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PATTERNS OF ARGUMENT STRUCTURE AND ARGUMENT REALIZATION WITH CLAUSE-EMBEDDING PREDICATES IN GERMAN: AN ILLUSTRATION OF THE ZAS DATABASE OF CLAUSE-EMBEDDING PREDICATES

Abstract: This paper has two distinct but interdependent goals. The empirical and analytical primary goal is to present a detailed overview of the patterns of (syntactico-semantic) argument structure and (morpho-syntactic) argument realization found with clause-embedding predicates in German. In particular, it will elucidate the observable relationships and dependencies between them, with a special focus on prepositional object clauses. The methodological secondary goal is to demonstrate the recently published ZAS Database of Clause-Embedding Predicates and illustrate its usefulness in approaching a concrete research agenda. The goals are aligned with each other because the data on patterns of argument structure and realization were collected using the database, and indeed the relevant questions could not have been investigated in such a thorough and efficient way without it. We will begin in Part 1 with an introduction to the database, its structure, and why and how it was created, before moving in Part 2 to the presentation of the data and analysis of argument structure and argument realization.

Abstract: Die vorliegende Arbeit verfolgt zwei unterschiedliche, aber voneinander abhängige Ziele. Das empirische und analytische Hauptziel besteht darin, einen detaillierten Überblick über die Muster der (syntaktisch-semantischen) Argumentstruktur und der (morpho-syntaktischen) Argumentrealisierung bei satzeinbettenden Prädikaten im Deutschen zu vermitteln. Insbesondere sollen die beobachtbaren Beziehungen und Abhängigkeiten zwischen ihnen aufgezeigt werden, wobei ein besonderer Fokus auf präpositionalen Objektsätzen liegt. Das methodenspezifische Nebenziel ist sowohl die jüngst veröffentlichte ZAS-Datenbank satzeinbettender Prädikate zu präsentieren als auch ihren Nutzen bei der Bearbeitung einer konkreten Forschungsagenda zu veranschaulichen. Die Ziele sind aufeinander abgestimmt, weil die Daten zu den Mustern der Argumentstruktur und -realisierung mit Hilfe der Datenbank erhoben wurden und die relevanten Fragen ohne sie nicht so gründlich und effizient hätten untersucht werden können. Wir beginnen in Teil 1 mit einer Einführung in die Datenbank, ihrer Struktur und warum und wie sie erstellt wurde, bevor wir in Teil 2 zur Präsentation der Daten und der Analyse von Argumentstruktur und Argumentrealisierung übergehen.

Keywords: German clause-embedding predicates, syntactico-semantic argument structure, morpho-syntactic argument realization, prepositional object clauses, ZAS Database of Clause-Embedding Predicates

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1. An introduction to the ZDB

1.1 Motivation and conception of the ZDB

The *ZAS Database of Clause-Embedding Predicates*,[1] henceforth ZDB, grew out of the desire to document the distinct patterns of clausal complementation of lexical predicates on a previously unattained scale, providing a basis to then classify those predicates – cf. Stiebels et al. (2018).[2] It was prompted by the observation that there was no adequate empirical foundation available for discussions of how types of complementation relate to or are licensed by particular predicates. Any analysis that is centered on a handful of verbs that are characteristic for specific types of clausal complement, no matter how careful, runs the risk of following misleading idealizations, skewed by the behavior of a few highly frequent predicates. The behavior of such predicates may not in fact be representative, and in any case is unlikely to reflect the full range of patterns found across all relevant predicates. The idea of the database is instead to massively extend the set of predicates considered and then systematically check for their occurrence with specific complementation types, thereby making it possible to test existing generalizations and identify new ones.

Relatedly, the goal is to document the full array of distinct clausal complements that are admissible with individual predicates. That is, we want to go beyond the tendency to either stick to a small number of very broad types, like declaratives, interrogatives and control infinitives, or look into detail, but only in one circumscribed area, like the different subtypes of interrogatives. It is well known from previous work on specific cases that individual predicates can vary significantly in precisely the fine details of the complement types they combine with, and under what circumstances they can do so. Thus, there is a need to go beyond just listing a handful of macro-clause-types for each predicate, and instead to catalogue the occurrences of each verb with a far more comprehensive inventory of the complementation types found in a given language. Only this will allow us to identify which specific properties are relevant and how they might interact with each other, e. g. what implications there might be between the verb moods a predicate licenses in finite complements and the sorts of control patterns it displays with non-finite ones.

An important methodological stimulus for the ZDB in this vein was Levin's (1993) book, which defines English verb classes in terms of the (argument-structural)

[1] www.owid.de/plus/zasembed/ (last access: 6.7.2021).

[2] We would like to note at this point the existence the valence dictionary of German verbs (VALBU) and its digital counterpart (E-VALBU) – cf. Schumacher et al. (2004). This includes extensive information about the significance of the predicates and the realization of the individual arguments, though not on clause-embedding behavior.

alternations that the verbs can participate in. Levin collected an impressive array of very detailed data on a large number of English verbs but did not consider clause-embedding predicates and their complements (see Stiebels 2011 for discussion). The ZDB intends, among other things, to help fill this gap. In place of admissible verbal alternations, we take the array of clausal complements found with particular predicates as a potential way of defining predicate classes. Rather than starting from e. g. semantic properties of verbs and attempting to derive their complementation patterns, we can use the database to investigate how embedding types cluster in their admissibility with specific predicates, providing an array of possible predicate classifications. We can then go back to the database to see what relationships might be found among the identifiable properties of the lexical predicates, the surrounding context, and the licensing of the different complement types. The current paper provides a concrete example of this kind of investigation. It details how the argument-structural patterns of clause-embedding predicates relate to the ways in which their arguments are realized morpho-syntactically, including the important question of when a propositional argument – the typical complement clause – can remain unrealized.

To these ends, the ZDB was developed following a series of desiderata. First, the usage of the predicates with different complementation types should be exemplified by naturally occurring sentences taken from existing high-quality corpora.[3] This was motivated in no small part by the insight that certain complementation patterns that seem unnatural in invented examples are unobjectionable when they occur in certain natural contexts, and furthermore that these contexts are themselves difficult to anticipate. Second, each predicate should be checked in all of its meaning variants and valency patterns. This is highly relevant for the study of argument structure and realization patterns, especially in interaction with polysemy, in the second part of this paper. Third, properties that appear to be relevant for specific complementation types should be checked systematically by searching for corpus examples that might contain them in various combinations with each individual predicate (e. g. the indicative/subjunctive distinction in embedded finite clauses or controller choice in infinitival complements). Fourth, only "surfacey" features should be exemplified and annotated, in order to keep the annotation simple and reasonably uncontroversial. I. e. we avoid encoding interpretive properties that would require (overly) subjective judgment or factors that depend on specific theoretical assumptions.[4]

[3] Complete information on the sources used can be found in the ZDB User's Guide (www.owid.de/plus/zasembed/docs/ZDB_UG.pdf, last access: 6.7.2021), section 4.

[4] More on the background of the ZDB, including the history of its development, can be found in the Users Guide, section 3.

1.2 Structure, properties and current status of the ZDB

The ZDB in its current published form documents the clausal complementation patterns of 1806 distinct predicates in contemporary German on the basis of 16804 corpus examples. It includes complement infinitival clauses, *dass*-clauses, verb-second clauses, interrogative clauses (embedded polar and *wh*-questions) and nominalizations. It also includes minor types such as argument conditionals (introduced by *wenn* 'if') and is being expanded for later releases to cover parentheticals and embeddings of direct speech. For each of these embedding types, the possibilities for several additional relevant grammatical properties are further exemplified for each predicate, e. g. the distinct control possibilities in infinitives and the definiteness of nominalizations. The result is an extremely detailed documentation of the distinct embedding behaviors that are found with the predicates that are included.

The basic structure of the database is built around two sets of data, essentially two large tables, and the connections between them. One table contains entries for the predicates, and the other contains entries for all of the examples. The two are linked in that every entry in the example table is associated with exactly one entry in the predicate table, and correspondingly, every entry in the predicate table is associated with a series of entries in the example table. That is, each example exemplifies a particular use of one of the predicates, and each predicate is exemplified by a list of examples. The two tables additionally contain an array of information encoded about each predicate (so-called predicate properties) and each example (example properties). The predicate properties include *i.* information about the predicate's categorial make-up (e. g. verb, copula + adjective combination …) and *ii.* its morphology (prefix verb, a particle verb …). The example properties[5] include *i.* the syntactic type of the embedded proposition (declarative verb final, declarative verb second, interrogative, infinitive, or nominalization), *ii.* the identity of the complementizer if there is one (*dass*, *ob*, *wenn*, *wer* …), *iii.* the (rough) semantic type of the embedded clause suggested by its complementizer (Assert, Quest,[6] Cond, or Unm in

[5] There is a fair amount of redundancy in the coverage of the various example properties – e. g. the example type 'declarative verb final' implies semantic type Assert, finiteness type Finite and word order Vlast. This is not an oversight, but is rather by design. The fact that there are implicational relationships among the various properties does not mean that they can be collapsed with each other, and there are several constellations where they are dissociated. Furthermore, the redundancies that we find generally reflect specific properties of (contemporary) German, and other languages show distinct implications (e. g. English has interrogative infinitives while German does not). Since the ZDB is designed to accommodate multiple languages, it necessarily includes more flexibility than would be strictly necessary for contemporary German. See sections 6 and 7 of the users guide for detailed discussion.

[6] See the list of abbreviations in the end of this paper.

clause types without a complementizer to mark such distinctions), *iv.* its finiteness type (Finite, Infinite, Nominalization),[7] *v.* its word order (Vlast or V2), and *vi.* the verb mood of the embedded predicate (INDC, KONJ I, KONJ II). With embedded nominalizations it is also indicated whether the nominalization itself is definite or indefinite, and for embedded infinitives certain control properties are encoded. For a full description of the properties coded in the database, see the User's Guide, section 7.

