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

1. Causers and Objects of Emotion

In the following examples, a pure causer reading is possible according to our judgment (bear in mind that translating emotion verbs is often difficult. It need not be the case that the translation provided here behaves in the same way.). In each case, the discussion below the example provides a context in which the emotional state of the object referent need not be directed at the subject referent. Judgments may be subtle.

ängstigen 'to frighten':

(1) Die Nachrichtensendung hat Lea geängstigt.
the news.broadcast has Lea frightened
'The news broadcast frightened Lea.'

But the object of her fear may be nuclear war (and not the news broadcast itself).

ärgern 'to anger':

(2) Der Artikel hat Lea geärgert.
the article has Lea angered
'The article angered Lea.'

But she need not be angry at the article (argumentation parallel to Pesetsky 1995: 56).

bezaubern 'to charm':

(3) Der Vortrag hat Lea bezaubert.
the presentation has Lea charmed
'The presentation charmed Lea.'

She fell in love with the person delivering it, although it was not a great presentation.

nerven 'to bother':

(4) Stilfehler können nerven.
style.errors can annoy
'Bad style can be annoying.'

When reading the text, one gets into a certain mood, but this need not really be directed at the bad style (or at anything at all).

verärgern 'to annoy':

(5) Der Vortrag hat Lea verärgert.
the presentation has Lea annoyed
'The presentation annoyed Lea.'

But the object of her anger need not be the presentation, it may e.g. be the government whose corruption the presentation is about.

anwidern 'to disgust':

(6) Der Film hat Lea angewidert.
the film has Lea disgusted
'The film disgusted Lea.'

But she may nevertheless consider it splendid because she likes gore. The difference to *gefallen* 'to appeal to' as discussed by Fanselow (1992: 292) (an article may appeal to me without making me feel good because it disproves my own paper) is that the experiencer need not evaluate the stimulus itself. When Lea considers the film splendid, this is a judgment that is only possible because the film really affects her in the way desired. But it shows that she need not be in a state of disgust *toward* the film.

verblüffen 'to baffle':

(7) Der Fernseher hat Lea verblüfft.
the television.set has Lea baffled
'The television set baffled Lea.'

Allows for a line of argumentation parallel to the one Pesetsky (1995: 57) provides for *worry*: If Lea is a detective and sees the television set in the living room of a purportedly blind person, this may baffle (*verblüffen*) her, but she need not be baffled about the television set itself.

imponieren 'to impress':

(8) Das Bücherregal hat Lea imponiert.
the bookshelf has Lea impressed
'The bookshelf impressed Lea.'

See discussion in paper.

We were unable to find examples with a pure causer reading for the following verbs: *auffallen, behagen, einleuchten, gefallen, missfallen, nahegehen, widerstreben, interessieren*.

Regarding *gefallen,* see the discussion in (Fanselow 1992: 292) and the brief discussion in the paper. An anonymous reviewer provides a similar argument for *missfallen*: They note that (9) should be contradictory if *missfallen* and *schlecht finden* 'consider bad' are taken to be synonymous. We fully agree (with the *caveat* mentioned in footnote 18 of the paper).

(9) #Die Nachrichtensendung missfällt mir, aber ich finde die
the.NOM news.broadcast.NOM displeases me.DAT but I find the.ACC

Nachrichtensendung nicht schlecht
news.broadcast.ACC not bad
'I dislike the news broadcast, but I do not consider it bad.'

Regarding *interessieren*, we disagree with Fanselow (1992: 293) (but we assume lectal variation for this verb anyway in the paper, so it is not surprising to find speakers with different judgments). One may say that (10) is non-contradictory if Lea plans a pie attack on her university's chancellor, but this may be due to an ambiguity of *Vortrag* 'talk', which may refer to the talk, its content, the event etc. In our judgment, one could also use (11) in these circumstances. If one fixes the meaning in both cases, (10) appears indeed contradictory to us, which indicates that a pure causer reading is not available. One may note that *interessieren* is one of only two verbs in GerEO (Poppek & Masloch & Kiss 2022) (the other one being *begeistern* 'to enthuse') that occurs in a pattern different from the transitive one used in the experiments, where a subject causes an object experiencer to be in a certain emotional state towards an object of emotion given in a PP as in (12).

(10) #Der Vortrag der Kanzlerin interessierte Lea, aber sie
the.NOM talk.NOM the.GEN female.chancellor.GEN interested Lea but she
interessierte sich nicht für den Vortrag
interested REFL not for the talk
'The chancelor's talk interested Lea, but she was not interested in the talk.'

(11) Lea interessierte sich für den Vortrag.
Lea interested REFL for the talk
'Lea was interested in the talk.'

(12) (adapted from NZZ_1998_03_11_a134_seg3_s8 in GerEO, Poppek et al. 2022)
Galland gelang es, Antoine Gallimard für das Projekt zu interessieren.
Galland succeed it Antoine Gallimard for the project to interest
'Galland managed to get Antoine Gallimard interested in the project.'

