represented in the statistical analysis of the data. However, we suggest that the awareness of potential differences between class members should lead to a choice of verbs that facilitates subsequent explorative analyses searching for reflexes of these differences. Thirdly, it is a surprising fact that participants in previous experimental studies were presented verb-second clauses, where one argument was placed in the prefield (exceptions being Scheepers et al. 2000 and Ellsiepen & Bader 2018). It should be clear that by placing a constituent in this position, possible confounding effects may be introduced, e.g. because placement in the prefield may be used to signal contrastive focus (Frey 2006). All three aspects have been addressed in the experimental studies reported in section 2.

2 Experimental studies

Linguistic Two-Alternative Forced-Choice experiments (FC) consist in presenting a minimal pair of examples, which only differs in the feature that should be predicted. We conducted two Two-Alternative Forced-Choice experiments in which participants chose between an SO and an OS variant of a sentence in a context that should favour the normal order. Hence, the minimal pairs only differ in order while all other factors are kept constant.

In Experiment A, we compared 8 accusative and 8 dative EO verbs with inanimate subjects. While certain problems can be avoided by using inanimate subjects, such as interfering agentive readings for many accusative EO verbs, or a lack of suitable dative EO verbs that take animate subjects, it also introduces an animacy mismatch regarding the experiencer object that may influence order according to some theoretical accounts. Taking the mismatch into account, we conducted Experiment B where subjects were animate. In this experiment, we further compared the behaviour of EO verbs and action verbs directly.

2.1 Test environment

The target sentences were constructed as verb-final sentences embedded in matrix clauses to avoid prefield effects. We follow Höhle (2019) in considering that linearisation unmarked which is the least contextually restricted. As Höhle shows, a sentence that allows a focus projection from one constituent to maximal focus has normal order. To ensure a maximal focus interpretation, each pair of sentences was displayed with a question that it is supposed to answer, as illustrated in example (5). Participants were asked to choose the answer that they perceived as “more natural”

(instead of “more grammatical/acceptable” to avoid an influence of prescriptive grammar).

- (5) Was hat Leon gesagt?
 What has Leon said
 ‘What did Leon say?’

a. SO order:

Leon hat gesagt, dass ein Artikel einen Leser geärgert hat.
 Leon has said that a.NOM article.NOM a.ACC reader.ACC annoyed has
 ‘Leon said that an article annoyed a reader.’

b. OS order:

Leon hat gesagt, dass einen Leser ein Artikel geärgert hat.
 Leon has said that a.ACC reader.ACC a.NOM article.NOM annoyed has
 ‘Leon said that an article annoyed a reader.’

Each participant saw and judged all items in a pseudo-randomised order subject to some constraints, e.g. no subsequent test items without at least one filler item in between. The horizontal alignment of choices (SO or OS right or left) was also pseudo-randomised, both variants of the sentence were presented simultaneously. A screenshot of an item from Experiment B can be found in the supplementary data.

Since factors like animacy, constituent weight and definiteness are known to influence linear order in German, they had to be controlled for. We only used indefinite subjects and objects, singular NPs containing only the noun and the indefinite article and aimed for differences in length of maximally one syllable (for the whole NP).

In Experiment A, subjects are inanimate, and objects animate, while in Experiment B both are animate. Experiencer objects, of course, must be animate – at least in a wider sense.⁵ All object NPs (in Experiment B also the subjects) in the test items were masculine because feminine and neuter NPs would have led to ambiguities or at least processing difficulties due to case syncretism in German.⁶

⁵ Of course, the objects may also refer to institutions etc. or be metaphorical or metonymical, and there are some other phenomena with superficially inanimate objects with experiencer-object verbs, which are not well understood yet (cf. Masloch et al., 2021). In the experiments, we avoided these cases and limited the choice of experiencers to non-controversially animate arguments.

⁶ This problem does not occur with dative objects, but we refrained from introducing a factor that varies between verb classes systematically.

Test items were constructed based on corpus examples following the procedure of *Modified Stimulus Composition* (Börner & Pieper & Kiss 2019), both from the GerEO database (Masloch et al. 2021; Poppek et al. 2022) for sentences containing an EO verb and the DWDS corpora (Berlin-Brandenburgische Akademie der Wissenschaften n.d.) for some of the filler items and the sentences containing an action verb in Experiment B.

We laid special focus on the selection of the verbs used in the experiments for two reasons: First, to avoid interference effects, as many verbs have frequent non-psych readings and are regularly used in syntactic constructions different from the one used in the experimental setting. Further the verbs may impose undesired semantic restrictions on their arguments. Secondly, corpus findings show that accusative EO verbs in particular differ with respect to the syntactic patterns they partake in (Poppek et al. 2021). Recently, it has been proposed that EO verbs belong to several different verb classes (Hirsch 2018). The inclusion of verbs from various potential subclasses reflects the presumed heterogeneity in the experimental design. In addition, the selection avoided the inadvertent consideration of verbs from a single subclass. The experimental design is taken up in the statistical modelling, where we included random factors, which allow the manifestation of latent differences between items.⁷ We selected the EO verbs for both experiments based on their behaviour in annotated corpus data. For this, we used GerEO, which contains syntactic and semantic annotations for ca. 10,000 examples (up to 200 per verb) for 64 German verbs which show a realisation as an experiencer-object verb – 16 selecting the dative, 48 the accusative – (Masloch et al. 2021, Poppek et al. 2022).

Verbs that possess a regularly occurring reading in which the verb does not refer to a mental state in the database were avoided.⁸ In both experiments, the verbs occur together with an experiencer object and a stimulus subject, but some verbs are typically used in other syntactic patterns, e.g., a reflexive one, where the experiencer is the subject and the stimulus is expressed in a PP (if it is expressed at all (see Hirsch 2018; Rott & Verhoeven & Fritz-Huechante 2020; Wiskandt 2021 among others on this pattern)), or without a stimulus argument. We computed the share of occurrences in

⁷ This is slightly oversimplified: The models will assume that the individual effects of the items are normally distributed, which would not be the case if there really were distinct subclasses. However, even if this were the case, the models would still be useful because in praxis they are quite robust against violations of the normality assumption (Schielzeth et al., 2020) and the large estimate for the standard deviation of the individual effects of the items would make us aware of the problem.

⁸ Annotated samples for each verb in GerEO were randomly extracted from the corpus resource to ensure a representative overview of their distributional properties (Poppek et al., 2022; Masloch et al., 2021).

the regular transitive pattern and an object-drop pattern (where the experiencer is not expressed overtly and receives an arbitrary interpretation) and used only verbs that regularly displayed these patterns.

Other exclusion criteria included frequent usage within a collocation or idiomatic expression, the overall frequency of the verb (operationalised via DWDS frequency classes (Berlin-Brandenburgischen Akademie der Wissenschaften n.d.)), and other aspects that could constitute confounding factors in an experimental setting, see the documents describing the selection process in the article's data directory.