The publicly available version of the ZDB is accessed on the IDS's OWID^{plus} platform through a custom-built interface for search and exploration, which was designed and programmed by Peter Mayer in consultation with the ZAS database team. The interface makes it possible to construct arbitrarily complex searches for both predicates and examples, based on properties coded for both. Yet it still presents the data in an intuitive way that allows novice users to explore the database through basic, easy-to-understand queries. The database has already proved to be a valuable aid for research projects on a number of topics – cf. Schwabe (2013, 2015, 2016, 2019, 2020), Schwabe/Fittler (2014), and Schwabe/Frey/Meinunger (2016). The topic argument structure and argument realization of clause-embedding predicates will be the focus of this paper, concentrating above all on prepositional object clauses.

2. Application example: patterns of argument structure and argument realization with clause-embedding predicates

The subsequent part is about the relationship between argument structure and argument realization. It is an attempt to test hypotheses H1 and H2.

H1 Obligatory propositional arguments tend to structural, optional propositional arguments to lexical cases.

H2 Concerning prepositional object clauses and the omission of prepositional adverbs, obligatory prepositional objects tend to allow less omission.

Section 2.1 gives an overview of possible argument structures and argument realizations of German sentence-embedding predicates. Section 2.2 focuses on prepositional objects and sections 2.3 and 2.4 are dedicated to the testing of H1 and H2.

[7] Nominalization counts as a finiteness type in the annotation system because finiteness is defined here in terms of the form of the main predicate of the propositional argument. In the embedding types included in the contemporary German portion of the ZBD, this can be either a finite verb, an infinitive with *zu* or a nominalized verb.

2.1 Argument Structure and Argument Realization in general

Argument Structure (AS): The argument structure property in the ZDB indicates the number of arguments a predicate can have, the argument type of each argument, and the position of an argument realization in a potential syntactic structure. The database uses different variables to indicated different argument types: individual arguments x, y, z and propositional ones P, Q [e. g. *wissen* 'know' with P-x and *abhängen* 'depend' with Q-P], reflexive ones r [e. g. *sich irren* 'be mistaken'with P-r-x], expletive ones e [e. g. *bedürfen* 'require with P-e], raising ones [e. g. *beginnen* 'begin' with P-a], and predicative ones P-r [e. g. *kritisieren* 'criticize' with Pr-P-x]. The argument types are distinguished by using semantic as well as syntactic criteria. While the individual and propositional argument types relate to ontological entities, reflexive, expletive and raising arguments relate to syntactic notions. Of course, an individual and a propositional argument can each be a raising argument. But this depends on the respective predicate. The order of the arguments indicates the hierarchical position of the argument realizations in a syntactic structure – cf. Bierwisch (1983) and Wunderlich (1997). The realization of the argument specified by the leftmost variable will be closest to the verb. In the case of a two-place predicate like *glauben* 'believe', which has the argument structure P-x, the specification of P is the direct object. As to three-place predicates like *erlauben* 'permit' with P-y-x, the argument specification of P is again the direct object. The specification of y is the indirect object. There are predicates where argument variables do not necessarily have to be realized by a syntactic constituent. This is the case, for example, with *loben* 'praise'. The propositional argument P can be suppressed here. These optional argument realizations are indicated in the database by round brackets. The argument structure of *loben* 'praise' is therefore (P)-y-x.

Looking at the argument structure of the 1806 predicates of the ZDB, one can see that 39 have one-place argument structures, i. e. 2%. 86% of the predicates have two-place argument structures, 64% have three-place ones and 0,5% four-place. The sum of the percentages shows that many predicates have multiple argument structures. In other words, these predicates are polysemous in a particular way. That is, the lexical entry of a clause-embedding predicate can comprise different sub-variants. While most predicates in the database turn out to have only one argument structure (e. g. eingestehen 'confess' with P(y)x), a considerable number exhibit two argument structures (e. g. imponieren 'impress' with (x)-P and (P)-(y)-x), some allow three argument structures (e. g. vorbereiten 'prepare' with (P)-r-x, P-(y)-x and P-x), a few have four argument structures (e. g. überraschen 'surprise' with (x)-P, (Q)-(x)-P, (P)-y-x and (P)-(y)-x, and 1% of them even show five distinct argument structures (e. g. *beginnen* 'begin' with (Q)-(P)-x, (Q)-P, P, P-a, P-x).

There are twenty-two different argument-structure types for which there are more than eight predicates. The following table shows each of these argument structures, two example predicates, the total number of predicates in the database that have the structure and the percentage that these predicates constitute of all 1806 in the database.

AS	**Examples**	**Preds 1806**	**%**
P	*naheliegen* 'be obvious', *zutreffen* 'be true'	39	2,0%
r-P	*sich durchsetzen* 'be established', *sich erübrigen* 'be superfluous'	28	2,0%
P-x	*ablehnen* 'decline', *zulassen* 'permit'	790	44,0%
(P)-x	*abstimmen* 'vote', *träumen* 'dream'	249	14,0%
Q-P	*bedeuten* 'mean', *widersprechen* 'contradict'	114	6,0%
(Q)-P	*folgen* 'follow', *passen* 'fit'	10	0,5%
x-P	*amüsieren* 'amuse', *verdrießen* 'annoy'	157	9,0%
(x)-P	*alarmieren* 'alert', *überraschen* 'surprise'	126	7,0%
P-e	*ankommen* ‚be the point'	9	0,5%
P-y-x	*anlasten* 'blame', *zurufen* 'shout'	115	6,0%
P-(y)-x	*abhalten* 'keep sb./sth. off', *androhen* 'threaten'	169	9,0%
(P)-y-x	*abkanzeln* 'lecture', *unterstützen* 'support'	279	15,0%
(P)-(y)-x	*ablenken* 'distract', *zustimmen* 'agree',	112	6,0%
Q-P-x	*ableiten* 'conclude', *unterscheiden* 'distin-guish'	19	1,0%
(Q)-P-x	*ablesen* 'read', *widerlegen* 'refute'	100	6,0%
Q-(x)-P	*abhalten* 'keep sb. from', *zwingen* 'force'	34	2,0%
(Q)-(x)-P	*abschrecken* 'scare', *verlocken* 'entice'	22	1,0%
P-r-x	*sich damit abfinden* 'accept', *sich darauf versteifen* 'harden'	150	8,0%
(P)-r-x	*sich informieren* 'inform', *sich zurückziehen* 'pull out'	127	7,0%
Q-r-P	*sich äußern* 'express itself', *sich danach richten* 'act according to'	17	1,0%
Pr-P-x	*abtun* 'dismiss sth. as', *nennen* 'call'	38	2,0%
(P)-(y)-r-x	*sich entschuldigen* ‚apologize', *sich unterscheiden* ‚differ'	9	0,5%

Table 1: AS-types of the ZDB exemplified by at least eight predicates

Argument realization (AR): The property 'argument realization' in the ZDB is to be understood as the way the respective arguments specified by the argument struc-

ture are realized morphosyntactically. Possible argument realizations are Nominative (NOM), Accusative (ACC), Dative (DAT), Genitive (GEN), and Prepositional Case (OBL).[8] Since clausal complements do not have a case in German, they must be imagined as realized by a noun or indicated by a sentential correlate to determine their argument realization value – cf. (1c) to (5c).[9] As shown in (1c) to (5c), a sentential correlate relates to an extraposed relating clause. Depending on the predicate, it can occupy the subject or an object position – cf. Zifonun/Hoffmann/Strecker (1997); Breindl (2013); Zitterbart (2013); Schwabe/Frey/Meinunger (2016); Frey (2016); Schwabe (2016).

(1) a. *Ob die einstweilige Verfügung der Kasse Erfolg hat,* NOM
steht noch aus. (ZDB 12622: DWDS BZ 1999)
'Whether the cash register's restraining order will be successful, is still pending

b. [*Ein Erfolg der einstweiligen Verfügung der Kasse*]$_{\text{NOM}}$ *steht noch aus.*
'A success of the temporary injunction of the cash office is still pending.'

c. *Es/das steht noch aus, ob die einstweilige Verfügung der Kasse Erfolg hat.*
'It remains to be seen whether the injunction of the cash office will be successful.

(2) a. *Die Grünen lehnen ab,* ACC
dass Sport und Schule getrennt werden. (ZDB 45: DWDS BZ 2000)
'The Greens reject the separation of sport and school.'

b. *Die Grünen lehnen* [*die Trennung von Sport und Spiel*]$_{\text{ACC}}$ *ab.*
'The Greens reject the separation of sport and school.'

c. *Die Grünen haben* [*das/es*]$_{\text{ACC}}$ *abgelehnt, Sport und Schule zu trennen.*
'The Greens have refused to separate sport and school.'

(3) a. *Allerdings muss das Jugendamt zustimmen,* DAT
ob eine Frau aufgenommen wird. (ZDB 10496: DWDS BZ 2001)
'However, the Youth Welfare Office must agree whether a woman is admitted.'

[8] In the ZDB, OBL stands for Oblique Case. The specific preposition licensed by the verb can be indicated in square brackets, for example OBL[unter] for *darunter leiden* 'suffer from'. As pointed out by a reviewer, our usage differs from traditional, categorizations of all cases other than nominative or other than nominative and accusative as oblique.