2. Constraint violation profiles assumed

We will assume that all dative-object action verbs are non-causative and that all accusative-object action verbs used in study B except for *betrügen* 'to deceive' are causative. We take them to be change-of-state verbs where a change in the object referent is caused by the action of the subject referent. The presence of a result state can be established via modification with *again*.

(13) a. Nachdem er ausgebüxt war, verhaftete die Kommissarin
after he absconded was arrested the.F inspector
den Juwelendieb wieder.
the jewellery.thiefagain
'After he absconded, the inspector arrested the jewellery thief again.'

b. Nach dessen Filmriss informierte Peter Uwe
after DEM.GEN mental.blackout informed Peter Uwe
wieder.
again
'After the latter's mental blackout, Peter informed Uwe again.'

c. Nachdem Lukas die Telefonkonferenz versehentlich verlassen hatte,
after Lukas the conference.call accidentally left had
rief Anna ihn wieder an.
called Anna him again PTK[1]
'After Lukas accidentally left the conference call, Anna called him again.'

In our judgment, (13a) can be used even if the inspector never arrested the thief before (it can be paraphrased as *The inspector caused the jewellery thief to be arrested again* then), (13b) can be used if it was not Peter but one of his colleagues who informed Uwe originally, and (13c) is acceptable even if Lukas was never called by anyone before he left but opened the call himself. The resulting eventuality is also available for modification with *informieren* 'to inform' as demonstrated by (14a), which also shows that modification of the causing action is possible, and *informieren* has a reflexive variant as in (14b) that may be viewed as an anticausative (although a modifier indicating the topic such as a PP headed by über 'about' is clearly preferred to a modifier indicating a cause).

(14) a. Peter informierte Uwe vollumfänglich/ mit einer
Peter informed Uwe in.full with a
eindrucksvollen Präsentation
impressive presentation
'Peter informed Uwe in full / with an impressive presentation.'

b. Uwe informiert sich.
Uwe informs REFL
'Uwe informs himself.'

Admittedly, such a variant is not available for *verhaften* and *anrufen*, and it is also hard to modify the result state with them. A paraphrase containing an overt causative is possible with all three of them although the paraphrases do not sound very natural (*Die Polizei verhaftete den Betrüger* 'The police arrested the fraudster' ≈ *Die Polizei verursachte, dass der Betrüger inhaftiert ist.* 'The police caused the fraudster to be detained', *Peter informierte Uwe (über X)* 'Peter informed Uwe (about X)' ≈ *Peter verursachte, dass Uwe (über X) informiert ist* 'Peter caused Uwe to be informed (about X)', *Lisa rief Lukas an* 'Lisa called Lukas' ≈ *Lisa verursachte, dass sich Lukas in einem Anruf befindet* 'Lisa caused Lukas to be in a call').

[1] Verbal particle

By contrast, such a paraphrase is not possible with the dative-object action verbs used here. Modification of a result state with *wieder* 'again' is not possible. In all examples in (15) the sentence can only mean that Tom performed the action again (or that the action was performed again), but not that the Alex returned into a specific state.

(15) a. Tom applaudierte/dankte/antwortete/betrog Alex wieder.
Tom applauded/thanked/answered/deceived Alex again

b. Tom jubelte Alex wieder zu.
Tom cheered Alex PTK
'Tom cheered for Alex again.'

Table 1 contains the constraint violation profiles for all verbs used in the experiments except for *imponieren* 'to impress' and *interessieren* 'to interest' (see discussion in paper). 1 if constraint is violated, cell empty if not.

Study	verbs	order	ACT	CAUS	ANIM	SEIN
A	*auffallen*, *nahegehen*	SO			1	1
		OS				
	accusative EO	SO			1	
		OS		1		
	other dative EO	SO			1	
		OS				
B	dative action, *betrügen*	SO				
		OS	1			
	other accusative action	SO				
		OS	1	1		
	auffallen	SO				1
		OS				
	accusative EO	SO				
		OS		1		
	other dative EO	SO				
		OS				

Table 1: Constraint violation profiles assumed for all verbs used in the experiments except for *interessieren* 'to interest' and *imponieren* 'to impress'

3. Data encoding for Maximum Entropy Grammar as a logistic regression model

Maximum Entropy Grammars correspond to logistic regression models (Hayes 2022). However, in order to get a Maximum Entropy Grammar from a logistic regression model using common R packages, we need to encode the data in a specific way.

