Hans C. Boas, Alexander Ziem (eds.)
Constructional Approaches to Syntactic Structures in German

Trends in Linguistics
Studies and Monographs

Editor responsible for this volume
Natalia Levshina

Volume 322

Constructional Approaches to Syntactic Structures in German

Edited by
Hans C. Boas and
Alexander Ziem

DE GRUYTER
MOUTON

ISBN 978-3-11-045472-7
e-ISBN (PDF) 978-3-11-045715-5
e-ISBN (EPUB) 978-3-11-045516-8
ISSN 1861-4302

Library of Congress Control Number: 2018017453

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at http://dnb.dnb.de.

Typesetting: Integra Software Services Pvt. Ltd
Printing and binding: CPI books GmbH, Leck

www.degruyter.com

Klaas Willems, Ludovic De Cuypere, and Jonah Rys

Case alternation in argument structure constructions with prepositional verbs: A case study in corpus-based constructional analysis

1 Introduction

Ever since the advent of the constructional approach in linguistic research, the exact relationship between the constructional and the lexical level has been a contentious issue (cf. Fillmore 1988, Goldberg 1995, 2003, Croft 2003, Boas 2008, 2009, among others).[1] Goldberg argues that ultimately all levels are constructional in nature as long as some aspect of the form or function of a construction "is not strictly predictable from its component parts or from other constructions recognized to exist" (Goldberg 2003: 219). Even when fully predictable, a pattern can be claimed to be stored as a construction if it "occurs with sufficient frequency", according to Goldberg (2003: 220; cf. Rostila 2011). It is obvious that the degree of conventionalization, the frequency of occurrence and the interaction between different kinds of meaning, ranging from abstract "higher-level" constructional meanings over intermediary semantic levels to "lower-level" item-specific meanings, are important and potentially competing factors in determining whether a syntagmatic combination has to be described as a fully-fledged 'construction' in the sense of a form-meaning pairing in its own right.

In this chapter, we investigate how lexical-semantic and morpho-syntactic properties of verbs and constructional patterns interact when verbs and two-way prepositions in German combine to instantiate argument structure constructions with a prepositional phrase (PP) which is either marked in the Accusative (ACC) or Dative (DAT). Our case study is based on a corpus of over 1000 sentences with

1 The authors wish to thank three anonymous reviewers for their helpful comments and suggestions. The usual disclaimers apply.

Klaas Willems, Ghent University, Linguistics Department, Blandijnberg 2, 9000 Ghent (Belgium), klaas.willems@ugent.be

Ludovic De Cuypere, Vrije Universiteit Brussel, Linguistics and Literary Studies, Pleinlaan 2, 1050 Brussels (Belgium) & Ghent University, Linguistics Department, Blandijnberg 2, 9000 Ghent (Belgium)

Jonah Rys, Ghent University, Linguistics Department, Blandijnberg 2, 9000 Ghent (Belgium)

https://doi.org/10.1515/9783110457155-003

aufsetzen auf ('set down on, land on, base on') and *aufnehmen in* ('allow [as a member], incorporate, shelter, assimilate mentally') drawn from the Mannheim German Reference Corpus (*Deutsches Referenzkorpus*, DeReKo). We henceforth call such a verb-preposition combination "prepositional verb" (henceforth: PV). *Aufsetzen auf* and *aufnehmen in* are among the dozens of PVs listed in *Duden* (2007) as particularly interesting, or peculiar, as far as their case marking is concerned. We argue that the ACC/DAT alternation is not primarily a matter of the conceptual difference between 'motion'/'directionality' and 'location'/'state' but the result of a complex interplay of various factors that can be adequately accommodated in a constructional framework. Using a multivariate analysis of the data, we evaluate the effect of four morpho-syntactic and lexical-semantic factors, viz. transitivity, voice, perfect tense and the conventionalized senses of the two PVs.

The chapter is structured as follows. In Section 2 we address the gradient distinction between prepositional complements and prepositional adjuncts from a constructional perspective and argue that previous accounts of the case alternation with two-way prepositions remain inconclusive. Section 3 describes the methodology of the study and introduces the morpho-syntactic and lexical-semantic factors that are investigated. Considering the results of the statistical analysis of the two PVs *aufsetzen auf* and *aufnehmen in*, we develop in Section 4 a constructional framework to address the issue of the case alternation in a way that takes full account of the quantitative findings. In Section 5 we discuss the complementarity of our approach with H. Paul's (1920) claims about the semantics of ACC and DAT and the case alternation with two-way prepositions. Section 6 rounds off the chapter with a summary of the main results.

2 Case marking with two-way prepositions in German

2.1 Argument structure constructions with two-way prepositions

The vexing problem of the complement/adjunct distinction has beset the theory of verb valency since its inception. No agreement exists about the criteria needed to define this distinction (Ágel 2000: 167–213). If the verb is construed as the central valency-bearing constituent of sentences with two-way prepositions, then the question arises on what grounds a distinction can be made between a prepositional complement and a prepositional adjunct. In the present study, syntactic structures with two-way PPs (either ACC PP or DAT PP) are not considered from

the standpoint of the verb but from that of argument structure constructions with PVs. We term such constructions "prepositional argument structure constructions" in the remainder of the chapter. The sentences we will be analyzing are seen as instantiations of constructional patterns whose verbal nucleus is a PV, which is itself a construction in its own right consisting of a verb and a preposition. Taking this perspective allows us to develop the complement/adjunct distinction in a novel way and to use a gradient distinction between complement and adjunct as a key to explain the case alternation with two-way prepositions.

Constructions are amenable to a description in terms of the traditional continuum of lexicalization. The preposition involved in a PV may either be highly lexicalized, as in *aufbauen auf* ('build on'), or less so, as for instance in *aufnehmen* ('include, take up') + PREP, where the preposition varies between *in*, *unter* and *auf* (and possibly still other prepositions, see Duden 2007: 115). Various PVs can be situated at different points on a cline ranging from a virtually fixed and strongly lexicalized preposition to relatively freely varying prepositions. The degree of prepositional variation does not necessarily coincide with semantic bleaching of the preposition. For example, as a PV *versinken* ('sink, disappear') is probably always combined with *in*, but the preposition retains its normal meaning as a lexical item. By contrast, as part of the PV *aufnehmen unter* ('include among') the function of *unter* deviates substantially from its common spatial meaning 'under'. Figure 1 depicts the differences in the degree of lexicalization of the prepositional slot in a schematic way:

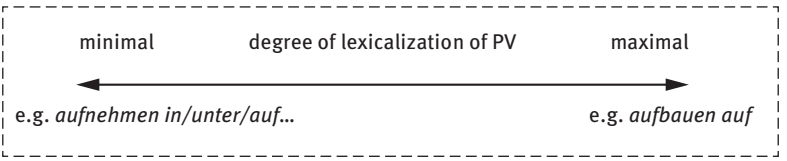

Figure 1: The lexicalization continuum of PREP in German PV constructions.

Identifying the PV, and not the verb per se, as the central verbal unit of the sentence does not mean that the methodological problem with the complement/adjunct distinction simply disappears. In the sentences (1) and (2) below, it is not immediately clear whether the highlighted PPs have complement or adjunct status, even when the analysis focuses on the PV rather than the verb alone[2]:

2 Unless indicated otherwise, all example sentences in this chapter are taken from DeReKo. The translations are ours; they are source language biased for the purposes of the analysis and not intended to be stylistically entirely adequate. The following abbreviations are used in the glosses: NOM: nominative, ACC: accusative, DAT: dative, PREP: preposition, REFL: reflexive, PV: prepositional verb, PVPARTICLE: particle of the prepositional verb, SUBJ: subjunctive ('Konjunktiv').

(1) *Eine 69 Jahre alte Frau hatte* ***auf ihrem Herd*** *einen Topf*
a 69 years old woman.NOM had on her stove.DAT a pot.ACC
mit Zucker, Essen und Früchten aufgesetzt.
with sugar, food and fruit PV-put
'A 69-year-old woman had put a pot with sugar, food and fruit on the stove.'

(2) ***In ihrer Musik*** *nahm sie schon vor Jahrzehnten*
in her music.DAT took she.NOM already before decades
verschiedene Stilrichtungen auf.
different styles.ACC PVPARTICLE
'She already included different styles in her music decades ago.'