[9] See Zifonun/Hoffmann/Strecker (1997, pp. 1070–1077) and Breindl (2013, p. 461), who refer to Engel (1977 and 2009, pp. 131 f.), call the prototypical argument realization "Leitform".

b. *Allerdings muss das Jugendamt* [*einer Aufnahme einer Frau*]$_{\text{DAT}}$ *zustimmen.*
'However, the youth welfare office must agree to the admission of a woman.'

c. *Allerdings muss das Jugendamt* [*dem*]$_{\text{DAT}}$ *zustimmen, ob eine Frau aufgenommen wird.*

(4) a. *Ich wurde nie gewahr,* GEN
ob sie unseren Rekord zunichtemachten. (ZDB: 12236: DWDS K-Be 1983)
'I never realized if they broke our record.'

b. *Ich wurde nie* [*eines Zunichtemachens unseres Rekordes*]$_{\text{GEN}}$ *gewahr.*
'I never noticed our record being broken.'

c. *Ich wurde nie* [*dessen*]$_{\text{gen}}$ *gewahr, ob sie unseren Rekord zunichtemachten.*

(5) a. *So könnte sie beitragen, dass die technische* OBL
Entwicklung vorankommt, … (ZDB 1848: DWDS TS 2004)
'In this way it could contribute to technical development.'

b. *So könnte sie* [*zum Vorankommen der technischen Entwicklung*]$_{\text{PP}}$ *beitragen.*
'In this way it could contribute to the advancement of technical development.'

c. *So könnte sie* [*dazu*]$_{\text{PP}}$ *beitragen, dass die technische* OBL
Entwicklung vorankommt, …

There are some predicates in the database where it is not clear whether their annotated propositional arguments are really arguments – see for instance *einschränken* 'qualify' in (6a) and *aufatmen* 'breathe a sigh of relief' in (6b).

(6) a. *Er schränkte aber ein, nicht über sämtliche Kontakte* ZERO
im politischen und wirtschaftlichen Leben Bescheid zu wissen.
'But he qualified that he did not know about all contacts in political and economic life.'

b. *Noch kann sie* (*unter dicken Rauchschwaden*) *aufatmen,*
daß nicht etwa ein Rauchverbot diskutiert wird. (ZDB 12203: DWDS BZ 1997)
'She can still breathe a sigh of relief (under thick clouds of smoke) that a smoking ban is not being discussed.'

Predicates like *einschränken* 'qualify' modify a non-expressed utterance predicate. That is, the complement clause is rather a complement of a silent utterance-denoting predicate. As for predicates like *aufatmen* 'breathe a sigh of relief', the presumed

argument clause expresses the stimulus for the mental state expressed in the main clause. Realizations of propositional arguments that seem not to be case marked are labeled ZERO in the database.

The database shows that 50% of predicates take a propositional argument corresponding to an accusative object, 49% take one corresponding to a prepositional object, 19% to a subject, 2% to a dative object, and 1% to a genitive object. For 10% of predicates, there is a propositional argument with unclear status. Their argument realization is annotated with ZERO.

In the following section we will concentrate on prepositional complement clauses.

2.2 Prepositional objects in focus

General remarks: As mentioned above, the oblique case of sentential prepositional objects is diagnosed by prepositional sentential correlates like *davon* in (7a–c).

(7) a. *Max hat* ... $[_{V'}\ [_{PP}\ [_{PP}$ *davon*$]\ [_{CP}$ *dass Isa gewinnt*$]]\ [_{V0}$ *geträumt*$]]$.
'Max dreamed that Isa would win.'

b. $[_{PP}\ [_{PP}$ *davon*$]\ [_{CP}$ *dass Isa gewinnt*$]]_i$ *hat Max* ... $[_{V'}\ t_i\ [_{V0}$ *geträumt*$]]$.

c. *Max hat* ... $[_{V'}\ [_{PP}$ *davon*$]_1\ [_{V0}$ *geträumt*$]]$ ... $[_{CP}$ *dass Isa gewinnt*$]_1$

In (7a) and (7b), the preposition *von* and the pronominal item *da* are joined together to form a morphologically complex unit, a prepositional adverb. A prepositional adverb which acts as a prepositional object is regarded as a prepositional sentential correlate or proform, ProPP in the following – cf. Breindl (1989, pp. 177–197), Axel-Tober (2012, p. 55), Breindl (2013, p. 461), Schwabe (2013, p. 143), Frey (2016, p. 87), Schwabe/Frey/Meinunger (2016, pp. 6–9). As shown in (7a) and (7b), the ProPP forms a complex PP-constituent with its adjacent clause. In (7a), the PP is in the middle field. From this position, it can move to the pre-field, as seen in (7b). Neither the ProPP nor the related clause can move to the pre-field separately.[10] The location of the related clause in the post-field, however, with the ProPP in the middle field, is possible. The latter configuration can be represented as in (7c) where the ProPP is base-generated as a V^0-complement and its related clause is base generated in the post-field.

Opinions differ as to whether the related clause is base-generated in the middle field or post-field – cf. the discussion in Schwabe/Frey/Meinunger (2016). Since the discussion plays no role for the further considerations, we will leave it at the representation in (7c).

[10] A reviewer pointed to the possibility of structures like i). However, here the ProPP is anaphoric. The related clause can be regarded as right dislocation/ afterthought – see Truckenbrodt (2016, pp. 109–116)

i) Davon hat Max geträumt, dass Ida gewinnt.

Stock of prepositions: The prepositions that occur in ProPPs consist of the twenty-one simplex prepositions: *ab*, *an*, *auf*, *aus*, *bei*, *bis*, *durch*, *für*, *gegen*, *hinter*, *in*, *mit*, *nach*, *neben*, *um*, *unter*, *über*, *von*, *vor*, *zu*, and *zwischen* mentioned in the paragraph "Präposition" in Grammis (cf. 'Präposition' in the References). Except for *ab* and *bis*, all simplex prepositions can form a prepositional adverb by incorporating the pronominal element da (cf. Table 2, which also indicates how many predicates in the database appear with each). Apart from daneben, all prepositional adverbs can be used as ProPPs. As Breindl (1989, p. 180) already noted, the *a* of *da* can be reduced if it is deaccented and the ProPP exhibits an intervocalic *r* – e. g. *darüber* >> *drüber*. When used as a ProPP, however, *darin* does not allow this reduction – cf. **er vertraut drin, dass* … 'trust'; **er willigt drin ein, dass* … 'agree'; **er irrt drin, dass* … 'be wrong'; and **er unterstützt sie drin, dass* … 'support'.

Preposition	**Prepositional adverbs**	**Prepositional correlates + verb**	**Preds 903**
an 'at'	*daran*	*daran denken* 'think of'	68
ab 'from'	–	–	
auf 'on'	*darauf*	*darauf hoffen* 'hope for'	121
aus 'from'	*daraus*	*daraus folgen* 'follow from'	18
bei 'at'	*dabei*	*dabei ertappen* 'catch'	27
bis 'until'	–	–	
durch 'by'	*dadurch*	*sich dadurch bestimmen* 'determine os'	48
für 'for'	*dafür*	*dafür stimmen* 'vote for'	133
gegen 'against'	*dagegen*	*sich dagegen absichern* 'protect against'	39
hinter 'behind'	*dahinter*	*dahinter stehen* 'stand behind'	1
in 'in'	*darin*	*darin zustimmen* 'agree in'	75
mit 'with'	*damit*	*damit abplagen* 'slog'	161
nach 'after'	*danach*	*danach suchen* 'look for'	35
neben 'beside'	*daneben*	–	
um 'for'	*darum*	*sich darum bemühen* 'try'	47
unter 'behind'	*darunter*	*sich darunter vorstellen* 'imagine'	5
über 'about'	*darüber*	*sich darüber unterhalten* 'chat'	170
von 'from'	*davon*	*sich davon distanzieren* 'dissociate'	66
vor 'before'	*davor*	*sich davor fürchten* 'fear'	25
zu 'for'	*dazu*	*dazu beitragen* 'contribute'	170
zwischen 'between'	*dazwischen*	*dazwischen unterscheiden* 'distinguish'	4

Table 2: Prepositional adverbs and prepositional correlates

'*Origin*' *of prepositional objects*: A first overview shows that most of the prepositional objects are grammaticalized adverbials – cf. Breindl (2013, p. 461). These adverbial-like arguments are firmly connected to the lexical entry of the predicate, i. e. they belong to its argument structure. Among the prepositional objects there are some that are the objects of subject-experiencer predicates, while others relate to sets of statements.

i. About 90% of oblique predicates license adverbial-like prepositional objects. Table 3, which presents the adverbial types found in the ZDB, shows adverbial types that correlate, for instance, with directional, local, modal, causal, and final adverbials. It seems to make no difference whether the P argument is obligatory or optional.[11] It is easy to see that there is a connection between the adverbial type and the preposition involved: Directional and local adverbials use *auf*, *an*, *in*, and *nach*, modal adverbials take *mit*, causal adverbials use *für*, *über*, *um*, and *vor*, purpose adverbials utilize *für* and *zu*, and final adverbials take *zu*.

	[P]-x	**[P]-r-x**	**[P]-[y]-x**
DIRECTIONAL	*darauf abzielen* 'aim at'	*sich danach sehnen* 'yearn for'	*jm. darauf hinweisen* 'point at'
	darin einwilligen 'agree to'	*sich davon lossagen* 'break away'	*jm. davon entlasten* 'relieve of'
LOCAL	*darauf verharren* 'insist on'	*sich daran klammern* 'cling to'	*jm. darin bestätigen* 'confirm in'
	daran arbeiten 'work on'	*sich darin auskennen* 'be familiar with'	*jm. darin folgen* 'follow in'
INSTRUMENTAL	*damit herausrücken* 'come out with'	*sich damit behelfen* 'help to'	*jm. damit überfahren* 'steamroll sb. with'
	damit angeben 'show off'	*sich damit wehren* 'resist'	*jm. damit beschämen* 'embarrass with'
STIMULUS	*dafür haften* 'be liable for'	*sich dafür rühmen* 'pride on'	–
	davor zittern 'tremble before'	*sich darüber ärgern* 'be upset about'	*jm. darum beneiden* 'envy for'
PURPOSE	*dazu berufen sein* 'be appointed to'	*sich dazu verschwören* 'conspire for'	*jm. dazu befähigen* 'enable sb. to'
	dafür trainieren 'train for'	*sich dafür anstrengen* 'work hard to'	*jm. dafür schulen* 'train to'

[11] Examples with obligatory P are in the first line for each adverbial type, ones with optional P in the second one. The square brackets indicate that P is either optional or obligatory.

