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A CORPUS-BASED PERSPECTIVE ON 'SPLIT STIMULI' IN GERMAN

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Experiencer-object verbs

- A subclass of 'psych verbs': verbs that possess an argument that expresses the experiencer of some psychological state (cf. Landau, 2010)
- Experiencer-object (EO) verbs are those psych verbs whose experiencer argument is (normally) realised as the object.
 - I. nominative stimulus, accusative experiencer
 Das beeindruckt ihn.
 'This impresses him.'
 - II. nominative stimulus, dative experiencerDas behagt ihm.'This pleases him.'



'Split Stimuli'

'Split Stimulus' refers to a phenomenon where the semantic stimulus of the experiencer's emotion appears to be 'split up' between an NP and another phrase (usually a PP) (see Engelberg, 2015)

- (2) Ein Hosenanzug beispielsweise, Streifen und Karos gemixt, imponiert mit seiner klaren A pantsuit for.example, stripes and checks mixed, impresses with its clear Linienführung [...] lines

 'For example, a pantsuit where stripes and checks are mixed, impresses with its clear lines [...] '
- (3) Nicht nur nervt das Programm durch Inkompatibilitäten und Systemabstürze [...]

 Not only annoys the program through incompatibilities and system.crashes

 'The program not only annoys through incompatibilities and system crashes [...].'



A Data-driven Perspective

- Particularly the prepositions mit 'with' and durch 'through' have regularly been
 described to license constructions like (2) or (3) (see Engelberg, 2015; Temme, 2018,
 among others), however, the phenomenon appears more widespread and more
 diverse than the literature suggests.
- We therefore relied on a large annotated database of German EO verbs to investigate the phenomenon from a larger corpus-based perspective.



The GerEO database

- **GerEO**: A large resource on the syntactic distribution of German EO verbs and some semantic properties of them (see Masloch et al., 2021; Poppek et al., 2022)
- contains up to 200 samples for 64 German EO verbs (16 dative, 48 accusative), annotated by three native speakers of German for syntactic pattern, semantic type of the stimulus, a stimulus PP (if present) and a number of other factors.
- The full database is publicly available via https://github.com/Linguistic-Data-Science-Lab/German_EO_verbs



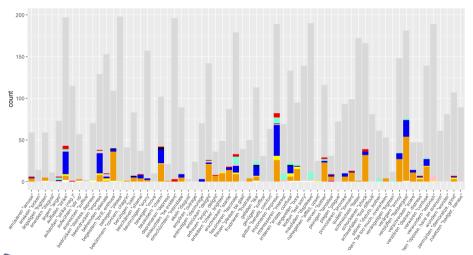
Semantic Properties of Stimulus and PP-internal Arguments

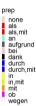
For a perspective on the semantic aspects, we additionally annotated all sentences with a stimulus PP in GerEO in the relevant syntactic constructions (transitive and intransitive/object drop) with respect to the semantic classes of the subject and the internal argument of the PP – about 780 sentences in total.

- Adapted the nominal semantic categories from the CISLEX-system (Langer, 2009) with some modifications (e.g., including a category for abstract objects and actions):
 Possible categories included concrete_obj, abstract_obj, event, event(action), state, locative, temporal, human/animal/plant, property and misc.
- We annotated both the stimulus subject and the internal argument of the PP if
 there was a notable shift in meaning enforced by the sentence context (including the
 P!) for the P's internal argument, we annotated it in a separate column. Further, we
 annotated the eventual absence of an otherwise obligatory determiner in the internal
 argument of the PP and we marked cases with a possessive determiner.



Overview PP Distribution







Overview PP Distribution

- 'Split stimuli' are by no means rare
- Verbs differ largely in how frequently they co-occur with an additional stimulus PP (and which PP) in the relevant constructions
- Some of them don't occur with any stimulus PPs in this dataset
- There are examples where more than one stimulus PP is used
- We find more prepositions that license such readings than usually listed in the literature.