At first glance, *ihrem Herd* ('her stove') in (1) is simply a complement of *aufsetzen auf*. However, the following two observations should be taken into account: (i) the verb *aufsetzen* regularly occurs in the corpus together with a direct object NP but without an accompanying PP (e.g. *einen Topf aufsetzen* 'put a pot on the fire', *Nudeln aufsetzen* 'cook the pasta', *den Deckel aufsetzen* 'close the lid', *Wasser aufsetzen* 'put a kettle on' etc.); (ii) the combination of *aufsetzen* with a particular class of object nouns such as the aforementioned ones is highly conventionalized semantically; it designates an activity that is a prerequisite to boil, cook etc. a substance. These two observations suggest that the complement status of the phrase in the DAT may be less straightforward than originally thought. By contrast, in (2), DAT marking and the observed word order (*in ihrer Musik* 'in her music' is not immediately adjacent to the direct object *verschiedene Stilrichtungen* 'different styles') might be taken as indicating that the PP is an adjunct rather than a complement. In itself, however, the position of the PP is not a sufficient condition to classify it as an adjunct, in particular when the preposition takes ACC; compare (3):

(3) ***In diese Kita-Gruppe*** *sollen mindestens zwei,*
in this day-care-group.ACC ought to at least two,
höchstens vier behinderte
maximally four disabled
oder von Behinderung bedrohte Kinder aufgenommen werden.
or by disablement threatened children.NOM on-taken got
'The plan is to allow at least two, maximally four, children who are disabled or threatened by disablement in this day care centre.'

The above observations suggest that no strict boundary can be drawn between complement PP and adjunct PP. We believe that a constructional account of prepositional argument structure constructions should go one step further and explicitly

acknowledge the possibility that with particular PVs a PP is in-between a complement and an adjunct. In this study we show that assuming a gradient distinction between complement and adjunct from the perspective of the constructions in which PPs are realized allows for a more realistic account of the data we will be investigating than when a strict boundary between complements and adjuncts is assumed from the point of view of the verb and its specific valency. This also creates a possible avenue for analyzing prepositional argument structure constructions in terms of a network of interrelated constructional patterns in which the case marking in one pattern may influence the case marking in another one.

2.2 The meaning/function of two-way prepositions

In Duden (2007), which is devoted to unclear cases ("Zweifelsfälle") in German grammar as well as questions of adequate style, there are separate entries for 73 PVs which occur both with ACC and DAT. Three-quarters of these PVs are particle verbs that consist of a root verb in combination with a particle (*an-*, *auf-*, *ein-*, *nieder-*, *unter-* etc.), but *basieren auf* ('be based on'), *münden in* ('flow into, result in'), *entladen über* ('unload, discharge, go off over/above'), *verschwinden in* ('disappear in/into') etc. show that the case alternation also applies to other types of PVs (cf. Section 4 below for further discussion). Most of the entries in Duden (2007) focus on the question whether either ACC or DAT is preferred, which as a rule is illustrated with examples. Some entries additionally provide a semantic/functional explanation for the case alternation. The fact that Duden (2007) deems it necessary to list several dozens of PVs and comment on their case alternation should not come as a surprise. The case alternation with two-way prepositions is a notoriously difficult part of German grammar, not only from a theoretical but also from an acquisitional point of view (Sylla 1999, Baten 2009, Baten and Willems 2012). However, the way the case alternation is commonly treated in textbooks of German might suggest that it is fairly straightforward. The alternation is usually explained by means of the conceptual difference between 'motion'/'directionality' and 'location'/'state', a distinction which is familiar from the grammar of the classical languages Greek and Latin. This conceptual explanation is also common in current cognitive accounts, albeit adjusted to the basic assumptions of the cognitive framework (see, e.g., Langacker 1987, 1999, Smith 1995, Serra-Borneto 1997, among others).

In Duden (2006), the variability of the case marking is partly explained on the basis of Smith's (1995) conceptual treatment of certain German verbs ("endpoint focus verbs") whose meanings encompass both the path and the endpoint of a directional event. With such verbs, ACC is said to instantiate a focus on

the path, whereas DAT brings the endpoint into focus (cf. Lakoff 1987: 422–424, Smith 1995: 297–304, Duden 2006: § 913; see Willems 2011a for discussion). In (4) the use of ACC with the reflexive PV *sich einschließen in* ('lock oneself up in') is said to entail a focus on the directionality of someone entering his room and locking himself up, whereas DAT in (5) emphasizes the eventual state of being locked up in the room:

(4) *Er* *schloss* *sich* ***in sein Zimmer*** *ein*.
he.NOM locked REFL.ACC in his room.ACC PVPARTICLE
'He locked himself up in (into) his room.'

(5) *Er* *schloss* *sich* ***in seinem Zimmer*** *ein*.
he.NOM locked REFL.ACC in his room.DAT PVPARTICLE
'He locked himself up in (into) his room.'

It is further maintained that with some verbs, DAT is associated with a concrete interpretation and ACC with an abstract interpretation (Duden 2006: §913), e.g.:

(6) *Sie* *hat* *sich* *schnell* ***in die neue Schule*** *eingelebt*.
she.NOM has REFL.ACC quickly in the new school.ACC PV-settled
'She has settled quickly in (into) the new school.'

(7) *Sie* *hat* *sich* *schnell* ***in der neuen Schule*** *eingelebt*.
she.NOM has REFL.ACC quickly in the new school.DAT PV-settled
'She has settled quickly in (into) the new school.'

DAT in (7) would entail that the new school is the actual building to which a person has been transferred, whereas ACC in (6) refers to the educational institution. Since abstractness/concreteness and directionality/state are not correlating categories, it is not clear from the observations in Duden (2006) whether a path-endpoint opposition is also in effect here, or how both oppositions could be united in a comprehensive explanation.

To these general remarks Duden (2007) adds some interesting observations regarding several of the PVs included in the volume.[3] For 45 out of the 73 items that are listed, either a weak or a strong preference for one of the two cases is

3 An anonymous referee points out that Duden (2007) is intended as a normative guideline for lay people, with occasional pseudo-scientific explanations. However, similar explanations have been proposed elsewhere in the literature, e.g. Smith (1995) and Serra-Borneto (1997), which have no normative purposes, and Duden (2006) explicitly draws on Smith (1995).

postulated. According to Duden (2007), the case alternation with 17 verbs is influenced by specific semantic and morpho-syntactic factors. For example, it is claimed that ACC with *aufnehmen in* is only correct if the included person or object is conceived in such a way that it becomes a permanent part of the incorporating entity; if the inclusion is temporary, then DAT is required. Compare (8) and (9) (Duden 2007: 115):

(8) *Ich* *nahm* *den jungen Mann* *als Schwiegersohn* ***in meine Familie*** *auf*.
I.NOM took the young man.ACC as son-in-law in my family.ACC PVPARTICLE
'I adopted the young man as a son-in-law into my family.'

(9) *Ich* *nahm* *ihn* *als Feriengast* ***in meiner Familie*** *auf*.
I.NOM took him.ACC as holiday guest in my family.DAT PVPARTICLE
'I adopted him as a holiday guest into my family.'

However, it is not at all clear how the precise nature of the inclusion relationship is to be determined and there is an obvious danger of circular reasoning. In (8) and (9), for instance, it can be argued that the lexical meanings of *Schwiegersohn* ('son-in-law') and *Feriengast* ('holiday guest') trigger the permanent and temporary readings. It stands to reason that the relationship between a family and a son-in-law is ordinarily considered to be of a more permanent nature than the relationship between a family and a holiday guest. But this type of information is contained in the lexical meanings of the words used in the sentences, not in any grammatical feature. Not surprisingly, if in both sentences the apposition introduced by *als* is omitted, it is no longer possible to tell whether the inclusion is permanent or not. It could be argued that more detailed information about the larger contextual setting, which might or might not be present in the text as a whole, is necessary in order to determine the functional difference between ACC and DAT. Moreover, the fact that in Duden (2007) obligatory case selection is restricted to a particular subset of PVs seems to imply that whenever such detailed information is not available, the case marking might vary depending on the speaker's own choice. But if sentences turn out to lack the necessary contextual cues to verify on what basis a particular case is selected, then the risk of circularity is again apparent, since the primary reason for ascribing a certain meaning difference to alternating cases would be the case marking itself.

Duden (2007: 119, 287) mentions two more semantic factors that might influence the case alternation with a number of PVs:

– literal (DAT) vs. figurative use (ACC), e.g. *sich entladen über* ('go off above'):
  Das Gewitter *entlud* *sich* ***über dem See.***
  the thunderstorm.NOM went off REFL.ACC above the lake.DAT
  'The thunderstorm came down above the lake.'
  Sein Zorn *wird* *sich* ***über mich*** *entladen.*
  his anger.NOM will REFL.ACC over me.ACC go off
  'His anger will come over me.'

– the difference in prepositional meaning, e.g. *ausbreiten auf* (DAT)*/über* (ACC) ('spread, unfold on/over'):
  die Decke ***auf dem Rasen*** *ausbreiten*
  the blanket.ACC on the lawn.DAT out-spread
  'spread the blanket on the lawn'
  Nebel *breitete* *sich* ***über das Land*** *aus.*
  fog.NOM spread REFL.ACC over the land.ACC PVPARTICLE
  'Fog rolled over the land.'