	[P]-x	**[P]-r-x**	**[P]-[y]-x**
FINAL	*dazu beitragen* 'contribute to'	*sich dazu bequemen* 'comfort to'	*jm. dazu veranlassen* 'cause sb. to'
	dazu übereinkommen 'agree to'	*sich dazu aufraffen* 'get ready for'	–

Table 3: Selection of adverbial types of prepositional objects[12]

ii. There are about 100 predicates the prepositional objects of which are the result of grammatical operations, which can be described roughly as transformations from an object-experiencer (OE) variant of a predicate to a subject-experiencer (SE) one. In the following we see three variations of this: (8a) where in the SE-variant (P)-x the predicate is adjectivized, (8b) where the predicate remains active but undergoes a vowel change in the SE-variant, and (8c) where the predicate is reflexivized in the SE-variant.

(8) a. x-P (P)-x
Dass P, alarmiert ihn. *Er ist darüber alarmiert, dass P.*
NOM ACC NOM OBL
'It alerts him that P.' 'He's alarmed that P'

b. x-P (P)-x
Dass P, erschreckt ihn. *Er erschrickt darüber, dass P.*
NOM ACC NOM OBL
'It frightens him that P.' 'He's scared about that P'

c. x-P (P)-r-x
Dass P, regt ihn auf. *Er regt sich darüber auf, dass P.*
NOM ACC NOM REFL. ACC OBL
'That P upsets him.' 'He's upset that P.'

iii. About 10% of the prepositional objects relate to sets of statements. In (9a, b), the prepositional objects denote statements which are answers to questions, which in turn are regarded as sets of propositions {p, ¬p}. The questions *Should the taxes be increased?* and *Can Leon sing along or not?* are contextually given. While the answer is controversial in (9a), which is indicated by the matrix predicate *diskutieren* 'discuss', it is uncontroversial in (9b). In (10a, b) the prepositional objects denote the question itself. In all cases, the set relation is indicated by the prepositional adverb *darüber* 'there-about'.

[12] The square brackets again indicate that the distinction between obligatory and optional argument is ignored here.

(9) a. *Sie diskutieren darüber, dass die Steuern erhöht werden sollen.*
'They are discussing raising taxes.'
b. *Sie haben darüber entschieden, dass Leon nicht mitsingen darf.*
'They've decided that Leon can't sing along.'

(10) a. *Sie diskutieren darüber, ob die Steuern erhöht werden sollen.*
'They are discussing whether taxes should be raised.'
b. *Sie haben darüber entschieden, ob Leon mitsingen darf.*
'They've decided whether Leon can sing along.'

While the predicates in (9a, b) and (10a, b) relate to questions and thus to sets of statements with alternative truth values, the predicate *lesen* 'read' in (11a, b) relates to sets of statements with non-alternative truth values. In both cases, the realization of P follows from a set of statements the matrix subject has read.

(11) a. *Die Leute haben darüber gelesen, dass die Steuern steigen sollen.*
'People have read about taxes going up.'
b. *Ich habe davon gelesen, dass die Steuern steigen sollen.*
'I've read that taxes are to go up.'

The ProPP *darüber* seems to indicate that the subject has read a comprehensive amount of text, while the ProPP *davon* indicates that the subject has read only a part of some set.[13] ProPPs of this type are often used for pejorative speech reports – cf. *davon labern* in (12).

(12) *Er hat davon gelabert, dass er keine Zeit habe.*
'He was babbling about not having time.'

Non-overt prepositional correlates: 59% of the approximately 900 oblique predicates allow the ProPP to remain unrealized if its associated clause is extraposed – cf. (13) and (14a).

(13) *Die Kassen plädieren* (*dafür*), *zunächst die weitere Entwicklung abzuwarten*
(ZDB 6992: DWDS BZ 2005)
'The health insurers are pleading to wait for further developments first.'

As shown in (14b), the silent ProPP is *pro*, which is case marked and thus licensed by its head *beneiden* 'envy'. Unlike the associated clause of an explicit ProPP, the one associated with *pro* cannot appear adjoined to it – cf. (14c). The reason for this is the

[13] One reviewer pointed out that this partial-whole-relation is an instance of the general pattern of ACC-von[DAT] alternations which are found with non-clausal complements too, cf. *Ich esse den Kuchen* 'I eat the cake' vs. *Ich esse von dem Kuchen* 'I'm eating the cake'.

generally known fact that the pronominal part of the ProPP must be accented if the related clause is adjoined to it – cf. (14d) and, for example, Breindl (1989, p. 180).

(14) a. *Fast möchte man Jürgen Höllers Mitarbeiterin Kerstin* (*darum*) *beneiden, dass ihr Beruf trotz der Niederlage immer noch ihr „bester Freund" ist – …* (ZDB 2070: DWDS BZ 2002)
'One almost wants to envy Jürgen Höller's colleague Kerstin (for the fact) that her profession is still her "best friend" despite the defeat.'

b. Man möchte … $[_{VP}$ Kerstin $[_{V'}$ $[_{PP}$ *pro*$_1$$]$ $[_{v0}$ beneiden$]]]$ … $[_{CP}$ dass ihr Beruf … ihr bester Freund ist$]_1$

c. *Man möchte … $[_{VP}$ Kerstin $[_{V'}$ $[_{PP}$ $[_{PP}$ *pro*$_1$$]$ $[_{CP}$ dass sie in Rom war$]_1]]$ $[_{v0}$ beneiden$]]$.

d. Man möchte … $[_{VP}$ Kerstin $[_{V'}$ $[_{PP}$ $[_{PP}$ *darum*$_1$$]$ $[_{CP}$ dass sie in Rom war$]_1]]$ $[_{v0}$ beneiden$]]$.

We will return to silent ProPPs in section 2.4.

Predicates with varying argument realization: The examples (15), (16) and (17) show that the predicates *diskutieren* 'discuss', *entscheiden* 'decide' and *lesen* 'read' each show variation with respect to their argument realization. They belong to the approximately 130 predicates whose argument realization alternates between ACC-NOM and OBL-NOM – cf. (15a, b).

(15) a. *Zum ersten Mal hatte ich* $[es]_{ACC}$ *in England gehört, dass dort durch die Potter-Bücher angeblich mehr Familien vorlesen.* (ZDB 25418: DWDS 2014)
'For the first time I had heard in England that more families allegedly read aloud because of the Potter books.'

b. *Er hat* $[davon]_{OBL}$ *gehört, dass mit der Reform mehr Polizisten Dienst auf der Straße tun sollen.* (ZDB 5689: DWDS BZ 2002)
'He heard that the reform is supposed to put more cops on the street.'

According to Schwabe/Fittler (2014a, b), predicates like *hören* 'hear' have in common that they are objectively veridical if they occur with an *es*- or ProPP-correlate. Predicates sharing this property relate directly to a proposition. If they embed an interrogative, they relate directly to the true answer of the question or to question extensions in the sense of Groenendijk/Stokhof (1997). While in the case of ACC there is a direct relationship between the subject individual and the proposition, in the case of a ProPP, the connection between the subject and the embedded proposition is indirect. Like in (11a, b) and (12), in (15b) and (16a), the ProPP refers to a statement that follows from what the matrix subject has heard. For instance, Frank heard among other things that Maria was seen in Rome by somebody. This potentially implies Maria being in Rome. If the associated clause of the ProPP is an *ob-*

clause as in (16b), the statement the ProPP refers to is related to a complex formula which follows from what Frank heard and which is related to the question {Maria is in Rome, Maria is not in Rome}. The complex formula could be, for instance, if Maria was seen in Rome, she is in Rome.

(16) a. *Frank hat davon gehört, dass Maria in Rom ist*
'Frank heard about Maria being in Rome'
b. *Frank hat davon gehört, ob Maria in Rom ist.*

Most of the predicates with varying argument realization can be placed into four predicate classes (cf. the first four columns in Table 4), but there are a few additional ones that are difficult to classify (cf. the ADDs-column).

KNOW	DECIDE	DISCUSS	THINK	ADDs
es/davon/darüber	***es/darüber***	***es/darüber***	***es/daran***	***es/dagegen***
berichten	*abstimmen*	*diskutieren*	*denken*	*anfechten*
'report'	'vote'	'discuss'	'think'	'refute'
erfahren	*bestimmen*	*verhandeln*	*glauben*	***es/dazu***
'find out'	'decide'	'negotiate'	'believe'	raten
schreiben	***es/dazwischen***		***es/darauf***	'advice'
'write'	*wählen*		*hoffen*	***es/dafür***
wissen	'chose'		'hope'	*garantieren*
'know'				'guarantee'

Table 4: Classes of ACC-NOM/OBL-NOM predicates

2.3 Obligatory and optional Arguments and Argument Realization

We now have all the prerequisites for turning to Hypothesis I: Obligatory propositional arguments tend to structural cases, while optional propositional arguments tend to lexical ones.

One-place predicates: The 39 one-place predicates of the database are uninteresting with regard to obligatory and optional statement arguments, because their one argument is always obligatory – cf. *ausstehen* 'be pending' in (1a).

Two-place predicates: As for the argument structure r-P of predicates like *sich durchsetzen* 'prevail' in Table 5, P as subject is obligatory and has NOM, which is a structural case. The reflexive is always realized with ACC. Concerning x-P and (x)-P predicates like *verdrießen* 'annoy' and *überraschen* 'surprise', their P again has NOM. Their experiencer argument is preferably realized by ACC.