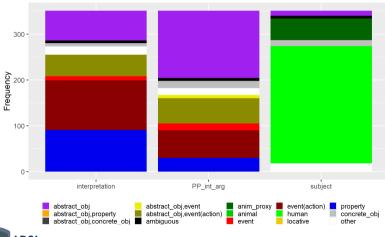
Prepositions with Relevant Readings

- Mit 'with' and durch 'through' are the most frequent prepositions used to express a part of a stimulus in our dataset.
- We also annotated some causal PPs headed by a preposition with a prominent causal reading (aufgrund 'because of', dank 'thanks to', ob 'due to', wegen 'due to') as expressing part of the stimulus.
 - Lange Schlechtwetterperioden bedrückten ihn der Frequenzausfälle spells.of.bad.weather depress him the frequency.breakdowns due.to long 'Long spells of bad weather depress him because of the frequency breakdowns'
- Other prepositions we find that are used to express part of a stimulus are: als 'as', an 'at', bei 'at' and in 'in'
- We will take a closer look at mit 'with' (see also Engelberg, 2015; Hirsch, 2018; Rapp, 2001), durch 'through' (see also Engelberg, 2015; Hirsch, 2018; Rapp, 2001), als 'as' and an 'at' (see also Engelberg, 2015)



Mit 'with'

Overview





Mit 'with'

Description

- The subject always refers to an individual entity: In our dataset, most usually a human being, but it may also be some other kind of object or even an event or action.
- The internal argument of the PP usually names a property of that individual, an action it performs or an event related to it. Even if the noun does not usually refer to a property, it often is interpreted as such in these PPs.
- The many abstract objects here are most often related to utterances or (parts of) pieces of art
 - (5) Mit dem Slogan [...] entzückte er [...] seine Anhänger [...] with the slogan delighted he his followers 'He delighted his followers with the slogan.'



Mit 'with'

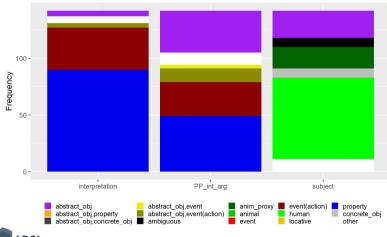
Description

- If the subject doesn't refer to a human being / anim_proxy, the mit-PP will almost always name a property.
 - (6) Der [...] Reihenvierzylinder imponiert mit bulliger Leistungsabgabe. the inline.four.cylinder impresses with beefy power.output 'The inline-four engine impresses with its powerful output.'



Durch 'through'

Overview





Durch 'through'

• With respect to the features we annotated, durch-PPs appear very similar to mit-PPs.

Typical reading:

(7) Der Spanier beeindruckte auf einer Strecke [...] durch Eleganz und Leichtigkeit [...] the Spaniard impressed on a track through elegance and lightness 'The Spaniard impressed on a track [...] through elegance and lightness [...] '

Event(action):

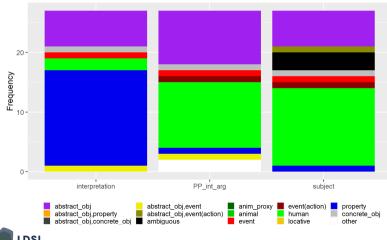
(8) Deutsche Fernsehanstalten hätten durch falsche Berichterstattung die Touristen German television.stations have.sbjv through false reporting the tourists eingeschüchtert.
intimidated

'German television stations had intimidated the tourists through false reporting.'



Als 'as'

Overview





Als 'as'

Description

- To our knowledge, occurrences of als 'as' as parts of a 'split stimulus' are undescribed in the literature
- Descriptively, its internal argument refers to a human being (or less frequent, an abstract object) in many cases, but in most cases it receives a property interpretation.
- Also interesting: (with one exception) the internal argument does not have a determiner – even if it is singular count noun.
 - (9) Der Rentner war dem Verkaufspersonal bereits früher als mutmasslicher The pensioner was the.dat sales.staff.dat already earlier as suspected Ladendieb aufgefallen shoplifter noticed

'The pensioner had already come to the attention of the sales staff as a suspected shoplifter.'