Among the morpho-syntactic factors that possibly play a role in the case marking, Duden (2007: 116, 262, 913) mentions:

– nominalization of the verb, e.g. *unterbringen in* ('place, house in'):
  Kannst *du* *den Anzug* *noch* ***im Koffer***
  can you.NOM the suit.ACC in addition in the suitcase.DAT
  unterbringen?
  under-place
  'Could you also store the suit in the suitcase?'
  die Unterbringung ***in ein/einem Krankenhaus***
  the accommodation in a hospital.ACC/DAT
  'the accommodation in a hospital'

– passive voice, e.g. *einfügen in* ('put in/into'):
  ein Zitat ***in den Text*** *einfügen*
  a quote.ACC in the text.ACC in-put
  'add a quote to the text'
  Wie viel Steinchen *sind* ***in diesem Mosaik*** *eingefügt?*
  How many pieces.NOM are in the mosaic.DAT in-put
  'How many pieces are inserted in (into) the mosaic?'

– transitivity, e.g. *aufsetzen auf* ('set down on, land on, base on'):
  Der Pilot *setzte* *die Maschine* *sicher* ***auf die Piste***
  the pilot.NOM put the plane.ACC safely on the runway.ACC

auf.
PVPARTICLE
'The pilot put the plane down safely on the runway.'

Das Flugzeug	*setzte*	*sanft*	***auf dem Boden***	*auf.*
the plane.NOM	put	gently	on the ground.DAT	PVPARTICLE

'The plane landed gently on the ground.'

This short survey of factors that may contribute to the ACC/DAT alternation with two-way prepositions can be read as an invitation to clarify the alternation from a constructional point of view. Because the constructional approach pays particular attention to the relationship between patterns and the lexical and grammatical properties of the items that occur in the slots of the patterns, it looks to be a promising approach to determine the relative preference for one or the other case in virtue of a set of simultaneously motivating factors. Moreover, many constructional approaches currently use quantitative methods, making these approaches particularly suited to investigate the role of a diverse set of potentially interacting factors not only in qualitative terms but also on a statistical basis. In the next section we discuss the methodology of the study and present the different factors we consider in the ensuing analysis.

3 Methodology

3.1 Qualitative and quantitative approach

A promising step towards a better understanding of the ACC/DAT alternation in prepositional argument structure constructions is to establish a detailed, statistically underpinned overview of the correlations of both cases with lexical elements, different constructional patterns and various other factors as they occur in natural language. The application of quantitative methods has not yet been used to study the motivations behind the case alternation with two-way prepositions in German. Previous accounts have primarily relied on self-constructed examples, or at best on a selective analysis of small corpus samples. As will become clear in the next sections, a multifactorial, corpus-based approach to the ACC/DAT alternation is able to detect the simultaneous influence of several factors in a sentence. At the same time, we must bear in mind that a statistical delimitation of correlations is only one of the instruments in the search for a comprehensive qualitative explanation. Statistical analysis subserves the qualitative interpretation of the findings but we want to go beyond predicting the co-occurrence of constructions

with a potentially large array of factors (presented in some recent studies as the primary goal of variational corpus linguistics, e.g., Stefanowitsch and Gries 2003, Gries and Stefanowitsch 2003, Gries 2003). Constructions are, after all, pairings of form and meaning/function that play a role in the production and comprehension of language in communicatively specific contexts of utterance. At the same time, the meanings/functions of constructions cannot be grasped to their full extent if we do not relate observed co-occurrences in discourse to the semantics of both the constructional patterns and the instantiating parts.

3.2 Data set

From the group of 73 PVs described in Duden (2007), we selected two verbs based on their diverse morpho-syntactic and lexical-semantic properties and the alleged different factors that motivate the case alternation: *aufsetzen auf* and *aufnehmen in*. For both PVs, we extracted all available observations from DeReKo, a multi-billion word corpus of written present-day standard German consisting mainly of edited newspaper articles (the sentences were extracted in 2014; since then DeReKo has kept growing in size). Of this first sample, we removed the observations from Swiss and Austrian sources, to exclude interference from macro-regional variety.[4] We also excluded the observations in which the PP is readily analyzable as a spatial adjunct[5] (see also Section 4 below). Finally, in order to ensure that all sentences were analyzable for the morpho-syntactic factors included in the study, all non-verbal (i.e. adjectival, nominal and infinitive) uses were removed. This resulted in a data set of N = 1098 observations (*aufsetzen auf*: 644, *aufnehmen in*: 454).

3.3 Corpus annotation

All observations were annotated for two types of factors: one lexical-semantic factor, viz. the conventionalized senses the PV takes on in particular occurrences, and three morpho-syntactic factors, viz. voice, perfect tense, and transitivity. In accordance with the constructional approach, we do not consider the boundaries between the two types of factors to be strict. The morpho-syntax of a language

4 Regional preferences within Germany may also have an effect on the case alternation. However, in this study we do not examine regional differences, nor differences relating to register and style.

5 Compare, e.g.:

Die Fotos	*sind*	*alle*	***in der Region***	*aufgenommen.*
the photos.NOM	are	all	in the region.DAT	on-taken

'All photos are taken in the region.'

contributes to linguistic meaning just as lexical-semantic motivations of an alternation are, as a rule, reflected in the syntax. However, there are good methodological reasons to keep both types separated in the analysis. The morpho-syntactic properties envisaged in this study are general ("higher-level") properties that can be used as the basis for an analysis of the data set as a whole, potentially allowing generalizing conclusions that span all observations. On the other hand, the lexical-semantic factor we take into account is item-specific, i.e. applicable to a particular ("lower-level") PV (for a discussion of the relationship between different levels of the lexicality-schematicity hierarchy, see Croft 2003, Boas 2009, Barðdal 2011, among others). Our selection of factors has been partly based on previous analyses and assumptions in the literature, partly on preliminary corpus analyses. The selection is not exhaustive and other factors may prove pertinent, but in selecting the factors we discuss below our major concern was that they are relevant to a corpus-based analysis of the two PVs under investigation. We excluded the meaning of the preposition as a factor from the study. Defining the meaning of prepositions is a contentious issue, given the apparent multifunctionality of most prepositions, which has led linguists to propose complex prepositional polysemy networks (cf. Tyler and Evans 2003 and the discussion in Van der Gucht, Willems, and De Cuypere 2007). We now turn to a presentation of the four factors.

– *Voice*. Sentences were annotated as either active or passive. Duden (2006: 617) claims that in sentences with a *sein*-passive, case marking corresponds, as a rule, to the equivalent active sentence, which means that the 'stative' meaning associated with the passive construction (whence 'Zustandspassiv') bears no consequences for the case marking. In Duden (2007), however, five verbs are described as preferring DAT when used in the passive voice, viz. *einfügen in* ('insert into'), *einnähen in* ('sew into'), *einpflegen in* ('enter into'), *einschreiben in* ('register in'), *gründen auf* ('base on'). Consider the following examples with *einnähen in*:

(10) *Er* *hat* *das Geld* ***in die Jacke*** *eingenäht*.
he.NOM has the money.ACC in the jacket.ACC in-sewn
'He has sewn the money into the jacket.'

(11) *Das Geld* *ist* ***in der Jacke*** *eingenäht*.
the money.NOM is in the jacket.DAT in-sewn
'The money is sewn into the jacket.'

The case alternation illustrated in (10)–(11) is in line with the viewpoint discussed in Section 2.2 which contrasts a focus on the 'path' (directionality) with 'endpoint focus' (cf. Ágel 2000: 157 for a similar analysis). It might therefore be assumed

that with some PVs the passive voice has a preference for DAT. It would also be interesting to see whether the semantic differences between *werden*-passives and *sein*-passives are associated with different case preferences. However, due to the low occurrence in our data set of *sein*-passives compared to the number of *werden*-passives, it is not possible to compute reliable statistics. We therefore leave this question for future research.

– *Perfect tense*. It has long been assumed that the presence of a past participle (in the present perfect or past perfect tense, but also as an adjective) which denotes the perfective aspect of an event motivates the use of DAT (cf. Paul 1920: 11–12, Dal 2014: §45). In essence, this follows from a similar reasoning as the one used to associate the passive voice with DAT, given that perfect tenses usually indicate the resulting state of an event rather than the event itself.