AS	Preds	ACC	OBL	DAT	GEN	ACC/OBL
r-P	28	100%	0%	0%	0%	0%
x-P	166	59%	0%	34%	0%	0%
(x)-P	125	59%	0%	35%	0%	0%

Table 5: Argument realization of r-P and [x]-P predicates

P-x predicates – where P is obligatory realize 85% of their argument structure by ACC-NOM – cf. *etw. bedauern* 'regret sth.' in (2a).

AS	Preds	ACC	OBL	DAT	GEN	ACC/OBL
P-x	690	85%	37%	1%	1%	7%
(P)-x	233	15%	63%	5%	0%	30%

Table 6: Argument realization of [P]-x predicates

ACC and NOM are regarded as structural cases – cf. Bierwisch (1983) and Wunderlich (1997). This means that, if the predicate has the argument structure P-x, and nothing else is defined for it lexically, it will have the argument realization ACC-NOM as the structural default.

However, it should not be ignored that 37% of the P-x predicates realize the propositional argument P with prepositional case (OBL) – cf. *darauf bestehen* 'insist on sth.'. Unlike the structural accusative case of P-x predicates, oblique case is not structurally determined. It must be specified as part of the lexical information of the matrix predicate. The prepositional objects are obligatory because they are formative for the verb meaning – cf. *darauf abzielen* 'aim', *davon abbringen* 'dissuade' and *darüber hinwegtäuschen* 'hush up'. The fusion of the verb meaning with the unspecified P and the subject meaning would not result in a meaningful statement.

There are only a few predicates, 1% each, that realize their propositional argument with DAT or GEN – cf. (17a, b).

(17) a. *..., deshalb widerspreche ich dem, dass es ein Konjunkturprogramm ist.* (ZDB 9858: DWDS Zeit 2006)
'... thus I disagree that it's a stimulus package.'

b. *Dann plötzlich wird er dessen gewahr, dass die Nacht auch behilflich sein kann.* (ZDB 12242: DNB 2005 S95 976739070)
'Then suddenly he realizes that the night can also help.'

In addition, there are the 7% of the predicates that realize P with ACC or OBL – cf. *es/dagegen anfechten* 'contest sth.' and *es/darüber entscheiden* 'decide sth./on sth.' – cf. section 2.3.

(P)-x predicates – where P is optional – realize P with ACC only 35% of the time – cf. *etw. lernen* 'learn sth.' and *etw. überlegen* 'ponder sth.' In contrast to P-x predicates, 65% of them prefer prepositional case, i. e. OBL, for their propositional argument – cf. *darauf aufpassen* 'take care of sth.' and *davor zittern* 'tremble at sth.'. It looks here as though the optional propositional argument is added to a more basic argument structure – cf. *er zittert* 'he is trembling' and *er zittert davor, dass er verlieren könnte* 'he trembles at the prospect of losing'. Interestingly, 30% of the (P)x predicates are polysemous – cf. *es/darüber abstimmen* 'coordinate it/vote on it' and *es/danach googeln* 'google sth./for sth.' in contrast to P-x predicates, of which only 7% are.

Figures 1 and 2 show the distribution of optional and obligatory oblique complements with two-place predicates.[14]

[P]-x $_{242}$	
P-x	(P)-x
37%	63%

Fig. 1: Oblique two-place predicates and optional and obligatory P

[P]-x $_{612}$	
P-x	(P)-x
85%	15%

Fig. 2: Structural two-place predicates and optional and obligatory P

Q-P-predicates behave like P-x predicates. Most of them (56%) assign ACC to their propositional arguments – cf. *etw. bedingen* 'condition sth.', while only 28% of them assign OBL – cf. *davon abhängen* 'depend on sth.'. The only exceptional properties of Q-P predicates are that they assign proportionally more DAT (*entgegen stehen* 'be opposed', *entsprechen* 'correspond') and GEN (*entbehren* 'lack', *schuldig sein* 'owe'), that they are not polysemous, and that Q cannot be ZERO. As for (Q)-P predicates, they are close to (P)-x predicates in their behavior. Most of them assign oblique case – cf. *folgen* 'follow' and *passen* 'fit'.

[14] Zifonun/Hoffmann/Strecker (1997, p. 1094) assume that prepositional objects ("Präpositivkomplemente") generally tend to be optional.

AS	Preds	ACC	OBL	DAT	GEN
Q-P	114	56%	28%	6%	2%
(Q)-P	10	0%	80%	20%	0%

Table 7: Argument realization of [Q]-P predicates

Three-place predicates: P-[y]-x predicates have an obligatory propositional argument. One could suggest that P is obligatory because the predicate itself is less descriptive – cf. *etw. darauf abstimmen* 'align sth. with sth.' and *jm. davon abbringen* 'dissuade sb. from sth. Other reasons might be that a predicate is polysemous, like *jm. damit überfahren* 'run over sb. with sth.', which, without P, means running someone over with a vehicle and *jm. dazu bewegen* 'pursuade sb. do sth.', which in the absence of a P means 'move sb.', cf. (17a, b). Another reason is that a predicate has distinct morphological variants – cf. *jm. damit schrecken* 'scare sb. with sth.' with obligatory P and *jm. damit erschrecken* with optional P.

(18) a. *Sie hatte ihn nicht gleich damit überfahren, daß sie ihm am liebsten vier Söhne geboren hätte, ...* (ZDB 10039: GBS Kloepfer 2005)
'She had not immediately run him over with the fact that she would have preferred to bear him four sons, ...'

b. *Ich habe jüngere Leute in der CDU dazu bewegt, daß wir nach den Wahlen gezielt mit einzelnen Personen der Grünen Gesprächsrunden beginnen.* (ZDB 2726: DWDS BZ 1995)
'I have persuaded younger people in the CDU that ...'

P-[y]-x predicates have 79% ACC-DAT-NOM as argument realization as shown in Table 8 – cf. *jm. etw. anvertrauen* 'confide sth. in sb.' and *jm. etw. anbieten* 'offer sth. to sb.'.

AS	Preds	ACC-A	A-DAT	O-A	O-D	GEN-A	ZERO-A
P-[y]-x	272	0,3%	89%	22%	4%	2%	1%
(P)-[y]-x	400	0,7%	11%	78%	4%	1%	15%

Table 8: Argument realization of [P]-[y]-x predicates

Predicates with ACC-DAT-NOM can again be regarded as showing the structural pattern of case-assignment. That is, if the predicate has the argument structure [P]-[y]-x and nothing else is defined for it lexically, the predicate will have the argument realization ACC-DAT-NOM with ACC being the case of the internal argument. 22% of P-[y]-x predicates have OBL-ACC-NOM – cf. *jm. dazu bewegen* 'pursuade sb. to do sth., 4% have OBL-DAT-NOM – cf. *jm. davon abraten* 'advise sb. not to do sth.', and 2% have GEN-ACC-NOM – cf. *jm. deswegen bezichtigen* 'accuse sb. of

sth.'. Here again, P has lexical, oblique case. And finally, 1% have ZERO-ACC-NOM – cf. *kommandieren* 'command'.

(P)-[y]-x predicates show 78% OBL-ACC-NOM, in distinction to P-[y]-x predicates where the percentage was 22%. As with (P)-x predicates, OBL can be regarded as lexically determined. Only 4% of the (P)-[y]-x predicates have ACC-DAT-NOM: *jm. etw. vorlesen* 'read'. Figure 3 once again makes it clear that a clear majority of the oblique [P]-[y]-x predicates have an optional P, in this case 78%. In this they differ from the P-x and (P)-x predicates, where 63% of the oblique predicates allowed an optional P. Like Figures 1 and 2, Figures 3 and 4 also verify H1, namely that obligatory propositional arguments tend to structural, optional propositional arguments to lexical cases.

[P]-[y]-x $_{316}$	
P-[y]-x	(P)-[y]-x
22%	78%

Fig. 3: Oblique three-place predicates and optional and obligatory P

[P]-[y]-x $_{226}$	
P-[y]-x	(P)-[y]-x
89%	11%

Fig. 4: Structural three-place predicates and optional and obligatory P

The contrast between the two-place and three-place predicates in Figures 1 and 3 could be explained by the informative unit that the three-place predicates already form with their accusative object. For instance, sentence (19) is sufficiently informative without a prepositional object.

(19) *Metallteile werden* (*darauf*) *untersucht,* (*daß sie nicht rosten*). (ZDB 8504: DWDS BZ 1996)
'Metal parts are examined to ensure that they do not rust.'

Table 9 shows that 23% Q-[x]-P predicates exhibit ACC-DAT-NOM – cf. *etw. macht jm. etw. klar* 'sth. makes sth. clear to so.' These predicates differ from the 79% P-[y]-x ones with ACC-DAT-NOM – cf. Table 7. The reason for this might be that the dative is primarily the case for beneficiary objects, and that statements can hardly assume this role. A similar difference becomes apparent when comparing the 77% Q-[x]-P predicates with OBL-ACC-NOM with the 22% OBL-ACC-NOM realizations of P-[y]-x ones.

AS	Preds	A-DAT	OBL-A	O-D	GEN-A	ZERO-A
Q-[x]-P	40	23%	77%	0%	0%	0%
(Q)-[x]-P	21	5%	95%	0%	0%	0%
Q-[P]-x	25	32%	68%	0%	0%	0%
(Q)-[P]-x	39	0%	33%	0%	0%	69%

Table 9: Argument realization of [Q]-[x]-P and [Q]-[P]-x predicates

Concerning (Q)-[x]-P-predicates, they behave similarly to Q-[x]-P predicates. 95% of them have OBL-ACC-NOM as argument realization – cf. *etw. schreckt jm. davor ab* 'sth. scares sb. off doing sth.'