Regarding the stimulus argument, both experiments required different criteria: Since the agentive readings many accusative EO verbs possess in combination with animate subjects are taken to have SO normal order (even by authors who argue for OS with accusative EO verbs otherwise), we included only verbs in Experiment B that had a decent share of animate subjects in GerEO and scored low on the agentivity test rating studies by Verhoeven (2014) and Hirsch (2018). Because stimuli are inanimate in Experiment A, agentivity is not an issue there.

All other criteria being fulfilled, we aimed for the inclusion of verbs with varying morphological structures as well as verbs that belong to different classes according to Hirsch (2018) or that displayed different distributional properties in corpus data (Poppek et al. 2021). This mainly applied to the accusative EO verbs since the number of suitable dative EO verbs in German is rather limited.

2.2 Procedure

Participants were recruited via the online survey tool Prolific (www.prolific.co). We conducted a Monte Carlo Power simulation for each experiment that estimated power at > 90 % for relevant effects at the expected parameter values given the intended statistical models and for 25 participants and an alpha of 0.05. Since some of the parameters of the models are hard to estimate (e.g., by-participants random effect correlations), we opted for a larger number of participants leading to a rather generous Power estimate.

Since judgment studies rely heavily on participants paying attention, the identification of non-cooperative or distracted participants is crucial. To check each dataset for eligibility, we followed the procedure proposed by Pieper et. al. (2023) and implemented attention and control items, which contain non-controversial grammatical violations cooperative and attentive participants should be able to identify. With the former items, the grammar violation is less notable in the last third

of the sentence. To identify distracted participants and participants who provided their answers implausibly fast, we used the response times for a latency-based ReMFOD analysis (cf. Pieper et al. 2023). This method aims for the identification of outlier reaction times for items, indicating very short (might be related to “guessing”) as well as very long (might point towards distraction or theory development) reaction times given the respective overall mean reaction times.

We also asked participants to guess the topic of the study and excluded participants who guessed correctly or displayed substantial linguistic background knowledge. Most participants did not even remotely guess the relevant aspects, suggesting that the actual topic of the study was masked to a sufficient extent by the filler items.

2.3 Experiment A: inanimate stimuli

The first experiment was designed to determine the normal constituent order with accusative and dative EO verbs, an inanimate stimulus and an animate experiencer argument, using a total of 16 EO verbs.

2.3.1 Design

Experiment A was conducted as an FC study with a simple design:

(6) FC(ORDER) ~ CASE

The dependent variable ORDER has the levels SO and OS. CASE represents the EO verb’s object’s case, accusative or dative, and is manipulated within participants (who judge both kinds of sentences) and between items (the sentences may either contain an accusative or a dative EO verb. There is no synchronic object case alternation with EO verbs in German). The random factors included are participants and items. Using 8 lexicalisations per condition results in 16 test items. These were accompanied by 66 filler items, among them 10 attention items (5 related), 16 control items (8 related) and 6 calibration items (3 related; used in the beginning to allow participants to familiarise themselves with the setting). Each participant saw the same items, but in a pseudo-randomised order.

All filler items resembled the test items in consisting of a question and two sentences of the form “*Person* has *Verb*-ed that [perfect tense verb-last clause]”. Filler items contained a fully acceptable sentence and a sentence of reduced acceptability, the degree of acceptability of the less acceptable sentence varying between items.

A list of the verbs chosen for this experiment based on the criteria specified in section 2.1 can be found in the supplementary data.

2.3.2 Hypotheses

If accusative EO verbs possess SO, and dative EO verbs OS normal order, we should expect participants to prefer the SO variant with the former and the OS variant with the latter. It must be considered, however, that the stimuli contain an animacy mismatch in this experiment. Temme & Verhoeven's (2016: 789) studies indicate that accusative EO verbs do not lean as much towards SO as action or ES verbs, while dative EO verbs do not lean as much towards OS as prototypical unaccusatives. On the basis of the data they report, we expect a preference for SO for accusative EO verbs, but only a mild one, which may not even be significant. As for dative EO verbs, we expect a stronger preference for OS. Together, this should lead to a medium-sized effect of CASE.

2.3.3 Results

40 native speakers of German participated in the experiment, from which 11 surveys were excluded following the exclusion criteria provided above. The remaining 29 participants judged 16 test items, resulting in a total of 464 observations. Figure 1 shows the empirical distribution of choices for both conditions. We see that OS is preferred with dative EO verbs (177 OS, 55 SO), and SO is preferred with accusative EO verbs (165 SO, 67 OS).

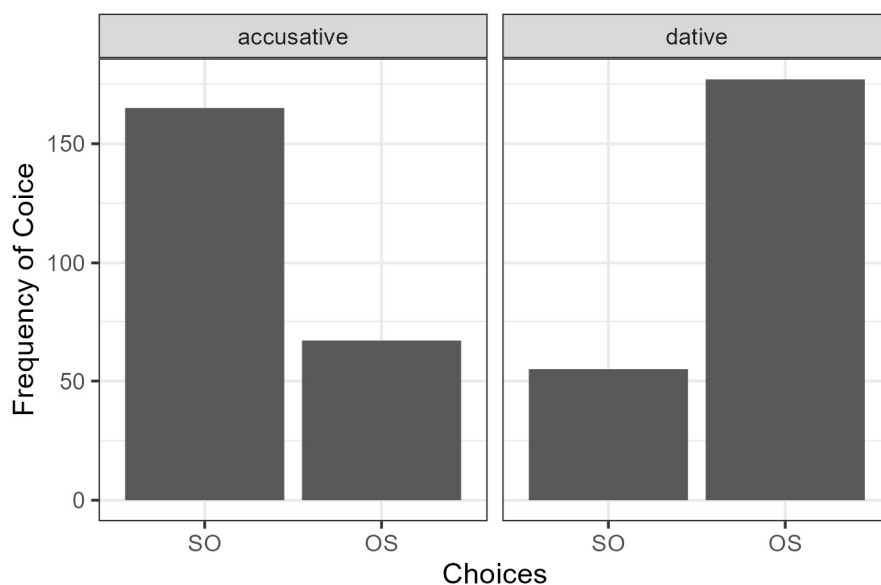


Figure 1: Empirical distribution of choices in Experiment A

We analyse this data using a binomial (logit) generalised linear mixed model (GLMM) using the R environment (R Core Team 2020) and the package *lme4* (Bates et al. 2015). All variables are dummy-coded, the reference levels being SO and dative. The model includes a fixed effect of CASE as well as random intercepts for participants and items and a random slope for CASE for participants (a random slope for CASE for items would not be meaningful since case is manipulated between items).

We observe significant effects both for the intercept ($\beta = 1.34$, $p < 0.001$) as well as for CASE ($\beta = -2.41$, $p < 0.001$). The positive effect of the intercept indicates that for dative EO verbs, the preferred order is OS ($\text{logit}^{-1}(1.34) = 79.25\%$ probability of OS), the negative effect of CASE means that the dative and accusative EO verbs differ in that the latter have a stronger tendency towards SO ($\text{logit}^{-1}(1.34 + -2.41) = 25.54\%$ probability of OS). Both effects exceed the initial expectations. Figure 2 depicts the estimates for the fixed effects and their 95 % confidence intervals.