– *Transitivity*: Each observation was annotated for transitivity. Whereas for *aufnehmen in* transitivity was found to be an invariable factor, *aufsetzen auf* allows for both the transitive and intransitive use. In accordance with common practice, reflexive uses were considered as transitive (albeit of a special nature). Passive sentences were also considered as transitive, even if there was no expressed agent (impersonal passives did not occur in our data). With regard to *aufsetzen auf*, Duden (2007) maintains that transitive use is associated with ACC which is said to correlate with the designation of "direction" ("weil eine Richtung bezeichnet werden soll", Duden 2007: 116; cf. also Ágel 2000: 165). The link between ACC and directionality is however difficult to maintain if figurative uses are taken into account. In (12) and (13), a directional reading is improbable, regardless of the transitivity of the sentences:

(12) *TCP* *setzt* *in den meisten Fällen* ***auf das IP-Protokoll***
TCP.NOM places in most cases on the IP-protocol.ACC
auf.
PVPARTICLE
'In most cases, TCP builds on the IP-protocol.'

(13) *Wir* *brauchen* *zunächst* *eine inhaltliche Basis,*
we.NOM need first a content-related basis.ACC,
auf der *wir* *diese Aktionen* *dann* *aufsetzen* *können*.
on the.DAT we.NOM these actions.ACC then on-place can
'First, we need a broad and firm basis on which we can then build these actions.'

In both sentences, there is a basis on which something is or will be built, but this relationship is not directional. Moreover, what is built can hardly be said to

'move onto' something else in (12) because of ACC but not in (13) because of DAT. Of course, this does not exclude the possibility that transitivity indeed influences the case marking, but then we should be able to define the role of transitivity in more generally applicable terms.

– *Conventionalized sense*. We consider this factor to be pivotal to the development of a well-founded, realistic constructional approach to the case alternation under investigation. Defining a finite number of conventionalized senses is a means to arrange the various semantic relationships between a PV and the different contexts of use in the sample sentences in a systematic way. There is an almost infinite range of semantic properties that can be ascribed to individual naturally occurring sentences. Demarcating these properties consistently depends to a large extent on the accuracy of context- and discourse-driven interpretations of as many observations as possible. In the past it was customary to define a set of semantic properties that might influence case marking on the basis of a small sample of (artificial) examples. Because the drawbacks of such an approach are obvious, we decided to inductively define a number of conventionalized senses similar to "default interpretations" in the pragmatics literature. Before proceeding with the definition of the conventionalized senses we propose for *aufsetzen auf* and *aufnehmen in*, we first outline the theoretical assumptions of our approach to meaning.

Regarding the different types of "meaning" that can be distinguished in the analysis of prepositional argument structure constructions with a PV, we follow the "layered" approach to semantics advocated by Coseriu (1970, 1975, 2001) and neo-Gricean linguists (cf. Grice 1989 and Levinson 2000). In particular, we adopt the "three-level" approach to meaning, i.e. the view that "meaning" is a complex phenomenon in which at least three different but interdependent semantic layers have to be distinguished. While Coseriu primarily focuses on the meaning of lexical items and word formations, Grice and Levinson concentrate on sentence meaning. Coseriu (1970: 108–116, 1975: 64–101, 2001: 248–249) makes a distinction between the following levels (cf. Willems 2001, 2013 for discussion):

Level 1: the general systemic *meaning* defined by the contrasts that hold between language-specific lexical items or constructions ("paradigmatic relations", following Saussure's theory of "valeurs" and "signifiés", see Willems 2011b);

Level 2: the "normal language use" of a lexical item or construction in which the general systemic meaning of Level 1 is enriched by conceptual and pragmatic knowledge, yielding a conventionalized *sense*, i.e. a "default" or "preferred" interpretation;

Level 3: the unique, referential *reading* that accrues to a lexical item or construction in the process of their interpretation in a particular contextual setting; this reading may or may not coincide with Level 2.

The major distinctions in Grice's and Levinson's "three-leveled theory of meaning" (Levinson 2000: 25) are conceived along similar lines, with, however, differences in focus. These authors emphasize the need to separate two types of utterance-meaning ("utterance-token-meaning" and "utterance-type-meaning") and one sentence meaning. "Sentence meaning" corresponds to the abovementioned Level 1; it constitutes the semantic layer of a sentence that is to be explicated by the theory of grammar. "Utterance-token-meaning" corresponds to Level 3; it constitutes the speaker-meaning which is a matter of the "actual nonce or once-off inferences made in actual contexts by actual recipients with all their rich particularities" (Levinson 2000: 22). Finally, there is the "utterance-type-meaning" which corresponds to Level 2; it is "a level of systematic pragmatic inference based *not* on direct computations about speaker-intentions but rather on general expectations about how language is normally used" (Levinson 2000: 22, emphasis in the original). It is this intermediary level which Levinson defines as the layer of "generalized conversational implicatures", "default inference" or "preferred interpretation" (Levinson 2000: 11, 21). The Coserian level of "normal language use" and Levinson's "generalized conversational implicatures" are no monolithic or static strata. They generalize over similar specific usage norms and allow for variation among speakers and speaker groups within limits.

Regarding the two PVs under investigation, the "three-level" approach results in the identification of the following conventionalized senses on "Level 2"[6]:

aufsetzen auf:
a) SET DOWN ON: 'X or Y sets down, or Y is set down by X, on a surface Z'; e.g.:

(14) *Mehrere Versuche,* *die Kugel* ***auf den Pylon***
several attempts.NOM, the ball.ACC on the pylon.ACC

6 In this study, conventionalized senses are rendered as verbs and in capital letters for the sake of clarity. The ensuing classification is based on extensive preliminary corpus analyses. Only senses that were attested in our data set are included. The senses we identified were cross-checked by comparing them with the semantic definitions of the two PVs provided in two standard dictionaries of present-day German, viz. Duden (1999) and Klappenbach & Steinitz (1978). We use the following symbols to designate the participant roles: X = Agent, Y = Theme or Patient, Z = Ground (the reason why we choose the term 'Ground' for the Z role will be made clear as we go along). In intransitive sentences with *aufsetzen auf* the subject may either be X or Y (see Section 4).

der Severinsbrücke *aufzusetzen,* *schlugen fehl.*
of the Severin bridge on-to-put, failed
'Several attempts to place the ball on the pylon of the Severin bridge failed.'

b) LAND ON: 'Y is put down by X, or X/Y lands, on a surface Z'[7]; e.g.:

(15) *Der Pilot* *startete durch* *und setzte* *die Maschine*
the pilot.NOM started through and put the plane.ACC
auf einer anderen Landebahn des Hamburger Flughafens *auf.*
on another runway.DAT of the Hamburg airport PVPARTICLE
'The pilot made a go-around and put the plane down on another runway of Hamburg airport.'

c) BASE ON: 'X or Y build, or Y is based by X, on a foundation Z'; e.g.:

(16) *JEPI* *setzt* ***auf dem Hypertext Transfer Protocol*** *auf.*
JEPI.NOM puts on the Hypertext Transfer Protocol.DAT PVPARTICLE
'JEPI is based on the Hypertext Transfer Protocol.'

aufnehmen in:

a) ALLOW (AS A MEMBER): 'X adds Y as a member to a group Z'; e.g.:

(17) *Maximal* *zehn Kleinkinder* *können* ***in einer Gruppe***
maximally ten small-children.NOM can in one group.DAT
aufgenommen werden.
on-taken get
'A maximum of ten small children can be part of one group.'

b) INCORPORATE: 'X includes Y as an integral part into Z'; e.g.:

(18) ***Im Finanzierungsplan des städtischen Haushalts***
in.the finance-plan.DAT of.the city budget
werde *die Maßnahme* *daraufhin* *aufgenommen.*
will be.SUBJ.PASSIVE the measure.NOM then on-taken
'It is said that the measure is then incorporated into the finance plan of the city budget.'

c) SHELTER: 'X offers Y shelter in Z'; e.g.:

(19) *In Bremen* *nahm* *sie* *eine bosnische Flüchtlingsfamilie*
in Bremen took she.NOM a family.ACC of Bosnian-refugees
in ihr Haus *auf.*
in her house.ACC PVPARTICLE
'In Bremen, she took a family of Bosnian refugees into her home.'

---

7 The most frequent instantiation of this sense is with regard to an airplane landing on a runway but various kinds of vehicles and landing surfaces can be involved (compare, e.g., *Der Korb mit den fünf Insassen konnte gerade noch auf dem Flachdach eines vierstöckigen Hauses aufsetzen* 'Just in time the basket with the five passengers could land on the flat roof of a four story building').

d) ASSIMILATE MENTALLY: 'X assimilates, or absorbs, a (mental or sensory) perception Y into Z'; e.g.:

(20) *So habe ich diese Magie* ***in mich*** *aufgenommen.*
so have I.NOM that magic.ACC in me.ACC on-taken
'In this way I took up and absorbed the magic.'