Q-[P]-x predicates like *entnehmen* 'gather sth. from sth.' resemble Q-[x]-P predicates. 32% have ACC-DAT-NOM realization and 68% have OBL-ACC-NOM.

As for (Q)-[P]-x-predicates, 33% are realized with OBL-ACC-NOM – cf. *etw. daraus schließen* 'conclude sth. from sth.' and *etw. damit entkräften* 'refute sth. with it'. Most of them (specifically 69%) are realized with ZERO-ACC-NOM. There is not a single predicate with ACC-DAT-NOM.

One can conclude that H1 is not confirmed by [Q]-[x]-P and [Q]-[P]-x predicates. For both optional and obligatory propositional arguments, they assign above-average non-structural case.

As far as reflexive verbs are concerned, Table 10 shows that, unlike the obligatory accusative P, an optional accusative P is not allowed. – cf. *sich *(etw.) vorstellen* '*imagine sth.*'.

AS	Preds	ACC-A	A-DAT	OBL-A	O-D	GEN-A	ZERO-A
P-r-x	149	2%	26%	27%	3%	7%	2%
(P)-r-x	139	0%	0%	73%	4%	5%	0%

Table 10: Argument realization of P-r-x and (P)-r-x predicates

73% of predicates with optional P have OBL-ACC-NOM in contrast to 27% predicates with obligatory P – cf. *sich darauf beschränken* 'confine oneself to' with P-r-x and *sich darüber ärgern* 'get angry' with (P)-r-x. The high percentage of reflexive predicates with optional P is partly explained by the fact that about 50 reflexive predicates are object experiencer predicates (OE), which have a subject experiencer counterpart (SE) – cf. *Der Lärm ärgert den Jungen* 'The noise annoys the boy' (OE) and *Der Junge ärgert sich über den Lärm* 'The boy is angry about the noise' (SE). With the SE-variant, the stimulus can be omitted – cf. section 2.2.

If one compares oblique (P)-r-x predicates with (P)-x and (P)-[y]-x predicates above, then the reflexive predicates lie between the (P)-x and (P)-[y]-x predicates – cf. Figures 1, 3 and 5.

[P]-r-x $_{202}$	
P-r-x	(P)-r-x
27%	73%

Fig. 5: Oblique reflexive predicates and optional and obligatory P

Finally, it can be stated that (P)-r-x a as well as (P)-x and (P)-[y]-x predicates confirm Hypothesis 1 that optional arguments tend to be realized as prepositional objects.

2.4 Obligatory and optional arguments and optional and obligatory prepositional correlates

In this section, we deal with Hypothesis 2: Predicates with optional P tend to license more non-overt ProPPs than predicates with obligatory P. Recall that non-overt ProPPs are considered to be *pro* – cf. section 2.2. Predicates that license non-overt ProPPs are called *pro*-tolerant predicates in the following.

Two-place predicates: Figure 6 illustrates that 66% of the prepositional (P)-x predicates are *pro*-tolerant. OBL[0] indicates an omittable ProPP – cf. Figure 3.

[P]-x $_{336}$	
P-x $_{201}$	(P)-x $_{135}$
+ OBL[0]	+ OBL[0]
39%	66%

Fig. 6: [P]-x and omittable ProPPs

(P)-x predicates that license OBL[0] include *daran mitwirken* 'contribute to', *darauf stolz sein* 'be proud', *dadurch gesegnet sein* 'be blessed', *dafür beten* 'pray', *dagegen rebellieren* 'rebel against', *darin einwilligen* 'agree', *damit kokettieren* 'flirt with', *danach forschen* 'research', *darum betteln* 'beg', *darüber alarmiert sein* 'be alarmed', *davon quatschen* 'chat', *davor erschrecken* 'be frightened' and *dazu übereinkommen* 'reach an agreement'. (P)-x predicates that do not license prepositional *pro* are for instance *daran zugrunde gehen* 'fall apart', *darauf verzichten* 'abstain from', *dadurch schuldig sein* 'be guilty', *dafür sparen* 'save for', *dagegen argumentieren* 'argue against', *darin vertrauen* 'trust', *damit leben* 'live with', *danach googeln* 'google for', *darum kämpfen* 'fight for', *darüber munkeln* 'rumor', *davon leben* 'live off', *davor*

gesichert sein 'be protected from'. Unlike the *pro*-tolerant (P)-x predicates above, the *pro*-intolerant (P)-x predicates do not co-occur with *dazu*.

As far as P-x predicates are concerned, Figure 6 shows that 39% of them are *pro*-tolerant. We find for instance *daran appellieren* 'appeal', *darauf versessen sein* 'be obsessed', *dafür werben* 'advertise', *dagegen antreten* 'campaign against', *darin vertrauen* 'trust', *damit werben* 'advertise', *danach streben* 'strive', *darum zanken* 'quarrel', *darüber sicher sein* 'be certain', *davon überzeugt sein* 'be convinced', *davor schaudern* 'shudder' and *dazu berechtigt sein* 'be entitled'. The ProPP *dadurch* is not exemplified for this predicate class. P-x predicates that are *pro*-intolerant include *daran kranken* 'suffer', *darauf abzielen* 'aim', *dadurch bestechen* 'captivate', *dafür einstehen* 'advocate for', *dagegen anfechten* 'challenge', *darin verharren* 'insist', *damit liebäugeln* 'flirt', *danach dürsten* 'thirst for', *darum ringen* 'wrestle', *darüber hinwegkommen* 'get over', *davon absehen* 'disregard' and *dazu neigen* 'tend'. Interestingly, the *pro*-intolerant P-x predicates, unlike the (P)-x predicates, do not have a predicate licensing *davor*.

Non-reflexive three-place predicates: P-[y]-x and (P)-[y]-x predicates allow similar percentages of silent ProPPs as P-x and (P)-x predicates – cf. Figures 7 and 8. Figure 7 illustrates that 68% of the 351 prepositional (P)-[y]-x predicates are *pro*-tolerant.

[P]-[y]-x $_{351}$	
P-[y]-x $_{106}$	(P)-[y]-x $_{245}$
+ OBL[0]	+ OBL[0]
61%	68%

Fig. 7: Non-reflexive three-place *pro*-tolerant predicates

Regarding *pro*-tolerant (P)-[y]-x predicates, one finds *jm. daran erinnern* 'remind sb. of st.', *jm. darauf ansprechen* 'talk to sb. about sth.', *jm. dadurch beschwichtigen* 'appease', *jm. dafür entschädigen* 'compensate for', *jm. darin bestärken* 'encourage', *jm. damit bedrohen* 'threaten', *jm. danach auswählen* 'choose', *jm. darum beneiden* 'envy', *jm. darüber verständigen* 'notify', *jm. davon überzeugen* 'convince', *jm. davor schützen* 'protect' and *jm. dazu ermuntern* 'encourage'. Except for *dagegen*, which doesn't occur with (P)-[y]-x predicates at all, all other ProPP-types co-occurring with (P)-[y]-x predicates are *pro*-tolerant. (P)-[y]-x predicates that are *pro*-intolerant are for instance *jm. daran gemahnen* 'remind', *jm. darauf kontrollieren* 'check', *jm. dadurch beeindrucken* 'impress', *jm. dafür belangen* 'prosecute', *jm. dagegen schützen* 'protect', *jm. darin unterweisen* 'instruct', *jm. damit widerlegen* 'disprove', *jm. danach einordnen* 'arrange according to', *jm. darüber verwirren* 'confuse', *jm. davon erlösen* 'save', *jm. davor sichern* 'protect' and *jm. dazu verdammen* 'condemn to'. One can see that there aren't any *pro*-intolerant (P)-[y]-x predicates for *darum*.

P-[y]-x predicates that license *pro* are for instance *jm. daran gewöhnen* 'get sb. used to doing sth.', *jm. darauf einschwören* 'swear sb. to st.', *jm. darum ersuchen* 'ask', *jm. davon abbringen* 'dissuade' and *jm. dazu anhalten* 'urge'. That is, the ProPPs *dafür*, *dagegen*, *darin*, *damit*, *darüber* and *davor* are not exemplified for *pro*-tolerant P-[y]-x predicates. They cannot be an associate of *pro*. P-[y]-x predicates that are *pro*-intolerant include *jm. daran gewöhnen* 'get used to', *jm. darauf bringen* 'make sb. think st.', *jm. dafür interessieren* 'interest', *jm. darin bestätigen* 'confirm', *jm. damit überfahren* 'steamroll', *jm. darum wetten* 'bet', *jm. darüber hinwegtäuschen* 'fool', *jm. davon lossprechen* 'absolve', *jm. davor bewahren* 'keep sb. from st.' and *jm. dazu ersehen* 'see about'. The ProPPs *dadurch*, *dagegen* and *danach* can be ignored because they are not exemplified for P-[y]-x predicates.

Reflexive three-place predicates: Figure 8 shows that (P)-r-x predicates are more *pro*-tolerant than (P)-x and (P)-[y]-x predicates.

[P]-r-x $_{205}$	
P-r-x $_{91}$	(P)-r-x $_{114}$
+ OBL[0]	+ OBL[0]
49%	77%

Fig. 8: Reflexive three-place predicates and OBL[0]

Unlike (P)-x and (P)-[y]-x predicates, of which about 70% license silent ProPPs, 77% of (P)-r-x predicates allow silent correlates.