Regarding the random effects, we find relatively high standard deviations for the items' ($SD = 0.52$) and the participants' ($SD = 0.69$) random intercepts as well as for the participants' random slope for case ($SD = 0.9$). The negative correlation of -0.56 for the participants' random effects indicates that higher intercepts come with lower slopes, i.e., the stronger a participants' comparative tendency towards OS with dative EO verbs, the stronger their comparative tendency towards SO with accusative EO verbs. Since we used contrast coding in the model, we also build a model with accusative as the reference level. While all other parameters of this model are similar to the model with dative as the reference level, it displays a significant negative intercept ($\beta = -1.07$,

$p < 0.001$), indicating that the accusative EO verbs' tendency towards SO is also significant.

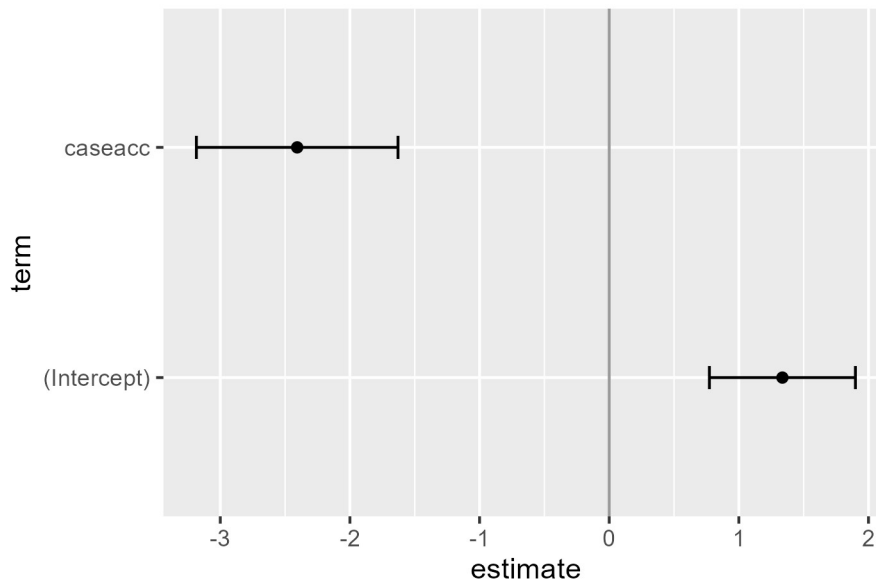


Figure 2: Estimates for the fixed effects and their 95% confidence intervals Experiment A

2.3.4 Discussion

We take these results to mean that accusative and dative EO verbs differ in their linearisation preferences and that the normal order (with inanimate subjects and all other factors equalled out) is OS with dative EO verbs and SO with accusative EO verbs. Since the items had to contain an unresolvable animacy mismatch due to the semantic restriction of the experiencer object being animate, the observed SO tendency for accusative EO verbs is worth noting. However, we observed relatively high standard deviations for the random effects. A short explorative investigation of the items' random effects in Figure 3 illustrates the frequencies of SO choices for the individual items grouped by CASE, purple for items containing an accusative EO verb (t01–t08) and yellow for dative EO verbs (t09–t16). While 29 judgments per verb are a small sample and individual properties of the items besides the verb might have added to the results, we note that some verbs appear not to comply with the general pattern of their classes.

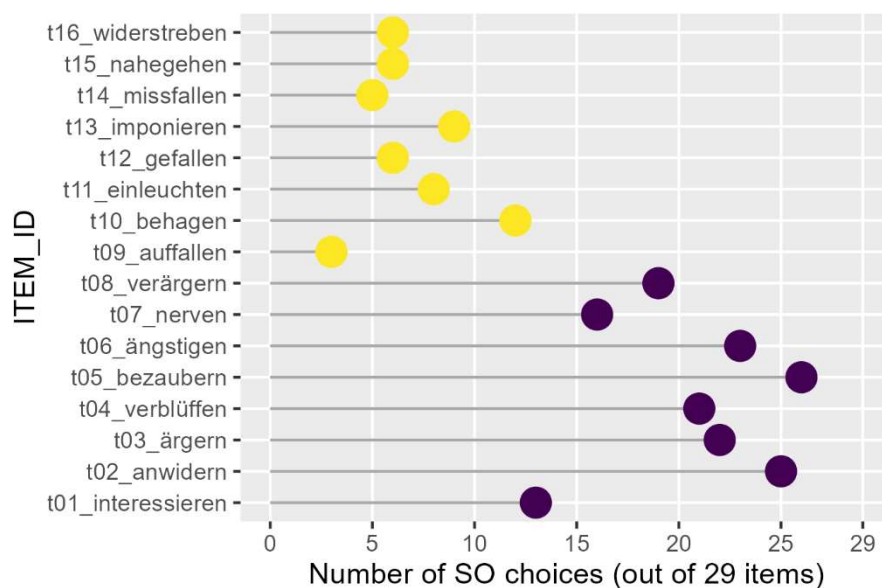


Figure 3: Number of SO choices for individual items in Experiment A

While most verbs display a rather clear preference in this setting, *interessieren* ‘to interest’ shows a very mild tendency towards OS, which fits previous accounts that argue for OS normal order for this verb (e.g., Haider & Rosengren 2003). Yet, its behaviour is generally unexpected for an accusative EO verb (the same holds for *nerven* ‘to annoy’). Among the dative EO verbs, *behagen* ‘to please’ stands out, which closely resembles *interessieren* in its judgement distribution. However, the tendencies of both verbs towards any order are so weak that they might point either towards no actual preferences on the participants’ side or to idiolectal variation.

2.4 Experiment B: animate stimuli

Experiment B was conducted to shed light on animacy effects in Experiment A. Since animacy differences were inherent to the design of Experiment A, Experiment B was designed to contain only animate subjects and objects. This has the disadvantage that some verbs may display an agentive reading with animate subjects – which is standardly assumed to behave like an action verb –, but it has the advantages that it eliminates the animacy mismatch from Experiment A and allows to directly compare EO verbs to action verbs as a contrasting verbal class with generally non-controversial linearisation behaviour.

2.4.1 Design

This experiment was again designed as an FC, this time using a 2×2 design:

(7) FC(ORDER) ~ AGENTIVITY × CASE

The dependent variable ORDER has the levels SO and OS. The fixed factors are:

- AGENTIVITY: action verb or EO verb
 - within participants (participants see sentences containing both kinds of verbs)
 - between items (sentences contain either an action or an EO verb)
- CASE: case of the object: accusative or dative
 - within participants (participants see sentences containing both kinds of objects)
 - between items (sentences contain either an accusative or a dative object.)

Items and participants are random factors.

The experiment contained a total of 32 test items in 8 lexicalisations per condition. Unlike Experiment A, the number of EO verbs suitable for an experiment with two animate NPs is severely restricted by selectional preferences of the verbs, which significantly influenced the candidate verb selection process.