3.4 Statistical analysis

We used the classification tree approach (see Breiman et al. 1984, Baayen 2008: 148–154) to evaluate the effects of the four factors on the choice of case. Classification tree modeling is a data mining tool that is traditionally used in exploratory data analysis.[8] Two of its main advantages are that a classification tree easily sorts through complex and unbalanced data and that it can straightforwardly uncover interaction effects that may stay unnoticed in other models. The method is well-suited for our data analysis, which purports to reveal the potential effects of simultaneously interacting factors. Numerous algorithms have been created to fit a classification tree. Basically, each algorithm performs a stepwise splitting of the data into successive subgroups with respect to the outcome variable. In this study, we have applied the algorithms provided in SPSS 20 to fit our models. The specific algorithm that we used is reported in Section 4. One known issue with classification tree modeling is that different trees can often be fit to the same data. We have fitted several trees to our data, but only report our final model. We evaluated the quality of our fitted trees based on their predictive accuracy after split-sample validation. Following the principle of parsimony, we also tried to establish a minimal adequate model (Crawley 2007), i.e. the tree that was able to classify most of the data based on the least number of variables.

4 Results and discussion

In this section we present the statistical findings and discuss what qualitative conclusions can be drawn from them. In Section 4.1 we set up a framework for evaluating the role of transitivity in a constructional account of the case alternation with PVs. This is the backdrop against which we interpret the statistical findings for *aufsetzen auf* and *aufnehmen in* in Sections 4.2 and 4.3.

8 Other examples of linguistic studies that use classification tree analysis include De Backer & De Cuypere (2012), Tagliamonte & Baayen (2012), and Vanderscheuren & De Cuypere (2013).

4.1 Constructions, transitivity and case alternation: a constructional framework

In Section 3.3 we introduced the morpho-syntactic factor transitivity. Transitivity is a central notion in modern functional accounts of argument structures (in particular since Hopper and Thompson 1980) and occupies a prominent position in many constructional accounts as well. In order to determine the probability of transitivity as a principal motivating factor in the case alternation under investigation, we conducted a preliminary corpus study. We extracted a sample from DeReKo with six PVs which were selected in view of their differences in transitivity as outlined in Table 1 (cf. Rys, Willems, and De Cuypere 2014).

Table 1: Profiles of six PVs with respect to the factor transitivity.

prepositional verb	intransitive use	transitive use
aufsetzen + *auf* ('set down on etc.')	yes	yes
aufnehmen + *in* ('incorporate, allow etc.')	no	yes
versinken + *in* ('sink, disappear in/into')	yes	no
versenken + *in* ('sink in/into')	no	yes
einsinken + *in* ('sink in/into')	yes	no
einsenken + *in* ('sink in/into')	no	yes

The total corpus sample for this part of the study contained N = 2177 observations. We found that *versinken in*, *versenken in* and *aufsetzen auf* most often occurred with DAT and *einsinken in*, *aufnehmen in* and *einsenken in* most often with ACC ($\chi^2(5) = 670$, p-value < 0.0001, $\varphi_c = 55\%$)[9] (Table 2). Based on the six PVs in Table 2, there is a statistically significant correlation between transitivity and case marking, cf. Table 3 ($\chi^2(1) = 445$, p-value < 0.0001, $\varphi_c = 45\%$).

The effect of the factor transitivity is comparable to the effect of the PV itself ($\chi^2 = 670$, df = 5, p-value < 0.0001, $\varphi_c = 55\%$). Yet, there is no straightforward one-to-one relationship between each particular PV and transitivity: while *einsenken in* and *aufnehmen in* are only used transitively and indeed occur with ACC much more often than with DAT, so does *einsinken in* which is only used intransitively. Conversely, the strictly transitive *versenken in* prefers DAT instead

9 φ_c (Cramér's V) is a widely adopted measure of the strength of the association between two variables, in this case transitivity and case marking with a two-way preposition (either ACC or DAT).

Table 2: Bivariate distribution of the PVs with respect to case.

prepositional verb	ACC	DAT
versinken in	38 (8%)	419 (92%)
versenken in	91 (23%)	306 (77%)
aufsetzen auf	213 (33%)	431 (67%)
einsinken in	104 (53%)	91 (47%)
aufnehmen in	382 (84%)	72 (16%)
einsenken in	27 (90%)	3 (10%)

Table 3: Bivariate statistics of the factor transitivity with respect to case.

transitivity	ACC	DAT
intransitive	169 (16%)	873 (84%)
transitive	686 (60%)	449 (40%)

of ACC in our data set. On the basis of these findings and in accordance with the premises of the constructional approach, we consider transitivity not only to be a property of the valency of particular (prepositional) verbs but also a defining property of argument structure constructions. Based on previous accounts and the values in Table 3 (intransitive/DAT: 84%, transitive/ACC: 60%), we furthermore assume, as a working hypothesis, that the PP in the transitive construction defaults to ACC, whereas the PP in the intransitive construction defaults to DAT. Under this view, deviations from the default correlations are especially in need of elucidation.

One of the basic assumptions of constructional approaches to which we subscribe is that constructions are form-meaning pairings. While the formal definition of a construction is rarely a subject of dispute, the way its meaning is to be defined is more controversial. We hold the view that higher-level constructional meanings are of a general ("schematic") nature. In addition to the working hypothesis regarding the correlation of (in)transitivity and the case alternation of the PP, we therefore posit the following pairings of form and meaning for prepositional argument structure constructions (Figure 2).

The semantic paraphrases of the transitive and intransitive construction in Figure 2 are intended to convey higher-level schematic meanings. They unite, in constructionally different ways, the categorial meaning of a VERB with the instrumental meaning of a PREP as part of the two prepositional argument structure constructions under investigation. Contrary to lexically-based constructional

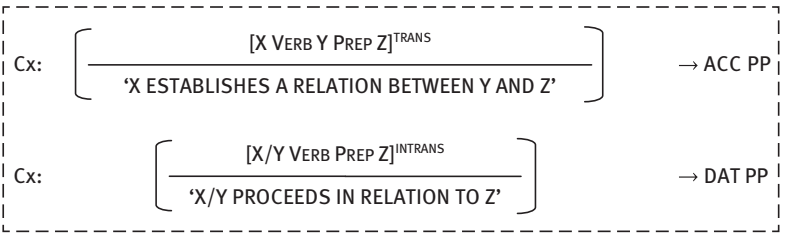

Figure 2: The correlation between transitivity, constructional meanings and the case marking of the two-way preposition in prepositional argument structure constructions.

approaches which emphasize constructional polysemy and prototypical central senses (cf. Goldberg 1995, Fried and Östman 2004, among others), we stress that the proposed paraphrases target the "Level 1" meanings of the constructions, as explained in Section 3.3. It is imperative that these constructional meanings are not confounded with particular meanings of lexical items or specific conventionalized senses (see Coene and Willems 2006 why it is undesirable to mix up different layers of meaning in the definitions of constructional meanings). As a result, any paraphrase of a constructional pattern is at best an approximation of its schematic meaning (see in this regard Coseriu 2001: 69–107 and 355–369 for useful discussions of the relationship between language and metalanguage). Importantly, both paraphrases in Figure 2 remain underspecified, in the sense that they are general enough to encompass the entire range of PVs, not just those we consider in this chapter. The general concepts ESTABLISH and PROCEED render the two categorial meanings of VERB, while the proposed instrumental meaning RELATION bears out the relational nature of PREP (see Van der Gucht, Willems & De Cuypere 2007 for further discussion).[10] In the intransitive pattern, either the Agent role (X) or the Patient or Theme role (Y) can occupy the subject slot.[11]

10 In response to a comment of an anonymous referee, it is worth pointing out that these are semantic paraphrases of VERB and PREP with respect to prepositional argument structure constructions, bearing in mind that we are focusing on combinations of verbs and two-way prepositions which are themselves defined as constructions (see Section 2). This excludes cases such as the following one, given that there is no prepositional verb *essen auf* in German: *Klaus isst Nüsse auf dem Fußboden* ('Klaus is eating nuts on the floor').

11 Compare, e.g., the following examples with *aufsetzen auf* (examples from DeReKo):

Mit Tempo 90 *setzte* *er* *das Flugzeug*
at 90 km per hour put he.NOM the plane.ACC
auf dem Brachgelände neben der Autobahn *auf.*
on a waste-land.DAT near the motorway PVPARTICLE
'At 100 kilometers per hour he put the plane down on a wasteland near the motorway.'

It may even be the case that both roles merge into a single role which is undetermined for agency.

In the following two sections we will look at the case marking regularities that can be observed when the two constructions in Figure 2 are instantiated (or "elaborated", Goldberg 1997: 386) by the PVs *aufsetzen auf* and *aufnehmen in*.