(P)-r-x predicates that are *pro*-tolerant include *sich daran freuen* 'enjoy', *sich darauf einigen* 'agree', *sich dadurch blamieren* 'embarrass', *sich dafür entscheiden* 'decide', *sich dagegen sträuben* 'resist', *sich darin irren* 'be wrong', *sich damit abquälen* 'struggle', *sich danach orientieren* 'orient', *sich darum bemühen* 'endeavour', *sich darüber amüsieren* 'enjoy', *sich davon distanzieren* 'distance os. from', *sich davor fürchten* 'be afraid of' and *sich dazu anbieten* 'offer'. Unlike (P)-x and (P)-[y]-x predicates, (P)-r-x predicates co-occur with all 13 ProPPs and are all *pro*-tolerant. (P)-r-x predicates that are *pro*-intolerant include *sich daran laben* 'be refreshed', *sich darauf zurückziehen* 'back off', *sich dadurch exponieren* 'expose os.', *sich dafür rächen* 'take revenge', *sich dagegen weigern* 'refuse', *sich darin verausgaben* 'spend os.', *sich damit abrackern* 'toil', *sich danach zurücksehnen* 'long', *sich darum Gedanken machen* 'ponder', *sich darüber beruhigen* 'calm down', *sich davon zurückziehen* 'retreat from', *sich davor drücken* 'shirk' and *sich dazu bekennen* 'admit'. Again, all ProPPs and their silent *pro*s are exemplified.

A final glance at the P-r-x predicates shows that 49% are *pro*-tolerant. The latter include sich *daran erfreuen* 'enjoy', *sich darauf einrichten* 'prepare os.', *sich dafür interessieren* 'be interested',[15] *sich dagegen verwahren* 'oppose', *sich darin ereifern* 'get excited', *sich damit*

[15] *Sich dafür interessieren* is only *pro*-tolerant when it embeds interrogatives.

abfinden 'accept', *sich danach sehnen* 'long for', *sich darüber entsetzen* 'be horrified', *sich davon überzeugen* 'satisty os.', *sich davor hüten* 'be careful' and *sich dazu anschicken* 'get ready'. The ProPPs *dadurch* and *darum* are not exemplified. As for *pro*-intolerant P-r-x predicates, there are for instance *sich daran klammern* 'cling to', *sich darauf abstützen* 'rely on', *sich dadurch auszeichnen* 'be distinguished', *sich dafür verwenden* 'use os. to get', *sich dagegen verwenden* 'object', *sich darin verbeißen* 'become engrossed in', *sich damit aufhalten* 'spend time on', *sich danach richten* 'be guided by', *sich darum reißen* 'rid os. off', *sich darüber verbreiten* 'spread about', *sich davon zurückziehen* 'withdraw from', *sich davor grauen* 'dread' and *sich dazu äußern* 'comment on'. Unlike the *pro*-tolerant (P)-r-x predicates, which are not restricted to the ProPP-types, *pro*-tolerant P-r-x predicates reject *dadurch* and *darum*.

There is no great discrepancy between the *pro*-tolerant P and (P) predicates in reflexive predicates and non-reflexive ones. That is, the percentage difference between *pro*-tolerant P-r-x and (P)-r-x predicates is 28, the difference between P-x and (P)-x predicates is 23, and the difference between P-[y]-x and (P)-[y]-x predicates is 20. If a *pro*-tolerance scale of the considered argument structures is drawn up, the following placement results: i. (P)-r-x, ii. (P)-[y]-x, iii. (P)-x, iv. P-[y]-x, v. P-r-x, and vi. P-y.

General remarks: Thus far it has been shown that predicates with an optional propositional argument are more *pro*-tolerant than predicates with a obligatory propositional argument. The question of what factors favor general *pro*-tolerance or *pro*-intolerance cannot be answered here. Some thought-provoking impulses, however, can nevertheless be formulated:

i. If the goal or reason of an activity is to be focused, and this is done by a ProPP, the latter must be explicit – cf. *dagegen/dafür kämpfen* 'fight for/ against', *dazu kommen* 'come to the fact' and *dafür büßen* 'atone' – cf. also Breindl (1989, p. 190–196).

ii. The particle *ab*, as for instance in *darauf abzielen* 'aim', *davon abbringen* 'dissuade' and *dazu abkommandieren* 'detach', denotes a movement away from a source. Together with the verb meaning, the explicit specification of a target or the specification of the source is enforced. Similar things happen regarding the particles *hin-*, *hinaus-* and *hinweg* in *darauf hinarbeiten* 'work towards', *darauf hinauswollen* 'get at', *darüber hinwegtäuschen* 'hush up' and *sich davon zurückziehen* 'withdraw'.

iii. Recall the approximately 100 polysemous predicates with varying argument realizations in section 2.3. The predicate *glauben* 'believe', for instance, varies between ACC-NOM (*es glauben*) and OBL[an]-NOM (*daran glauben*). As for *daran glauben*, the ProPP must be explicit to avoid confusion with the accusative variant of the predicate. However, about 40% of the polysemous predicates license *pro*. In most examples it is the ProPP *darüber*, which refers to a question, which is not expressed.

(20) *Bis heute läßt sich nur* (*darüber*) *mutmaßen, was und ob überhaupt etwas dahinter liegt.* (ZDB 6692: DWDS BZ 1994)
'To this day, it is only possible to speculate about what and whether anything at all is behind it.'

3. Conclusion

This paper has been concerned with the argument structures of German clause-embedding predicates and tendencies in the possible associated argument realizations, based on data from the ZAS Database of Clause-Embedding Predicates (ZDB). It first gave an overview of the most frequent argument structures in the database. Second, it discussed structural properties of prepositional objects and their 'origin'. Third, it showed that there is a connection between obligatory and optional propositional arguments on the one hand and the structural or prepositional realization of these arguments on the other. Fourth, the paper showed that there is also a connection between optional prepositional arguments and non-overt prepositional adverbs. Here we summarize the results in a nutshell.

i. As shown in Table 1 in section 2.1 52% of all 1806 proposition embedding predicates in the database have [P]-x as an argument structure – cf. *ablehnen* 'decline' with P-x and *träumen* 'dream' with (P)-x. 36% have [P]-[y]-x – cf. *zurufen* 'shout' with P-y-x, *androhen* 'threaten' with P-(y)-x, *unterstützen* 'support' with (P)-y-x, and *zustimmen* 'agree' with (P)-(y)-x. 16% have [x]-P – cf. *amüsieren* 'amuse' with x-P and *überraschen* 'surprise' with (x)-P. 17% are reflexive and have r-P or [P]-r-x – cf. *sich erübrigen* 'be superfluous', *sich damit abfinden* 'accept' with P-r-x and *sich zurückziehen* 'withdraw' with (P)-r-x. Only 2% have P as argument structure – cf. *naheliegen* 'be obvious'. The overlaps in the percentages of the predicate classes indicate that there are predicates that have more than one argument structure.

ii. Prepositional case of sentential objects is indicated by sentential prepositional correlates (ProPP) like *davon*. ProPP is a complement of V^0 as shown in (7a) in 2.2. The main reason for prepositional case is the adverbial-like character of the propositional argument. One finds directional prepositional objects, local and modal ones, ones indicating a stimulus or purpose, and final ones – cf. Table 3. Another reason for prepositional case are grammatical operations where an object-experiencer predicate turns into a subject-experiencer one – cf. (8a–d). Prepositional case is also present when the embedded clause is related to a set of propositions instead of a single proposition. The set can be indicated by an interrogative as shown in (10a, b). Or it is given situationally, the expressed proposition being related to it – see (9a, b) and (14b).

iii. Propositional arguments are obligatory if, for instance, the predicate demands an explicit source or goal – cf. *jm. davon abbringen* 'dissuade from' and *darauf ab-*

zielen 'aim'. Obligatory arguments also contribute to the disambiguation of polysemous predicates – cf. *etw. angeben* 'indicate sth.' with P-x and *mit etw. angeben* 'brag' with (P)-x – see also (18a, b) in 2.3. Additionally, morphological variants of a predicate force an obligatory P – cf. *Max schreckt Uli damit, dass p* 'Max frightens Uli with the fact that p' with P-y-x and *Max erschreckt Uli damit, dass p* with (P)-y-x. Propositional arguments are optional if the sentence can have an interpretation also with an unrealized P – cf. *Max leidet* 'Max is suffering' which means there is an eventuality Max is suffering from. As far as non-reflexive predicates are concerned, obligatory propositional arguments tend to have structural case – see Tables 6 and 8. That is, if the argument structure (AS) is P, the argument realization (AR) is NOM, if AS is P-x, AR is NOM-ACC and if AS is P-[y]-x, AR is ACC-DAT-NOM. Table 11 below also shows that a minority of obligatory propositional arguments are realized by lexical case.

AS		**ACC-(DAT)-NOM**		**OBL-(ACC/DAT)-NOM**	
P-x	690	85%	*etw. ablehnen* 'decline' *etw. hören* ‚hear'	37%	*dazu neigen* 'tend', *davon hören* 'hear about'
Q-P	114	56%	*etw. bedingen* 'imply'	28%	*davon abhängen* 'depend'
P-[y]-x	272	89%	*jm. etw. anbieten* 'offer'	22%	*jm. darin bestätigen* 'confirm' *jm. darin vertrauen* 'trust'
P-r-x	149	26%	*sich etw. unter etw. vorstellen* 'imagine'	27%	*sich darauf beschränken* 'confine os to' *sich darüber klar sein* 'be aware of sth.'

Table 11: Obligatory propositions and default case realizations

Table 12 shows that optional propositional arguments have mostly prepositional case.

AS		**ACC-(DAT)-NOM**		**OBL-(ACC)-NOM**	
(P)-x	233	15%	*etw.* überlegen 'think about st.'	63%	*darunter leiden* 'suffer from'
(Q)-P	8	0%	–	100%	*daraus folgen* 'follow from'
(P)-[y]-x	400	11%	*jm. etw. vorlesen* 'read to sb.'	83%	*jm. dabei unterstützen* 'support sb.'