From the 16 dative EO verbs GerEO provides data for, only four remained after excluding all verbs that have frequent non-psych readings and are not (or only hardly) compatible with animate stimuli in the relevant reading. Markedness in combination with an animate stimulus was not an issue with the accusative EO verbs. However, many accusative EO verbs may receive an agentive reading with animate subjects. Since these readings are usually taken to lack any special psych-properties (and assumed to have SO normal order even in theoretical analyses that normally assume OS for accusative EO verbs), we used only accusative EO verbs that received low scores for agentivity tests in the rating studies by Verhoeven (2014) and Hirsch (2018), which also notably limited the choice of verbs.

In conclusion, we decided to include only four accusative and four dative EO verbs, but to use two items per verb for each condition instead (the rest of the lexical material in the sentences still differs). This also allowed us a subsequent explorative analysis of differences between items.

In addition to the test items, participants judged 64 filler items (containing the same number of attention, control, and calibration items as in Experiment A). To mask the doubling of verbs in the test items, we also doubled all verbs in the filler items. Each participant saw all items in pseudo-randomised order.

2.4.2 Hypotheses

If action verbs and accusative EO verbs indeed have SO normal order, participants should choose the SO alternative in a considerable majority of cases. If dative EO verbs have OS normal order, participants should choose the OS alternative in a considerable majority of cases.

We use a binomial generalised linear mixed model to analyse the data (Bates et al. 2015). Taking SO, dative and EO as the reference levels and dummy-coding all factor variables, the following effects are predicted considering our hypotheses:

- a strong positive effect of case
- a strong positive effect of agentivity
- a medium or strong negative interaction of the two
- a small to medium negative effect of the intercept

2.4.3 Results

33 native speakers of German participated in the experiment. However, datasets from 8 participants had to be excluded following the criteria specified in section 2.2, so that data from 25 participants remained. Each participant provided a judgement for 32 test items, resulting in 800 data points. Figure 4 depicts the empirical distribution of choices for the four conditions.

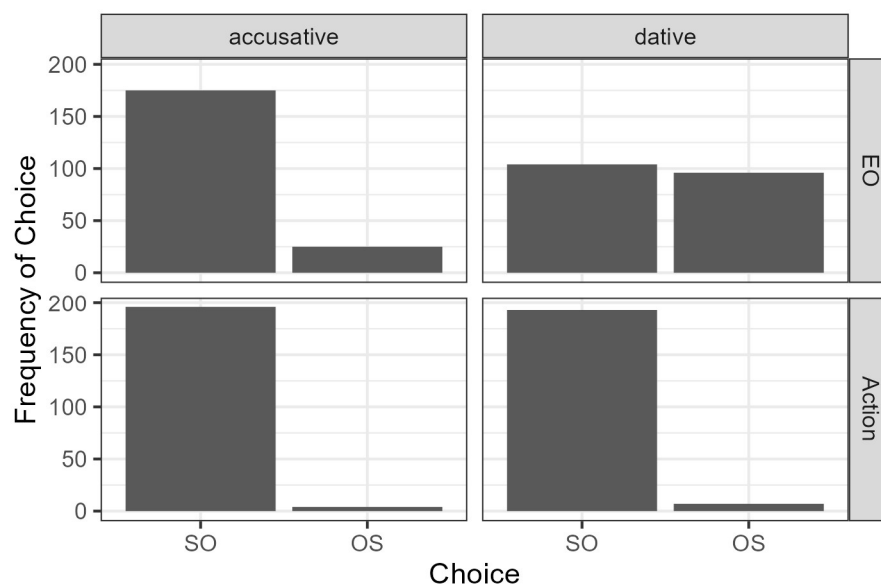


Figure 4: Empirical distribution of choices in Experiment B

We fitted a binomial (logit) generalised linear mixed model to the data, including CASE, AGENTIVITY and their interaction as fixed effects, random intercepts for items and participants and random slopes for CASE, AGENTIVITY and their interaction for participants. All factor variables were dummy-coded with SO, dative, and EO as reference levels.

The observed effects generally match the expected ones: There is a significant strong positive effect of CASE ($\beta = 2.28$, $p < 0.001$) and a significant strong positive effect of AGENTIVITY ($\beta = 4.61$, $p < 0.001$), which – given our setting – illustrates that dative EO verbs differ strongly both from accusative EO verbs as well as from dative action verbs. The interaction effect is also strong, but negative (as expected) and not significant ($\beta = -2.58$, $p = 0.1$).

At first, it may appear counterintuitive that the interaction effect is negative, but it is caused by the fact that the other effects are already high and the overall resulting probability has to be smaller than 1. Surprisingly, the intercept is smaller than expected and not significant ($\beta = 0.12$, $p = 0.74$). One could take this to indicate that there is no preferred order with dative EO verbs, but we will discuss differences between the verbs in the section below. Figure 5 shows the estimates for the fixed effects together with their 95 % confidence intervals. To see whether the difference between accusative EO and action verbs is also significant, we fitted an additional model that differed from the original one only in having accusative as the reference level of CASE. Indeed, the effect of AGENTIVITY is significant then ($\beta = -2.03$, $p < 0.05$). The intercept of this model

is also rather large, negative and significant ($\beta = -2.4$, $p < 0.001$), which means that accusative EO verbs tend towards SO. We will switch back to the first model in the following.

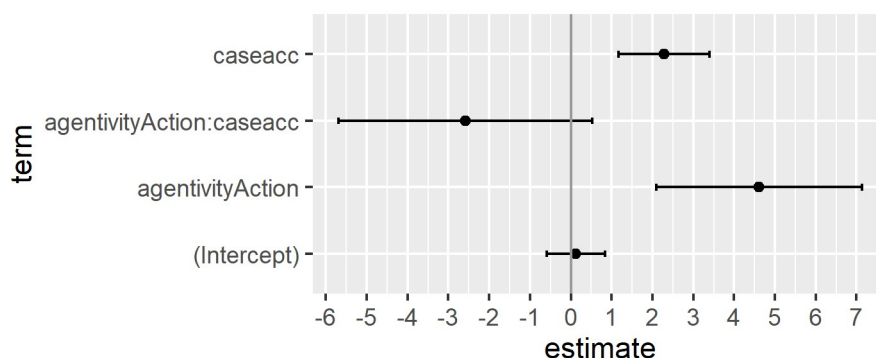


Figure 5: Estimates for the fixed effects and their 95% confidence intervals Experiment B

Concerning the random effects, participants do not differ that much in their judgements ($SD = 0.46$). Also, there is not much difference in how participants change their behaviour from dative to accusative EO verbs ($SD = 0.28$). However, the variance of the items' random intercepts is more notable ($SD = 0.89$): Items differ in which variant is preferred even if all other factors are considered (recall that the standard difference of ca. 0.9 is on the same scale as the fixed effects). We will explore these differences below and see that they are likely linked to the verbs. The variances of the participants' random slopes for agentivity ($SD = 1.75$) and the interaction ($SD = 1.65$) are huge, and they display a considerable negative correlation (-0.78), mainly caused by five participants with high values for the interaction and huge negative slopes for agentivity who also chose OS for some dative action verbs.