4.2 aufsetzen auf

The subset with *aufsetzen auf* contains N = 644 observations. 213 sentences occur with ACC (33.1%), 431 sentences with DAT (66.9%). Among the lexical-semantic factors the conventionalized senses yield the strongest effect. The classification tree in Figure 3 shows that *aufsetzen auf* mostly occurs with ACC when used in the sense SET DOWN ON and with DAT in the senses LAND ON and BASE ON. The effect is particularly strong with the sense LAND ON, which in 98.7% of all cases correlates with DAT.

Recall that *aufsetzen auf* can be used both transitively and intransitively. Among the morpho-syntactic factors transitivity is the only factor for which we found a significant effect. With the conventionalized sense SET DOWN ON the intransitive use is clearly associated with a preference for DAT and the transitive use with a preference for ACC. There is a small but nearly negligible effect of transitivity for the sense LAND ON: the intransitive use always correlates with DAT, but in the transitive use, too, DAT is dominant. ACC occurs in only four transitive observations of *aufsetzen auf* with the sense LAND ON.

We can evaluate the predictive accuracy of our statistical model by comparing the predictions of the model as they occur in the classification tree in Figure 3 with the cases observed in our data set. Table 4 cross-tabulates the predicted and observed categories. We can see that both ACC and DAT are correctly predicted in more than 92.1% of all cases (the misclassification risk is 7.9% after 10-fold cross-validation). This correct prediction rate is substantially higher than the baseline of 66.9% (the observed proportion of DAT in the data, see Node 0 in Figure 3).[12]

Der 65-jährige Pilot [...] *setzte* *unbeschadet* ***auf einer Wiese*** *auf.*
the 65-year-old pilot.NOM [...] put unharmed on a meadow.DAT PVPARTICLE
'The 65-year-old pilot [...] landed on a meadow without any injuries.'

Die Raumsonde "Near" *setzt* ***auf dem Gesteinsbrocken "Eros"*** *auf.*
the space-probe 'Near'.NOM puts on the rock 'Eros'.DAT PVPARTICLE
'The space probe 'Near' lands on the rock 'Eros'.'

12 We use the term "predicted" following common statistical parlance. Note, however, that the 10-fold cross-validation method only involves predictions within subsets of the current data set, we do not evaluate the prediction of our model outside our data set.

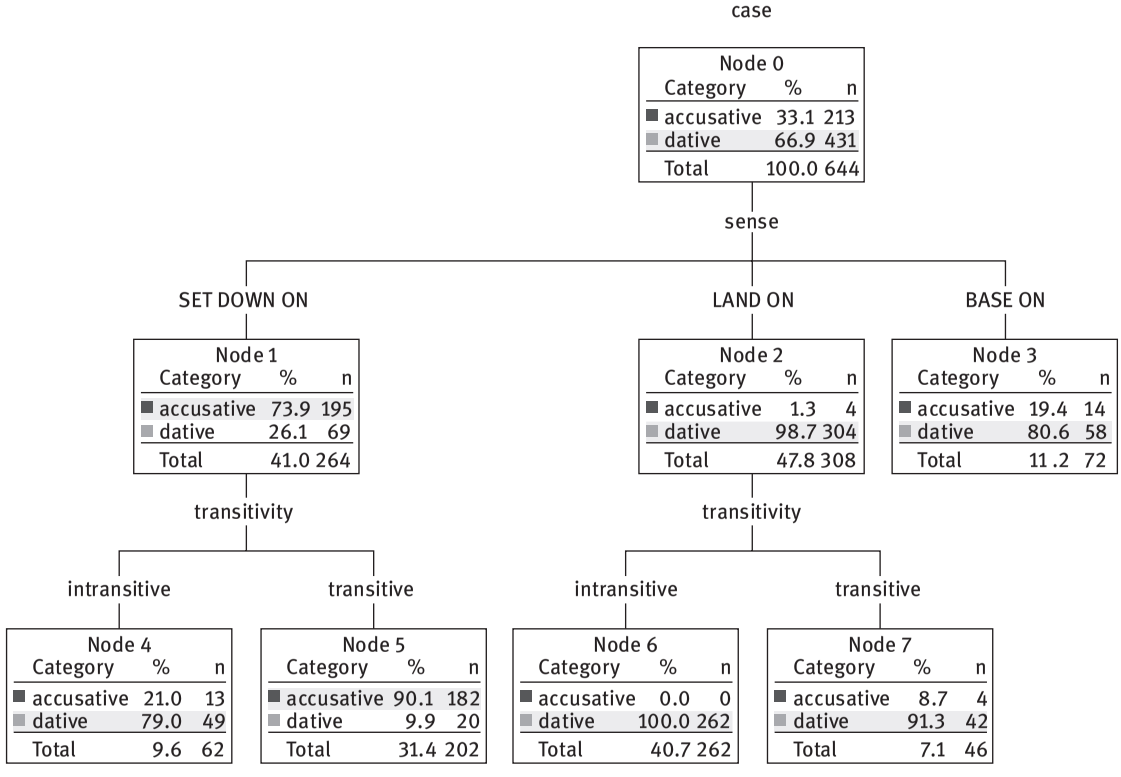

Figure 3: Classification tree for *aufsetzen auf*.

Table 4: Classification table for the estimated classification tree for *aufsetzen auf*.

Observed	Predicted		
	ACC	DAT	Correct
ACC	182	31	85.4%
DAT	20	411	95.4%
Overall percentage	31.4%	68.6%	92.1%

We now turn to a qualitative discussion of the findings. ACC is dominant (90%) in transitive sentences when *aufsetzen auf* is used in the sense SET DOWN ON and DAT is dominant (79%) across the intransitive occurrences, but exceptions occasionally show up in the data. For example, (21) is transitive, (22) is intransitive:

(21) *Nun habe er den Wunsch, Dach- und Obergeschoss*
now has.SUBJ he.NOM the wish.ACC, attic and upper-floor.ACC
abtragen zu lassen, um ***auf dem übrigen Erdgeschoss***
tear down to let, to on the remaining ground-floor.DAT
ein Satteldach aufzusetzen.
a saddle-roof.ACC on-to-put
'He now wishes to tear down the attic and the upper floor in order to put a saddle roof on the remaining ground floor.'

(22) *Bei Grippe etwa sind zwar Viren die Auslöser,*
with influenza about are in fact viruses.NOM the causes.NOM,
oft setzen jedoch bakterielle Infektionen ***auf die Erkrankung***
often put though bacterial infections.NOM on the illness.ACC
auf.
PVPARTICLE
'Although viruses are the causes of influenza, bacterial infections often superimpose themselves on the illness.'

On the other hand, the conventionalized sense LAND ON is associated almost exclusively with DAT, an effect of transitivity is hardly noticeable. There are four transitive sentences (out of 46 sentences) used in this sense with ACC PP, one of which is (23) below:

(23) *Butterweich, beinahe lautlos setzt Pilot Wolfgang Absmeier (46)*
very gently, almost silently puts pilot Wolfgang Absmeier (46).NOM

den Giganten ***auf das Rollfeld*** ***in Finkenwerder*** *auf.*
the giant.ACC on the roll-field.ACC in Finkenwerder PVPARTICLE
'The pilot W.A. (46) puts the giant plane very gently, almost silently, on the runway in Finkenwerder'

Finally, although the frequency of transitive sentences that realize the sense BASE ON is too low to draw definitive conclusions, it is noteworthy that the six transitive sentences in the data set (on a total of 66 sentences for this particular sense, i.e. 9%) all have DAT, as in (24).

(24) *Das Projekt* *konnte* ***auf bestehenden Anwendungen***
the project.NOM could on existing applications.DAT
aufgesetzt werden.
on-put get
'The project could further build on existing applications.'

It is clear that the above findings only lend limited support to the common correlation of the case alternation and transitivity provided for *aufsetzen auf* (e.g. in Duden 2007: 116). The substantial qualification is that the correlation is only prominent in one particular conventionalized sense, viz. SET DOWN ON, not across all the occurrences of the PV in the data set. If the correlation is to reveal its true significance, the morpho-syntactic factor 'transitivity' must therefore be narrowed down in terms of the specific conventionalized senses of the PV. If we take the transitive and intransitive constructional patterns as a starting point, then the basic correlations that emerge are as in Figure 4.

In two of the three senses we have distinguished, case marking is essentially indifferent to the factor transitivity, barring occurrences of exceptional case marking, which of course calls for an explanation (see below). This observation goes against any attempt to link the case alternation directly to morpho-syntax. To account for the correlations in Figure 4, we propose to introduce a number of explanative contrasts on a constructional level. The PP in the intransitive construction defaults to DAT when the PV *aufsetzen auf* is instantiated, regardless of any particular conventionalized sense (but with exceptions). Conversely, in the transitive construction ACC is the preferred case for the PP when the constructional meaning 'X ESTABLISHES A RELATION BETWEEN Y AND Z' is instantiated as SET DOWN ON, but not when the conventionalized senses LAND ON or BASE ON are instantiated.