AS		ACC-(DAT)-NOM		OBL-(ACC)-NOM	
(P)-r-x	139	0%	–	82%	sich darüber ärgern 'get angry' *sich darüber Gedanken machen* 'be worried'

Table 12: Optional propositional arguments and oblique case realizations

It follows that Hypothesis 1 – optional arguments tend to be realized as prepositional objects – is confirmed.

iv. Non-overt ProPPs are mostly licensed by predicates with optional propositional arguments – cf. Figure 6. A ProPP is necessarily overt if, for example, the reason for an activity is focused – cf. *dafür büßen* 'atone', if there are alternative reasons for the denoted activity – cf. *dafür/dagegen kämpfen* 'fight for/against' or if the predicate varies between accusative and oblique case – cf. *davon/es hören* 'hear' in (15a, b). Here again, it follows that Hypothesis 2 – that predicates with optional P tend to license more non-overt ProPPs than predicates with obligatory P – is verified.

[OBL] $_{869}$					
[P]-x $_{328\ /\ 38\%}$		**[P]-[y]-x** $_{336\ /\ 39\%}$		**[P]-r-x** $_{205\ /\ 24\%}$	
P $_{163\ /\ 50\%}$	**(P)** $_{165\ /\ 50\%}$	**P** $_{65\ /\ 19\%}$	**(P)** $_{271\ /\ 81\%}$	**P** $_{76\ /\ 38\%}$	**(P)** $_{126\ /\ 62\%}$
+[0]$_{58}$ 39% *danach streben* 'strive'	+[0]$_{109}$ 66% *darum betteln* 'beg'	+[0]$_{33}$ 61% *dazu anhalten* 'cheer'	+[0]$_{199}$ 77% *darum beneiden* 'envy'	+[0]$_{45}$ 49% *sich danach sehnen* 'long'	+[0]$_{88}$ 77% *sich darum bemühen* 'labour'
-[0]$_{105}$ 61% *dazu neigen* 'tend'	-[0]$_{56}$ 34% *dafür sparen* 'save'	-[0]$_{32}$ 39% *daran gewöhnen* 'get used'	-[0]$_{72}$ 23% *davon erlösen* 'save'	-[0]$_{31}$ 51% *sich daran klammern* 'cling'	-[0]$_{38}$ 23% *sich dafür rächen* 'get even'

Table 13: Comparison of *pro*-tolerant and *pro*-intolerant verb classes

Abbreviations

ACC	Accusative
AR	Argument Realization
AS	Argument Structure
Assert	Assertion (value for example property 'semantics')
Cond	Conditional (value for example property 'semantics')
DAT	Dative
GEN	Genitive
IDS	Leibniz-Institut für Deutsche Sprache
INDC	Indicative (value for example property 'verb mood')
KONJ I	Konjunktiv I (value for example property 'verb mood')
KONJ II	Konjunktiv II (value for example property 'verb mood')
NOM	Nominative
OBL	Oblique (i. e. prepositional)
Quest	Question (value for example property 'semantics')
Unm	Unmarked (value for example property 'semantics')
ZAS	Leibniz-Zentrum Allgemeine Sprachwissenschaft
ZDB	ZAS Database of Clause-Embedding Predicates
ZERO	No case marking

References

Axel-Tober, Katrin (2012): (Nicht-)kanonische Nebensätze im Deutschen. Synchrone und diachrone Aspekte. (= Linguistische Arbeiten 542). Berlin/Boston: De Gruyter.

Bierwisch, Manfred (1983): Semantische und konzeptuelle Repräsentation lexikalischer Einheiten. In: Ruzička, Rudolf/Motsch, Wolfgang (eds.): Untersuchungen zur Semantik. (= Studia grammatica 22). Berlin: Akademie-Verlag, pp. 61–99.

Breindl, Eva (1989): Präpositionalobjekte und Präpositionalobjektsätze im Deutschen. (= Linguistische Arbeiten 220). Berlin: Niemeyer.

Breindl, Eva (2013): Präpositionalobjektsätze. In: Meibauer/Steinbach/Altmann (eds.), pp. 458–481.

Engel, Ulrich (1977): Syntax der deutschen Gegenwartssprache. (= Grundlagen der Germanistik 22). Berlin: ESV.

Engel, Ulrich (2009): Deutsche Grammatik. 2nd, rev. ed. München: Iudicium.

E-VALBU = Wörterbuch zur Verbvalenz. Grammatisches Informationssystem „grammis". Mannheim: Leibniz-Institut für Deutsche Sprache. https://grammis.ids-mannheim.de/verbvalenz. DOI: 10.14618/evalbu.

Frey, Werner (2016): On properties differentiating constructions with inner-sentential proforms for clauses. In: Frey/Meinunger/Schwabe (eds.), pp. 73–104.

Frey, Werner/Meinunger, André/Schwabe, Kerstin (eds.) (2016): Inner-sentential propositional proforms. Syntactic properties and interpretative effects. (= Linguistik aktuell 232). Amsterdam/Philadelphia: Benjamins.

Groenendijk, Jeroen/Stokhof, Martin (1997): Question. (Commentator: J. Ginzburg). In: van Benthem, Johan/ter Meulen, Alice (eds.): Handbook of logic and language. Amsterdam u. a.: Elsevier, pp. 1055–1124.

Levin, Beth (1993): English verb classes and alternations: A preliminary investigation. Chicago: University of Chicago Press.

Meibauer, Jörg/Steinbach, Markus/Altmann, Hans (eds.) (2013): Satztypen des Deutschen. (= De Gruyter Lexikon). Berlin/Boston: De Gruyter.

Präposition = grammis: Grammatisches Informationssystem grammis. „Systematische Grammatik". Mannheim: Leibniz-Institut für Deutsche Sprache. DOI: 10.14618/grammatiksystem. https://grammis.ids-mannheim.de/systematische-grammatik/210.

Schumacher, Helmut/Kubczak, Jacqueline/Schmidt, Renate/de Ruiter, Vera (2004): VALBU – Valenzwörterbuch deutscher Verben. (= Studien zur deutschen Sprache 31). Tübingen: Narr.

Schwabe, Kerstin (2013): Eine uniforme Analyse sententialer Proformen im Deutschen. In: Deutsche Sprache 41, pp. 142–164.

Schwabe, Kerstin (2015): On the licensing of argument conditionals. In: Aher, Martin/Jerabek, Emil/Hole, Daniel/Kupke, Clemens (eds.): Logic, language and computation. 10th International Tbilisi Symposium TbiLLC 2013. Revised selected papers. (= Lectures Notes in Computer Science 8984). Berlin/Heidelberg: Springer, pp. 290–309.

Schwabe, Kerstin (2016): Sentential proforms and argument conditionals. In: Frey/Meinunger/Schwabe (eds.) (2016), pp. 211–240.

Schwabe, Kerstin (2019): Misfits: On unexpected German ob-predicates. In: Silva, Alex/Staton, Sam/Sutton, Peter/Umbach, Carla (eds.): Language, logic and computation. 12th International Tbilisi Symposium TbiLLC 2017. Revised selected papers. (= Theoretical Computer Science and General Issues 11456). Berlin/Heidelberg: Springer, pp. 253–274.

Schwabe, Kerstin (2020): A typology of German polar clause embedding predicates. In: Durand, Marie-Laure/ Lefèvre, Michel/Öhl, Peter (eds.): Tradition und Erneuerung: Sprachen, Sprachvermittlung, Sprachwissenschaft. Akten der 26. Fachtagung der Gesellschaft für Sprache und Sprachen GeSuS e. V. in Montpellier, 5.–7. April 2018. (= Schriftenreihe Sprache und Sprachen in Forschung und Anwendung 9). Hamburg: Dr. Kovac, pp. 77–92.

Schwabe, Kerstin/Fittler, Robert (2014a): Über semantische Konsistenzbedingungen deutscher Matrixprädikate. Teil 1. In: Sprachtheorie und germanistische Linguistik 24, 1, pp. 45–75.

Schwabe, Kerstin/Fittler, Robert (2014b): Über semantische Konsistenzbedingungen deutscher Matrixprädikate. Teil 2. In: Sprachtheorie und germanistische Linguistik 24, 2, pp. 123–150.

Schwabe, Kerstin/Frey, Werner/Meinunger, André (2016): Sentential proforms: An overview. In: Frey/Meinunger/Schwabe (eds.), pp. 1–22.

Stiebels, Barbara (2011): Von den Herausforderungen des lexikalischen Reichtums. Geisteswissenschaftliche Zentren Berlin: Bericht über das Forschungsjahr 2010. Berlin: GWZ. pp. 51–72. www.gwz-berlin.de/workspace/dokumente/gwz_jb10_gwz.pdf (last access: 1.9.2022).

Stiebels, Barbara/McFadden, Thomas/Schwabe, Kerstin/Solstad, Torgrim/ Kellner, Elisa/Sommer, Livia/Stoltmann, Katarzyna (2018): ZAS Database of Clause-embedding Predicates, release 1.0. In: OWID*plus*. Leibniz-Institut für Deutsche Sprache, Mannheim. www.owid.de/plus/zasembed/ (last access: 1.9.2022).

Truckenbrodt, Hubert (2016): Some distinctions in the right periphery of the German clause. In: Frey/Meinunger/Schwabe (eds.), pp. 105–146.

Wunderlich, Dieter (1997): Cause and the structure of verbs. In: Linguistic Inquiry 28, 1, pp. 27–68.

Zifonun, Gisela/Hoffmann, Ludger/Strecker, Bruno (1997): Grammatik der Deutschen Sprache. 3 Bde. (= Schriften des Instituts für Deutsche Sprache 7). Berlin/New York: De Gruyter.

Zitterbart, Jussara Paranho (2013): Satztyp und Korrelat/Platzhalter/Bezugsausdruck. In: Meibauer/Steinbach/Altmann (eds.), pp. 602–626.