2.4.4 Discussion

As the effects of case and agentivity illustrate, accusative EO verbs and dative action verbs differ significantly from dative EO verbs in unmarked word order. This cannot be attributed to agentive readings of the accusative EO verbs since the experiment contained only EO verbs that scored low on agentivity tests with animate subjects. Given the observed proportion of choices, we can assume an SO normal order for action verbs, which strongly indicates OS preference is not an effect of dative case *per se*. The same holds true for the accusative EO verbs, although their tendency towards SO is less strong (but see below).

The choices for dative EO verbs, however, are unexpected. The model even predicts a slight preference for SO (53 %) for them. This is surprising since dative EO verbs are

almost universally taken to have OS normal order (see section 1.2.2). Another interesting aspect is the high variation of the item random intercepts. Items must differ within the conditions; due to low variation within the action verbs (for which virtually always SO is chosen), the observed high variance must be rooted in the judgments for the EO verbs.

An explorative view on the individual verbs sheds further light on the matter. Figure 6 shows the number of SO choices per item for the EO verbs with the dative EO verbs on top (item IDs t17–t24) and the accusative EO verbs below (t01–t08). Clearly, the verb appears to be the decisive factor since differences between the individual items for each verb are small. We observe that there are differences within the case-based classes: Among the dative EO verbs, there is no clear linearisation preference for *leidtun* ‘to feel sorry’ and *gefallen* ‘to appeal to’, while *imponieren* ‘to impress’ leans towards SO and *auffallen* ‘to strike’ towards OS. *Auffallen* is the only verb in this experiment that uses *sein* ‘to be’ instead of *haben* ‘to have’ as its perfect auxiliary, a classic, but controversial unaccusativity diagnostic. *Imponieren* seems to have an agentive reading: We are not aware of a discussion of agentive readings with dative EO verbs in the literature, but we find examples like (8) in GerEO. (8) contains an impersonal *lassen-middle*. Since agentivity of the implicit argument is a core feature of middles (see Pitteroff 2014: 43 sqq. and the literature cited there), *imponieren* must have an agentive reading (and it is clearly interpreted this way here). Arguably, (9) shows that *imponieren* must also have a change-of-state reading independent of animacy since it contains *imponieren* in the adjectival/stative passive and it has been argued that an adjectival passive is only possible in German with verbs that have such a reading (Gehrke 2015). However, the acceptability of examples like (9) is subject to idiolectal variation.

(8) NZZ_1996_02_23_a187_seg4_s4 in GerEO (Poppek et al. 2022)

[...] Mit ihnen lässt sich trefflich imponieren.
 with them lets REFL splendidly impress
 ‘With them, it’s easy to impress’

(9) NZZ_1994_05_25_a98_seg7_s13 in GerEO (Poppek et al. 2022)

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

Among the accusative EO verbs, *interessieren* ‘to interest’, displays a much weaker tendency towards SO than the other accusative EO verbs, as in Experiment A. Thus, the difference between accusative EO verbs and action verbs may be only superficial, caused by including a verb among the accusative EO verbs that behaves differently from the others.

The question arises whether mixed judgments for certain verbs are caused by idiolectal variation among the participants or by the same participants lingering between both options (which would indicate that participants do not have a clear preference). Figure 7 suggests that the latter is the case: Very often, participants chose the SO variant only once. For *gefallen* ‘to appeal to’ and *leidtun* ‘to feel sorry’, the choices are almost exactly what is expected if participants are forced to choose between two alternatives they like equally well. However, we also assume some degree of individual variation, particularly for *imponieren* ‘to impress’ and *interessieren* ‘to interest’. Naturally, these considerations are to some degree speculative since each participant only saw two sentences for each verb and many other factors could have played a role. However, the conclusion remains that a number of verbs appear not to enforce a specific linearisation in this setting.

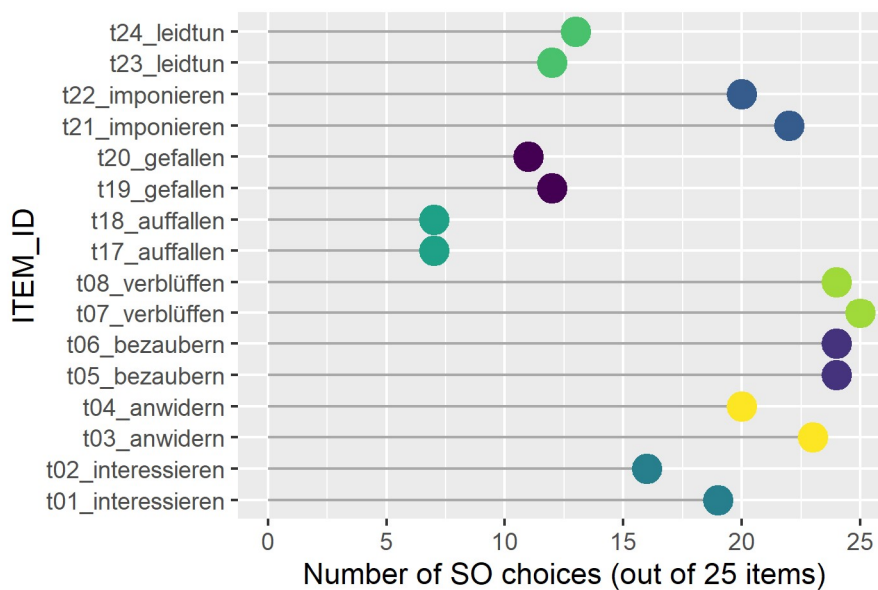


Figure 6: Number of subject before object choices per item for experienter-object verbs in Experiment B

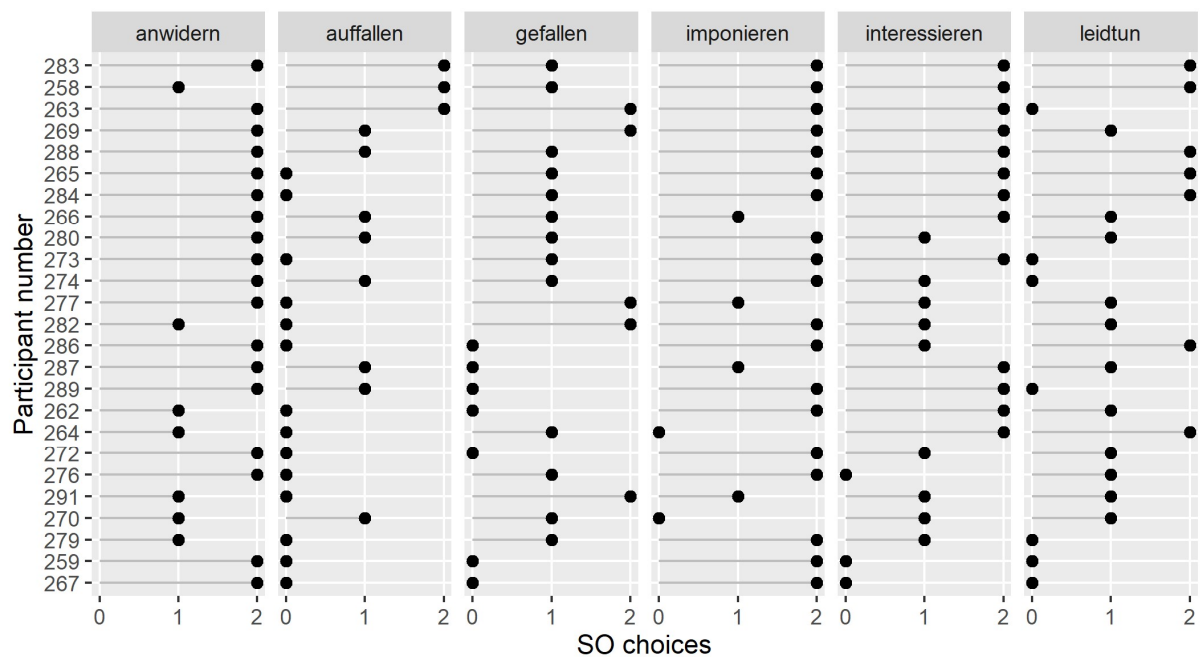


Figure 7: Number of subject before object choices of each participant for noticeable verbs in Experiment B