Under the assumption that ACC is the default case of the PP in the transitive construction, the conclusion can be drawn that the association between the

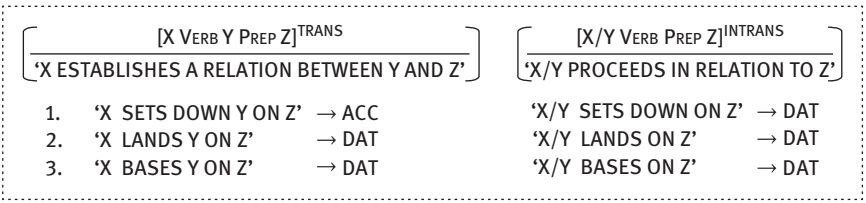

Figure 4: Case preferences of *aufsetzen auf* with different conventionalized senses.

conventionalized senses LAND ON and BASE ON and DAT is particularly strong, to the extent that it is able to override the association of the general constructional meaning and the default ACC marking of the PP. Put in other words: the stronger the bond is between a conventionalized sense and one of the two cases, the more the case marking of the PP tends to be "lexical", i.e. tied to the PV as an item (itself a construction) of the lexicon with its own idiosyncratic properties, rather than "structural" (see Barðdal 2011 for a critical appraisal of the dichotomy between lexical and structural case). Moreover, with respect to LAND ON, an additional analogical motivation for DAT may very well play a role: the regular German verb which has LAND ON as its systemic ("Level 1") meaning, *landen auf*, invariably selects DAT in DeReKo.

As illustrated in sentences (21)–(23) above, we found occurrences of exceptional case marking with the conventionalized senses SET DOWN ON and LAND ON, which need to be explained. We interpret exceptions such as these as the outcome of competing motivations for case marking. A constructional point of view proves helpful in accounting for such competing motivations. The ACC in (22) may be motivated by the fact that *Infektionen* ('infections') occupies a middle position between a typical Agent and a typical Patient or Theme role, making the sentence akin to the transitive structure with the sense SET DOWN ON which has an overtly expressed Agent and normally takes an ACC PP. This points to the need to further specify the intransitive construction at a finer level of granularity, viz. to posit a cline of subconstructional patterns which further specify argument roles and are intermediary between the general intransitive prepositional construction and specific PVs. This is schematically illustrated in Figure 5.

We claim that case variation is structurally linked to the cline presented in Figure 5. This is a further strong indication for the validity of the constructional approach. It provides a plausible explanation for why ACC occurs more often with the pattern on the left side of the cline:

$[X_{\text{Agent}}$ VERB PREP Z] INTRANS

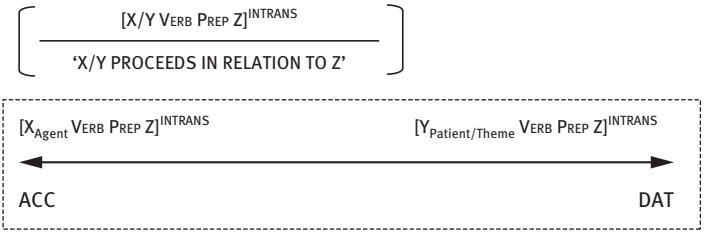

Figure 5: Subconstructional patterns of the intransitive prepositional argument structure construction with *aufsetzen auf*.

than with the – apparently more frequent and more entrenched – pattern on the right side:

[$Y_{Patient/Theme}$ VERB PREP Z] INTRANS

– even though the elaboration of the intransitive construction by *aufsetzen auf* is strongly associated with DAT PP.

In a similar vein, it can be argued that *auf dem übrigen Erdgeschoss* ('on the remaining ground floor') in (21) is midway between a complement and an adjunct, which may account for why DAT is preferred over ACC in this particular occurrence. There is again a constructional explanation to this. In DeReKo, *aufsetzen* most often occurs as part of the PV *aufsetzen auf*. However, we also found a considerable number of occurrences in which *aufsetzen* is used without a prepositional object, not only in intransitive sentences (e.g., *der Hänger setzte auf* 'the trailer crashed') but also in transitive sentences such as (25) and (26):

(25) *Die Piloten* *konnten* *das Flugzeug* *sicher* *aufsetzen.*
the pilots.NOM could the plane.ACC safely PV:put
'The pilots succeeded in landing the plane safely.'

(26) *Zwei Jahre später* *beschließen* *sie,* *das Rittergut*
two years later decide they.NOM the knight-manor.ACC
zu retten *und* *setzen* *ein neues Dach* *auf.*
to safeguard and put a new roof.ACC PVPARTICLE
'Two years later they decide to safeguard the ancient manor and put a new roof in place.'

This observation underscores the need to distinguish subconstructional patterns with respect to the transitive construction as well, this time along the following lines:

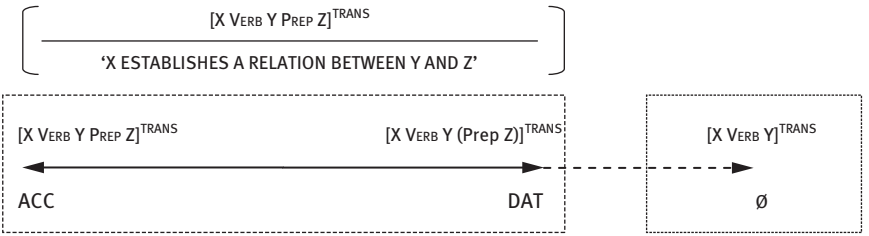

Figure 6: Subconstructional patterns of the transitive prepositional argument structure construction with *aufsetzen auf*.

Figure 6 illustrates that the transitive prepositional argument structure construction can be placed on a cline with regard to two-way prepositions, ranging from the pattern

[X VERB Y PREP Z] TRANS

in which the PP has full complement status, over the pattern

[X VERB Y (PREP Z)] TRANS

in which the PP has a modifying status in-between a complement and an adjunct (represented by round brackets), to the altogether different argument structure pattern

[X VERB Y] TRANS

in which an added PP can only be an adjunct.[13] To further illustrate this continuum compare the examples below:

(27) *Die Architektur* *setzt*
the architecture.NOM puts

13 Given its gradient nature, it should not come as a surprise that the cline in Figure 6 may also interfere with what we call "constructional homonymy". For instance, the sentence *Auch hatte der Fahrer seine vorgeschriebene Brille nicht aufgesetzt* ('Moreover, the driver had not put on his glasses as required') is analyzable as instantiating the right-most pattern on the cline. However, in DeReKo we did not come across sentences in which the collostruct *(seine) Brille aufsetzen* ('put one's glasses on') was combined with an additional PP with *auf*, whereas external possessor constructions such as *jemandem/sich eine Brille auf die Nase setzen* ('put glasses on someone's/one's own nose') (with accusative) were quite common. This proves that the central PV in this particular structure is not *aufsetzen auf* but *setzen auf*, which however may merge with *aufsetzen* in the pattern [X VERB Y] TRANS at the right end of Figure 6.

auf dem Point-to-point-tunneling-Protocol (PPTP) *auf.*
on the PPTP.DAT PVPARTICLE
'The architecture is built on the basis of PPTP.'

(28) *[...] produziert der Tänzer zwei unterschiedliche Rhythmen,*
produces the dancer.NOM two different rhythms.ACC,
zu deren Takt er seine Füße ***auf den Boden*** *aufsetzt.*
to which beat he.NOM his feet.ACC on the ground.ACC on-puts
'the dancer produces two different rhythms and according to their beat he puts his feet on the ground.'

(29) *Wenn du nicht weißt, was du*
if you.NOM not know, what.ACC you.NOM
kochen willst, setzt erst mal einen Topf Kartoffeln auf.
cook want, put first a pot of potatoes.ACC PVPARTICLE
'If you don't know what to cook, start with putting a pot of potatoes on the stove.'

The full complement status of the PP in (27) is clear from the observation that the sentence would become next to uninterpretable without the PP. At the other end of the cline, we find sentences such as (29) which lack a PP. Although it is possible to add one (compare, e.g., *einen Topf Kartoffeln auf dem Herd aufsetzen* 'to put a pot of potatoes on the stove', usually with DAT), it is important to draw attention to a major difference in conventionalization: whereas the pattern

[X *aufsetzen* Y (*auf* Z)] TRANS

realizes the sense SET DOWN ON, the pattern

[X *aufsetzen* Y] TRANS

entails a further specification of this sense and idiosyncratically designates in present-day German a telic activity intended to boil, cook etc. a substance. As already pointed out in Section 2.1, this idiosyncratic sense is typical of certain collocations (*Kartoffeln* 'potatoes', *Wasser* 'water', *Fleisch* 'meat' etc. *aufsetzen*, see Klappenbach and Steinitz 1978, 1: 279) and it is frequently, or even typically, instantiated without a PP.