Als 'as' Meaning

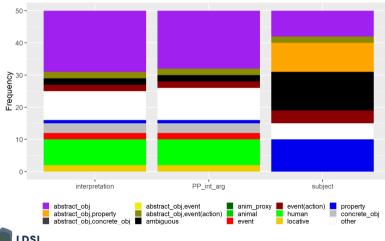
- What seems to be the case with als is that the P's internal argument without the
 determiner refers to a predicate (type et) that is predicated of the subject.
 - (10) [...] der als genialer Dribbelkünstler die Massen entzückte.
 who as ingenious dribbling.artist the masses delighted

 '[...] who delighted the masses as a brilliant dribbler.'
- There are two examples in which the internal argument of the PP refers to an individual/group: The effect of *als* then is to equate the subject to this entity.



An 'at'

Overview





An 'at'

Description

- Regarding the semantics of their arguments, *an*-PPs appear much more diverse than other PPs while the subject choice is quite restricted.
- The element in the PP names an individual and the subject the aspect of that individual that leads to the psychological state of the experiencer.
- This will usually be a property of it, but it can also be an action or a specific part.
- Often, the subject is interpreted as a property only in context: In this respect, *an*-PPs often turn around the pattern we find with *mit*, *durch*, and *als*.
 - (11) An Berlusconi imponiert ihnen der Machertyp, an Fini die Zurückhaltung. at Berlusconi impresses them the maker.type, at Fini the restraint. 'What impresses them about Berlusconi is his 'can-do-attitude', about Fini, it is his restraint.'



An 'at' Description

- High number of ambiguous subjects due to examples like (12)
 - (12) [...] aber es bleibt dabei unklar, was ihn an dem Stück wirklich interessiert. but it remains at.this unclear what him at the play really interests.

 'But what really interests him about the play remains unclear.'



'Split Stimulus' PPs are Adjuncts

- They are optional.
- There may be more than one of them: We find more than one (reduplicated or different) stimulus preposition in about 3.5 % of the examples
- (13)[...] seine Leistung, mit der er besonders durch die ganz engen Wendungen zwischen performance with which he especially through the very tight turns between den ersten Hindernissen verhlüffte the first obstacles flabbergasted '[...] his performance, with which he amazed [everyone] especially by the very tight turns
 - he took between the first obstacles'
- ⇒ 'Split Stimuli' are not split stimuli in a syntactic sense



Pragmatic effect

By allowing different elements to be realised as subject or in a PP, these prepositions
provide speakers with means to choose different information structural
configurations without dropping anything



Possessive Pronouns

- English examples with with have sometimes been discussed as taking part in a
 'possessor-attribute factoring alternation' (Levin, 1995, pp. 72 sqq.; see also
 van Oosten, 1984; and for Polish Klimek & Rozwadowska, 2004, who propose that
 the subjects of Polish EO verbs are raised from the possessor position of an
 instrumental (case) DP (that seems to correspond to mit/with))
 - (14) (van Oosten, 1984, p. 182)
 - a. The kitten amused me with her antics.
 - b. The kitten's antics amused me.
- This is also possible in German.



Possessive Pronouns

- While van Oosten (1984) emphasises pragmatic factors that lead to a preference for one of the alternants, there are also some cases where the use of one stimulus NP would simply not be possible:
 - o man 'one', which lacks a genitive form
 - Some raising and control predicates
 - Some relative clauses



'Split stimuli' and verbsWhat they can tell us about semantic restrictions imposed by certain verbs

- Alleged facts about the distribution of 'split stimuli' have sometimes been used to argue for specific properties of certain verbs that may or may not combine with them. In the absence of a sufficient understanding of the semantics of the relevant prepositions, this is not without risks:
- Temme (2018, p. 131) uses the idea that factive stimuli may not split in one (of many) arguments for a subcategorisation of EO verbs based on different semantic selection criteria with respect to the subject. But factive stimuli may split:



'Split stimuli' and verbs What they can tell us about semantic restrictions imposed by certain verbs

(15) An Peter Grütter habe ihr vor allem imponiert, dass er ein grosses Vertrauen in at Peter Grütter has.søjv her before all impressed that he a big trust in seine Mitmenschen habe [...] his fellow.humans has.søjv

'What impressed her most about Peter Grütter was that he had great trust in his fellow human beings [...]'