3 Theoretical implications

In this section, we will point out some theoretical implications of our experiments, both for the syntax of EO verbs and for general accounts of the linearisation of arguments in German.

First and foremost, we take Experiment B to show that at least for some verbs there is more than one unmarked order in the given setting. This is hard to reconcile with any account identifying the normal order with a configurationally real, predicate-dependent base order from which other orders are derived via scrambling because on such an account the order would have to be either SO or OS with our verbs. Proponents of such accounts must provide an explanation why a lower subject should scramble with dative EO verbs (in approximately half of the cases and without an obvious trigger), but a lower object does not do so with action verbs, or to show that there are actually two different readings of the verbs that can be viewed as predicates with different linearisation properties. Also, a comparison of the results of Experiment A and B suggests that animacy is crucial (this is in line with the results of Scheepers et al. (2000)). The strategy to reduce apparent animacy effects to ambiguity of the verb and different thematic roles (cf. e.g. Haider & Rosengren 2003: 218 sqq.; Frey 2015: 531) seems implausible in this case. This criticism does not apply to approaches that assume a base order but take linearisation to be the result of potentially competing constraints

(G. Müller 1999) since only strictly configurational data would be able to do so, e.g. possible binding configurations. The analysis we will sketch in the next section will lead to clear predictions for binding possibilities when combined with a theory of binding.

Regarding EO verbs, our experiments show that there is a difference between accusative and dative EO verbs, the former leaning more towards an SO order than the latter, although there is some class-internal variation. This calls for an explanation. We will now reject some possible explanations discussed (and except for unaccusativity also rejected) by Temme & Verhoeven (2016) before we present our account in the next section.

The first one is case syncretism: Accusative and nominative NPs are often identical in form in German, which does not hold for dative and nominative NPs. Since we found significant differences even though we avoided case ambiguities in our experiments, this cannot explain the differences on a case-to-case basis.

The second rests on the fact that many accusative EO verbs alternate with an anticausative/“psych alternation” (Rott et al. 2020) form where the experiencer is the subject (and precedes an oblique stimulus in normal order if present). Speakers may thus choose these forms instead of an object-first order if they want the experiencer to precede the stimulus. Such forms are not available for dative verbs. However, most of the accusative EO verbs in our experiments also do not possess an anticausative variant and those that do (*ärgern* ‘to annoy’, *ängstigen* ‘to frighten’, *interessieren* ‘to interest’⁹) do not consistently display significant deviance in the experiments.

The third possible explanation is unaccusativity: As mentioned in section 1.2.1, it is a widespread assumption that dative EO verbs are unaccusative (their experiencer argument c-commanding the stimulus on some syntactic level), while unaccusativity is less often proposed for accusative EO verbs. Linearisation preferences could be taken to simply follow hierarchical structure. In a discussion of their experimental results, Temme & Verhoeven (2016) ultimately shy away from using linearisation data to argue for hierarchical relations, but they maintain that the thesis can explain their data (together with their proposal that experiencers are more likely aboutness topics than patients). However, it does not fit well with our data from Experiment B, where dative EO verbs surprisingly did *not* have a tendency towards OS. In contrast to

⁹ *Nerven* ‘to annoy’ has an anticausative alternate only in Switzerland and Liechtenstein (Variantengrammatik des Standarddeutschen 2018).

Experiment A, their subject was animate (and thus plausibly also a more typical aboutness topic, which may lead to scrambling); however, this also holds true for the object of the dative action verbs, which virtually display no OS order at all. Thus, irrespective of whether one maintains that only dative, no, or all (as has also been proposed, cf. section 1.2.1) EO verbs are unaccusative, one cannot link their linearisation properties to unaccusativity.

In the following section, we will sketch an analysis that explains the experimental data.

4 Analysis

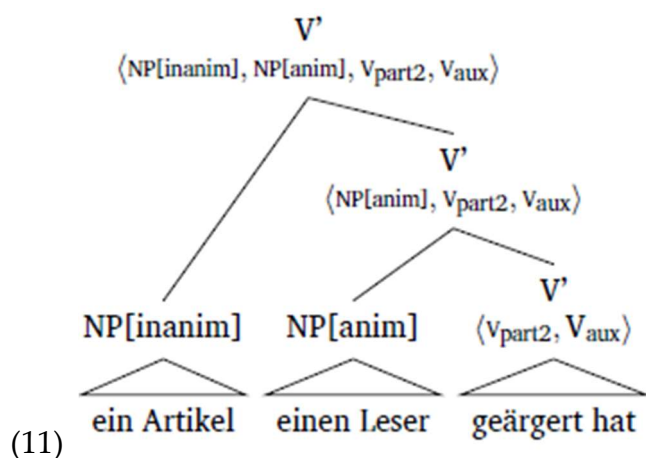
4.1 Syntactic framework

We follow Haider (2010) and assume that there are no functional projections between C and the maximal verbal projection in German, that this verbal projection is binary branching with the verb on the right and that the subject is contained in the maximal verbal projection. Furthermore, we will assume that arguments and adjuncts may in principle combine with the verb in any order, but that their ordering is subject to certain constraints. Technically, this is implemented as in Kiss & Pieper & Börner (2022): Phrases contain a list-valued feature that represents the order of their daughters, and within a projection the list of the mother contains the elements of the head daughter's list as well as the non-head daughter.¹⁰ Linearisation constraints apply on this list and will thus have access to all features of the relevant elements.

We further assume that at least a subset of the linearisation constraints in German is violable (while we remain agnostic about the question if they are weighted or (partially) ordered). (11) contains a partial analysis of a fragment of one of the test sentences (repeated in (10)). We only indicate animacy here, but all elements will have many other (possibly irrelevant) features. Most obviously, the NPs have case, number, and gender features, but we will also assume that the verbal projections carry features for argument structure and semantics with which they may impose certain features on their arguments (via feature sharing or some other mechanism).

¹⁰ We do not attempt to deal with cases where scrambling (apparently) splits an NP, PP or AP here.