The formula for the Maximum Entropy Model underlying a Maximum Entropy Grammar as defined in (Goldwater & Johnson 2003) (sightly modified here) is

$$P(z|x) = \frac{exp\left(\sum_{i=1}^{m} w_i\, f_i(z,x)\right)}{\sum_{y \in Y(x)} exp\left(\sum_{i=1}^{m} w_i\, f_i(y,x)\right)}$$

where x is a context, $Y(x)$ a candidate set and z a candidate from that set (we can think of Y as the generator function from Optimality Theory (Prince & Smolensky 2004) and of x as its input). In the case at hand, where we have only two candidates, this can also be written

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

The inverse logit as used in logistic regression models is defined as follows:

$$logit^{-1}(x) = \frac{exp(x)}{1 + exp(x)}$$

We see that both fractions are almost identical (the sum in the denominator of the model formula containing the nominator). But how to ensure that the values for the other candidate(s) add up to 1? If we proceed naively, this will often not be the case. By subtracting the constraint violation profile of the OS variant from both constraint violation profiles, however, we can ensure it. This way, the 'ideal' counter candidate will have no constraint violations, so that all f_is are 0 and since $exp(0) = 1$, we get the desired format. The following equations ensure that the resulting values for the weights will be the same as the ones we would get for the original model.

Proof of equation 4 from the paper (for the case at hand that there are only two candidates. We skip the context dependence here to enhance readability):

1. Formula for the Maximum Entropy Model with two candidates x, y; m being the total number of constraints:

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

2. Expanding the fraction with a well-chosen factor, namely $exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right)$ (note that it is necessarily > 0)

$$= \frac{exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right) exp\left(\sum_{i=1}^{m} w_i\, f_i(x)\right)}{exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right)\left(exp\left(\sum_{i=1}^{m} w_i\, f_i(y)\right) + exp\left(\sum_{i=1}^{m} w_i\, f_i(x)\right)\right)}$$

3. by Distributivity

$$= \frac{exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right) exp\left(\sum_{i=1}^{m} w_i\, f_i(x)\right)}{exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right) exp\left(\sum_{i=1}^{m} w_i\, f_i(y)\right) + exp\left(\sum_{i=1}^{m} -w_i\, f_i(y)\right) exp\left(\sum_{i=1}^{m} w_i\, f_i(x)\right)}$$

4.Since $a^m \times a^n = a^{m+n}$

$$= \frac{exp\left(\sum_{i=1}^{m} w_i\, f_i(x) - w_i f_i(y)\right)}{exp\left(\sum_{i=1}^{m} w_i\, f_i(y) - w_i f_i(y)\right) + exp\left(\sum_{i=1}^{m} w_i\, f_i(x) - w_i f_i(y)\right)}$$

5. Since $e^0 = 1$

$$= \frac{exp\left(\sum_{i=1}^{m} w_i\, f_i(x) - w_i f_i(y)\right)}{1 + exp\left(\sum_{i=1}^{m} w_i\, f_i(x) - w_i f_i(y)\right)}$$

6. Since $w_i f_i(x) - w_i f_i(y) = w_i\left(f_i(x) - f_i(y)\right)$

$$= \frac{exp\left(\sum_{i=1}^{m} w_i\left(f_i(x) - f_i(y)\right)\right)}{1 + exp\left(\sum_{i=1}^{m} w_i\left(f_i(x) - f_i(y)\right)\right)}$$

Thus, we can use a logit-based model if we subtract the constraint violations of the OS variant from the one of the SO variant (given that OS is the reference level, the model predicts the probability of SO. Then, SO corresponds to x in the formulae above.).

Since our constraints are only violated once by a variant if they are violated at all, this means that the value for each factor will be 0 if both variants violate it or do not violate it, 1 if only the SO variant violates it, -1 if only the OS variant violates it.

4. Predictions

Table 2 provides an overview of the predictions of *model_base* for the verbs used in both experimental studies except for *imponieren* 'to impress' and *interessieren* 'to interest' (see discussion in main text). Only the fixed effects are considered here, the predictions of the model for individual items and participants will differ slightly. The linear predictor is computed by summing up the weighted constraint violations, the predicted probability of SO is computed by applying the logistic function to the linear predictor.

Study	verbs	ACT -3.581	CAUS -2.355	ANIM -1.137	SEIN -0.853	linear predictor	predicted P(SO)
A	*auffallen, nahegehen*	0	0	1	1	-1.99	0.12
	accusative EO	0	-1	1	0	1.218	0.771
	other dative EO	0	0	1	0	-1.137	0.243
B	dative action, *betrügen*	-1	0	0	0	3.581	0.973
	other accusative action	-1	-1	0	0	5.936	0.997
	auffallen	0	0	0	1	-0.853	0.299
	accusative EO	0	-1	0	0	2.355	0.913
	other dative EO	0	0	0	0	0	0.5

Table 2: Predicted probabilities of SO for the verbs from both studies except for *interessieren* and *imponieren*. -1 is used if the OS variant violates the constraint but the SO variant doesn't, 1 is used if the SO variant violates the constraint but the OS variant doesn't. Values are rounded and only the fixed effects are used, i.e. the actual predictions of the model for the data from the experiments will slightly differ from the values presented here.

5. References

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