'Split stimuli' and verbs What they can tell us about semantic restrictions imposed by certain verbs

• Hirsch (2018, pp. 168 sqq.) uses the fact that the subject with mit 'with' and durch 'through' has to be an individual as one argument for the support of his claim that there is a systematic divide among the accusative EO verbs in German. According to him, it is not possible to use these PPs with these verbs because they are stative and their subject already is interpreted as a subject matter of emotion (⇒ proposition). However, some dative EO verbs occur with mit and durch regularly, and they should also be stative and have a subject matter subject.



Summary

- That the semantic stimulus is dispersed over several constituents is not a rare phenomenon in German
- Taking this 'split' as syntactic is not feasible
- Various prepositions display different semantic restrictions on their internal argument and the subject
- This may be exploited pragmatically



Open Questions

- What is the precise semantics of the prepositions involved? What are the precise differences between prepositions occurring in similar configurations (*mit*, *durch*; *an*, *bei*)? How do these readings relate to other readings of the prepositions?
- What are the differences to examples where the whole stimulus is expressed in the subject NP?
- Which EO verbs are (in-)compatible with which PPs (or combinations of subjects and PPs)?





A Corpus-based Perspective on 'Split Stimuli' in German

Thank you for your attention

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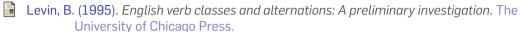


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Complex examples

Mit: Action with an abstract object as subject: Agent can be inferred from context. (There may be an PP attachment ambiguity here and Gegenüberstellung 'juxtaposition' also has a result reading, but we consider the relevant reading at least possible here)

(16) Jedenfalls hatte [...] der Konzertzyklus mit einer Gegenüberstellung sämtlicher however had the concert.cycle with a juxtaposition all.gen Streichquartette von Schubert und Schostakowitsch das Publikum [...] befremdet [...] string.quartets of Schubert and Shostakovich the audience alienated 'In any case, the concert cycle had alienated the audience with a juxtaposition of all the string quartets by Schubert and Shostakovich.'

Mit: human subject, internal argument concrete object.

(17) Da fällt man mit fremdländischem Esswerkzeug natürlich auf. there strikes one with foreign eating utensils naturally PRT 'Of course, you stand out with foreign eating utensils.'



Complex examples

Why so many non-property interpretations for *als*?: It seems that during annotation, we tended to annotate 'property' if on the more prominent reading of the sentence, this predication is the stimulus of the experiencer's emotion, and what would usually be the class of the head noun of the internal argument if a reading where the PP rather seems to provide additional information is more prominent.

Als 'as' with definite article:

(18) [...] Hotels, die Schrott als die «eigentlichen Tempel unseres Jahrhunderts» faszinieren hotels that Schrott as the actual temples our.gen century.gen fascinate [...]

'hotels that fascinate Schrott as the real temples of our century'

Deviant example with *durch* 'through': At least on our judgement the subject has to be coerced into a different reading here.



Complex examples

(19) Manz' Wettermacherqualitäten [...] begeistern durch ihre Naturnähe.

Manz.gen weather.maker.qualities thrill through their nature.closeness

'Manz's weather-making skills thrill (everyone) due to their naturalness'

Split propositional stimulus with als:

(20) Dass die Bewegung der Himmelskörper exakt zu messen und zu berechnen sein soll,
That the movement of celestial.bodies exact to measure and to calculate be shall,
erschreckt ihn als Beweis der Leblosigkeit des Weltraums [...]
startles him as proof the lifelessness of space [...]
'The fact that the movement of celestial bodies is to be measured and calculated exactly
startles him as proof of the lifelessness of space [...]' (NZZ 1999 04 17 a229 seg9 s6)