- (10) dass ein Artikel einen Leser geärgert hat.
 that a.NOM article.NOM a.ACC reader.ACC annoyed has
 ‘that an article annoyed a reader.’



Ordering constraints will take the form ANIMATE \ll INANIMATE, meaning that animate daughters precede inanimate ones.

We assume that syntactic and semantic structures are built up¹¹ in parallel.

4.2 Causation

It will be useful now to take a step back and to consider the nature of emotions. Although it is subject to ongoing debate in philosophy and psychology (see e.g. Deigh 2009; Scarantino & de Sousa 2021; van Berkum 2022 for recent overviews), an important tradition views “emotions as intentional states of mind, that is, states of mind that are directed at or toward some object” (Deigh 2009: 17). Saying that emotions are states, at least some of which are directed at certain objects is even more uncontroversial (see Lindquist & MacCormack & Shablack 2015). That being said, it need not be the case that the verbs called “psych verbs” denote these states (or functions from individuals into functions from individuals into states etc.): E.g. Marín & McNally (2011) argue that a certain class of Spanish reflexive psych verbs denotes only the beginning of a state, not the state itself. Pesetsky (1995) points to a distinction among the arguments of psych verbs one may naively describe as stimuli or themes. Some of them are the objects of emotion (which can further be subdivided into targets of emotion and subject matters), while others are mere causers. He shows that they can be distinguished by truth conditional differences:

¹¹ Since we work in a constraint-based setting, this is not to be taken literally.

(12) Target vs. causer (Pesetsky 1995: 56)

- a. Bill was very angry at the article in the *Times*.
- b. The article in the *Times* angered/enraged Bill.

(13) Subject matter vs. causer (Pesetsky 1995: 57)

- a. John worried about the television set.
- b. The television set worried John.

The PPs in (12a) and (13a) indicate objects of emotion while the subjects in (12b) and (13b) are causers of the emotion. Pesetsky points out that example (12b) is compatible with a situation in which Bill considers the article itself great but is angry at e.g. the government whose corruption the article exposes. This is not possible in (12a): The object of the anger has to be the article itself. In example (13b), the television set need not be the subject matter of John's worries but only needs to cause them: If John is a detective, a television set owned by a purportedly blind man can make John worry about completely different things. In (13a), however, the television set must be the subject matter of John's worries.

Since we will propose below that causers push towards the beginning of the clause, the causer/object-of-emotion distinction is crucial. As shown above, causer subjects with EO verbs can be identified by finding a context in which a pure causer reading is possible, i.e., the subject is not the object of emotion. E.g., in (14) my fear need not be directed towards the news broadcast, it is fully compatible with a situation in which I watched the news and am afraid of a nuclear war afterwards.

(14) Die Nachrichtensendung ängstigte mich.
 the news.broadcast frightened me
 'The news broadcast frightened me.'

In general, there is a strong correlation between object case and nature of the subject such that the accusative EO verbs used in our experiments have causer subjects and the dative EO verbs object of emotion objects. There are exceptions however: We were unable to find or to come up with an example in which the subject of (accusative EO)

interessieren ‘to interest’ is not an object of emotion,¹² and the subject of (dative EO) *imponieren* ‘to impress’ seems to allow a pure causer interpretation in (15). In our judgment, (15) allows a line of argumentation parallel to the one for (13).

- (15) Das Bücherregal imponierte ihm.
 the book.shelf impressed him
 ‘The bookshelf impressed him.’

However, there may be some degree of (idiolectal) variation for these judgments: As discussed in section 2.4.4, the fact that *imponieren* ‘to impress’ may enter the adjectival/stative passive may be taken to indicate that it has a change-of-state reading (which would fit well with a causer subject), but many native speakers apparently reject the adjectival passive with *imponieren* ‘to impress’.

While Pesetsky is concerned with linking problems and places his newly introduced roles on a rather traditional role hierarchy (in the order *Causer* > *Experiencer* > *Target/Subject Matter*), we need not assume such a hierarchy. For our purposes, it suffices that causers can be identified and marked.

4.3 Constraints

We assume the following constraints to be among the linear precedence constraints of German. None of them is new or should be too controversial.

(16) Proposed linearisation constraints

- a. ACTOR << NON-ACTOR
- b. CAUSER << NON-CAUSER¹³
- c. ANIMATE << INANIMATE¹⁴

¹² Except for cases in which the object of the interest is present in an additional PP headed by *für* ‘for’ as in *jemanden für etwas interessieren* ‘get sb. interested in sth.’. This is a different construction, however (see Royo (2019) for a similar construction in Catalan).

¹³ One will usually take causal relations to hold between propositions, events or the like. What we mean with “causer” here is the argument associated with the causing sub-eventuality.

¹⁴ We do not claim that animacy in a biological sense is relevant grammatically in German. Rather, we assume that there is a grammatically relevant property that we call animacy and animate beings are typical instantiations of it.

While ACTOR << NON-ACTOR must be weighted quite strongly / have a prominent position in the constraint hierarchy, CAUSER << NON-CAUSER and ANIMATE << INANIMATE will be ranked lower and in this order of importance.

In Experiment A, there was an animacy mismatch such that objects were animate and subjects inanimate. Because all other relevant factors were controlled for in the experiment, the only constraint applicable to the dative EO verbs is the animacy constraint (on case-based constraints, see below), which explains why they prefer an OS order. The interpretation of the causer status of their subjects, however, might be subject to idiolectal variation for some verbs (e.g., *imponieren* 'to impress', for which we have to assume here that most participants do not share our judgments).

The accusative EO verbs, however, have a causer subject. Because the causer constraint dominates the animacy constraint, SO is preferred for these verbs. An exception is *interessieren* 'to interest', whose subject is an object of emotion (maybe also subject to idiolectal variation). While one will naively assume that the general rule in a forced-choice setting is "the winner takes it all", it is equally conceivable that some participants just choose a sentence with a fairly acceptable linearisation without judging both alternatives contrastively or that they choose the alternative they read last if both sound approximately equally well to them. This may explain the share of OS with accusative EO verbs in Experiment A, where one constraint has to be violated.

In Experiment B, where animacy does not interfere, the causation constraint is the only one relevant for EO verbs: since no constraint pushes an argument in any direction with *gefallen* 'to appeal to' and *leidtun* 'to feel sorry', participants do not have a preference. Since *imponieren* 'to impress' has an agentive reading for some, but not all speakers, it has a tendency towards SO. *Interessieren* 'to interest' is striking because it is an accusative EO verb whose subject is an object of emotion. And indeed, it shows only a mild tendency towards SO, while all other accusative EO verbs tested there have a causer subject and strongly prefer SO (in the absence of an animacy mismatch pushing in the other direction). The remaining dative verb is *auffallen* 'to strike'. One may speculate that whatever property is responsible for the exceptional perfect auxiliary selection with *auffallen* 'to strike' is also responsible for the exceptional status of its object and its strong tendency towards OS. With action verbs, the actor constraint (depending on one's view of thematic roles: together with the causer constraint) overrules anything else.

Note that this analysis does not need to postulate case-based constraints. Indeed, while it would be generally compatible with a (low ranking/weighted) constraint

NOMINATIVE << ACCUSATIVE (which could explain why *interessieren* ‘to interest’ does not completely behave like a dative EO verb), it is incompatible with constraints that demand nominatives to precede datives. This is because such a constraint would destroy the equilibrium with dative EO verbs and animate subjects.

(17) Some constraints not needed¹⁵

- a. SUBJECT << NON-SUBJECT
- b. NOMINATIVE << NON-NOMINATIVE
- c. NOMINATIVE << DATIVE

An obvious question is why almost all accusative EO verbs fall into one class and almost all dative EO verbs into the other. Since it would require a discussion of many grammatical properties of EO verbs whose empirical basis is far from clear, we must leave this for future work. Nevertheless, we may speculate that the constraints governing linking are to a large extent similar or equal to the ones governing linearisation, one difference being that linking constraints apply to lexical items, linearisation constraints to lists that are built on the fly. This would explain why idiosyncrasies are possible with the former, but not the latter. Dative case on the object of *imponieren* ‘to impress’ could be such an idiosyncrasy, at least in the grammar of some speakers.

4.4 Alternatives

After sketching our analysis, we will discuss alternatives within the general framework proposed in the following sections.

¹⁵ This analysis does not aim at treating unstressed pronouns, which are in several ways special (cf. e.g. Haider, 2017). The nominative NPs used in arguments for (the importance of) case-based constraints typically fall under (16) or (16) (cf. e.g. Müller, 1999: 797, Ellsiepen & Bader, 2018: 21). Verbs like *ähneln* ‘to resemble’ or *gleich* ‘to equal’ may pose a problem though since e.g. (i) seems to be marked to us (requiring focus on the subject) although one will naively treat *ähneln* as a symmetric predicate, so that it will be hard to make a semantic distinction responsible for the contrast.

- (i) dass dem Viehhändler der Taschendieb ähnelte.
that the.DAT cattle.dealer.DAT the.NOM pickpocket.NOM resembled
‘that the pickpocket resembled the cattle dealer.’

4.4.1 Predicate-specific linearisations via argument structural differences and a faithfulness constraint

Observing that linearisation constraints correlate to a great degree with linking constraints (as per Dowty 1991), one might be tempted to postulate the existence of some representation of argument structure, probably needed on independent grounds, and to reduce all linearisation constraints making reference to thematic prominence (in a wider sense) to a faithfulness constraint with respect to that structure.

However, such an approach loses much of its appeal once we recognise that also some adverbials, which will trivially not be listed on argument structure representations, adhere to the same constraints, so that postulating them is necessary on independent grounds (Kiss et al. 2022): With affirmative comitatives as in (18) (from Kiss et al. 2022), a linearisation in which the PP precedes the direct object is preferred (so (18) shows the dispreferred, albeit grammatical order), which is not the case with privative comitatives (as in (19)). In Kiss et al.'s (2022) analysis, the affirmative comitative takes over the theta-role of its antecedent (a c-commanding NP) and the linearisation patterns follow because the adverbials must follow the same linearisation constraints as arguments do.

(18) Ich glaube, dass Ramona was mit einem Berater unterzeichnet
 I believe that Ramona what.ACC with a counsellor signed
 hat.
 has
 'I believe that Ramona signed something in tandem with a counsellor.'

(19) Ich glaube, dass Ramona was ohne einen Berater
 I believe that Ramona what.ACC without a counsellor
 unterzeichnet hat.
 signed has
 'I believe that Ramona signed something without a counsellor.'

4.4.2 Different degrees of causal responsibility

Primus (2004) provides a constraint-based analysis, which is in some respects similar to the one we present here. However, she assumes that the experiencer is always a causal factor, but that its causation is weaker than that of a true causer (she assumes that a case-hierarchy constraint equals out the thematic constraint then). While this may have some intuitive appeal and in a framework like ours would also be suited to

link gradient degrees of markedness of SO/OS to gradient causal involvement, we do not see how to sort out different strengths of causation, especially not if the supposedly weaker factor is treated as absolutely necessary for the coming-about of the consequent.

Another possibility within our system that recognises (some) experiencers as causally involved would be to assume that verbs like *gefallen* ‘to appeal to’ or *leidtun* ‘to feel sorry’ in fact do involve causation but that they semantically decompose into something like [[Y evaluates X] CAUSE [emotional state Y]]. This would place both arguments on the causer side, leading to the same overall result. However, a deep investigation of the verbs’ meaning is beyond the scope of this article, so we must leave this to further research.

4.4.3 Causation or change-of-state?

One may note that almost all accusative EO-verbs preferring an SO order involve change in their semantics, while the verbs preferring an OS order do not. However, as extensively discussed by Hirsch (2018), *ärgern* ‘to annoy’ is causative but stative and does not involve a change of state. Rothmeyer (2009) also argues that *ärgern* – unlike the dative EO-verbs – contains a causal operator (although she assumes that it may also have non-stative readings). We will thus assume that causativity is the decisive factor.

5 Conclusion

We presented two experiments that investigated the unmarked constituent order with German experiencer-object verbs. Experiment A showed that with inanimate stimuli, object before subject is the preferred linearisation for dative experiencer object verbs while the accusative ones show a preference for subject before object. With the animate stimuli in Experiment B, however, preferences changed. Accusative EO verbs (even if they do not have an agentive reading) showed a clear tendency towards SO while we observe no tendency at all for dative EO verbs. Explorative investigations of the data also indicated that there are verb-specific differences, which cannot be attributed solely to idiolectal variation.

We argued that the patterns observed, particularly for the dative EO verbs with animate subjects in Experiment B, are hard to reconcile with the widespread accounts of German sentence structure that assume a predicate-dependent base order. We

suggested that this pattern and the influence of animacy may be most easily captured in a constraint-based framework coupled with base generation and we sketched an analysis along these lines. Following this account, linearisation data also is largely irrelevant for an evaluation of the hypothesis that (some) experiencer-object verbs are unaccusatives. While considerations on the nature of the stimulus arguments are crucial to our analysis, this area is still insufficiently understood. Another open question is whether base generation (as we proposed) or a fixed base order (as argued for by e.g. G. Müller 1999) is more appropriate. If one assumes violable linearisation constraints, linearisation data is not suited to answer this question.

Abbreviations

3SG = third person singular, ACC = accusative, DAT = dative, EO = experiencer object, FC = forced choice, NOM = nominative, OS = object before subject, REFL = reflexive, SO = subject before object

Data availability

All analysis scripts, the raw data (items and results), documents describing the power analyses and the verb selection and additional materials are available from https://osf.io/9nqjc/?view_only=b43923b9a3034c0b9aeb8f26fa185f75. Additionally, there is a document containing the supplementary data referred to in the text (doi:)

Ethics and consent

All experiments reported were conducted as part of the project *The grammar of Experiencer-Object verbs: theoretical, computational and experimental approaches towards reflexive binding in German*. The Deutsche Forschungsgemeinschaft approved the whole project proposal without an ethic committee's statement on individual experiments. Participants gave their informed consent to participate in the experiments.

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Competing interests

The authors have no competing interests to declare.

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