Sentences such as (28) occupy an intermediate position on the cline in Figure 6. In this particular occurrence, the ACC marking of *den Boden* ('the ground') is arguably proof of its complement status. However, (30) shows that the information conveyed by the PP in (28) may be conventionalized to such a degree that it is not necessarily overtly expressed:

(30) *Besonders wichtig* *ist es,* *die Füße* *gerade und weder nach innen*
particularly important is it, the feet.ACC straight and neither inwards
noch nach außen gedreht *aufzusetzen.*
nor outwards turned on-to-put
'It is particularly important to place one's feet straight on the ground and not turn them inwards or outwards.'

The PP can therefore be considered more akin to an adjunct in (28) than in (27). This in turn concurs with the observation that in sentences such as (28) the PP occasionally occurs in the DAT. As a matter of fact, the same reasoning is also helpful to explain why *aufsetzen auf* takes DAT in more than 90% of the sentences with the sense LAND ON. This conventionalized sense also occurs without a PP, as illustrated in (25). Reference to a landing site is one of the conventionalized senses of the verb *aufsetzen*, with an 'internalized Ground' Z. However, this sense may be further specified or extended by a PP, and although part and parcel of the prepositional argument structure construction, this PP has a less profiled (more "backgrounded", see Section 5) complement status, as signaled by the preference for DAT.

Our notion of an additional semantic specification or extension by means of a PP has to be carefully distinguished from the concept of pleonastic directionals ("pleonastische Direktionale") in the literature on particle verbs. First described by Wunderlich (1983), pleonastic directionals have been a central element in recent studies on the relation between German particle verbs and accompanying PPs (see Olsen 1996, Lindemann 1998: 116–117, Eisenberg 2006: 265, Rehbein and Van Genabith 2006). It is claimed that a verb particle derived from a preposition (e.g. *ab-*, *an-*, *auf-*, *ein-*, *vor-*) saturates the prepositional argument position of the base verb. According to this view, the particle *auf-* in *aufsetzen* fills the same argument role as the PP *auf die Lötpunkte* ('on the solder pads') in (31), which functions as a prepositional object of *setzen* (example from DeReKo):

(31) *Vorsichtig* *führt* *er* *den Lötkolben* *und*
carefully handles he.NOM the soldering-iron.ACC and
setzt *ihn* *genau* ***auf die Lötpunkte***.
puts it.ACC exactly on the solder-pads.ACC
'He carefully handles the soldering iron and puts it exactly on the solder pads.'

Only PPs with ACC marking are pleonastic, the argument goes, since both the particle and the ACC PP are directional modifiers designating the goal of a movement (Olsen 1996: 304, Rehbein and Van Genabith 2006: 61). The only difference between

the particle and the ACC PP is that the latter carries an overt reference to the goal that remains implicit in the particle of the verb. DAT PPs, on the other hand, are analyzed as optional locative adjuncts that operate independently from the particle and have a different referent, i.e. they designate the spatial frame within which the movement takes place (e.g. *sickert in die Erde ein* 'soaks into the soil' vs. *sickert in der Erde ein* 'soaks in the soil', Rehbein and Van Genabith 2006: 60).

The problem with this rigid distinction between an independent DAT PP adjunct and an allegedly pleonastic ACC PP understood as an inherent part of the argument structure of the particle verb is that it is based on an unwarranted assumption concerning the complementarity of both types of PPs. If ACC and DAT mark two different types of PPs, then it is to be expected that both PPs regularly occur together in the same sentence. However, sentences with *aufsetzen auf* containing both a "locative" DAT PP and a "directional" ACC PP were not found in our corpus and it seems that they are quite exceptional. This casts doubt on the assumption that the two types of PPs are complementary. Moreover, the assumption that an ACC PP (but not a DAT PP) is in fact the redundant expression of an inherent part of the argument structure of a particle verb is not supported by the data. We searched the DeReKo corpus for sentences with *aufsetzen* as the main verb in combination with the noun *Flugzeug* ('airplane') either as the intransitive subject or the transitive object. This resulted in a sample (N = 106) of sentences that invariably instantiate the conventionalized sense LAND ON (see Table 5). 53 sentences turn out to have a PP with *auf*, the other sentences lack a PP. As is to be expected on the basis of the findings in our original data set (cf. Figure 3), the large majority of the PPs have DAT marking.

Table 5: Occurrences of the sense LAND ON of *aufsetzen auf* with *Flugzeug* ('airplane') as subject or object.

	without PP (N)	with PP (N)	ratio	PP with DAT(%)
Flugzeug + aufsetzen	53	53	1.00	94.3%

Consider (32)–(33) below. Both *auf die Landebahn* and *auf der Landebahn* ('on the runway') designate the 'Ground Z' as part of the sense LAND ON:

(32) *Es ist 23.27 Uhr am Dienstag, Ortszeit Rabat, als das Flugzeug*
it is Tuesday 23.27 o'clock, local time Rabat, when the plane.NOM
auf die Landebahn *aufsetzt.*
on the runway.ACC PV:lands
'It is Tuesday 23.27 o'clock, Rabat local time, when the plane lands on the runway.'

(33) *Zu dem Vorfall kam es, als das Flugzeug*
to the incident came it, when the plane.NOM
auf der Landebahn des Flugplatzes *aufsetzte.*
on the runway.DAT of the airport PV:landed
'The incident occurred when the plane landed on the runway of the airport.'

The claim that the ACC PP is a directional argument in (32) whereas the DAT PP is a locative adjunct in (33) crucially relies on the difference in case marking. But this is begging the question because the very assumption that ACC expresses directionality and DAT locality is not confirmed by other evidence than the difference in case marking. The reasoning in support of this distinction is therefore circular, in the sense explained in Section 2.2. There is no reason to conclude that an ACC PP is an inherent but redundant part of the argument structure of a particle verb whereas a DAT PP has an altogether different function. We saw, on the one hand, that the use of a PP to express the Ground Z (the landing site) of the sense LAND ON is fairly common and that the preferred case of the PP is then DAT. On the other hand, the sense LAND ON of *aufsetzen auf* is conventionalized to the extent that reference to a landing site may be incorporated in the sense. However, given that such a reference to an 'internalized Ground Z' is necessarily generic in nature, i.e. not lexically specified, the use of an additional PP cannot simply be redundant. This is why we prefer to use the term "semantic specification" to designate the contribution of the PP in such occurrences.

Finally, the case marking of the PP in the transitive sentence (23), in which *aufsetzen auf* selects the ACC instead of the much more common DAT in the conventionalized sense LAND ON, can be explained by resorting to yet another constructional motivation. Not only can the particularly strong bond between a conventionalized sense and a case override the correlation of the constructional meaning with a case, as we saw with LAND ON or BASE ON and DAT PP in the transitive sentences discussed above. The reverse also occurs. We hypothesize that in (23) *X setzt den Giganten auf das Rollfeld auf* 'X puts the giant plane on the runway' the constructional meaning 'X ESTABLISHES A RELATION BETWEEN Y AND Z', which defaults to an ACC PP (see Figure 2), overrides the observed strong association between the conventionalized sense LAND ON and DAT. Of course, the exact reason why a speaker does not choose the default case on a particular occasion cannot be stated in general terms and may differ from one speaker to another or even from one occasion to another. However, it is the general linguistic condition that renders such a choice possible that interests us here, and then the constructional approach is able to provide a particularly elegant, and realistic, explanation for the observed case variation, which also

has the advantage of being broadly generalizable. The simultaneous availability of different levels of meaning is foundational to creative language use (cf. Coseriu 1975, Willems 2013, among others). The fact that the two-way preposition *auf* takes ACC in (23) shows that the general transitive meaning of the prepositional argument structure construction can be emphasized despite the fact that it is instantiated by a conventionalized sense which normally correlates with a DAT PP.

4.3 aufnehmen in

Our data set contained N = 454 observations for *aufnehmen in*. There was a considerably larger proportion of observations that occurred with ACC, viz. 382 (84.1%), than with DAT, viz. 72 (15.9%). The classification tree in Figure 7 only retained the factor conventionalized sense as a predictor. No evidence was found for an effect of the morpho-syntactic factors.

The overall correct prediction rate of this model is 84.3% after 10-fold classification. This is only slightly better than the baseline of 84.1% (see Node 0, Figure 7), but the accuracy is accomplished by only one factor, viz. conventionalized sense. The performance of the model is particularly poor with respect to the prediction of DAT. As indicated in Table 6, DAT was predicted correctly in only one third of all occurrences. This low rate is partly related to the low overall use of DAT with *aufnehmen in* alongside the fact that there is no

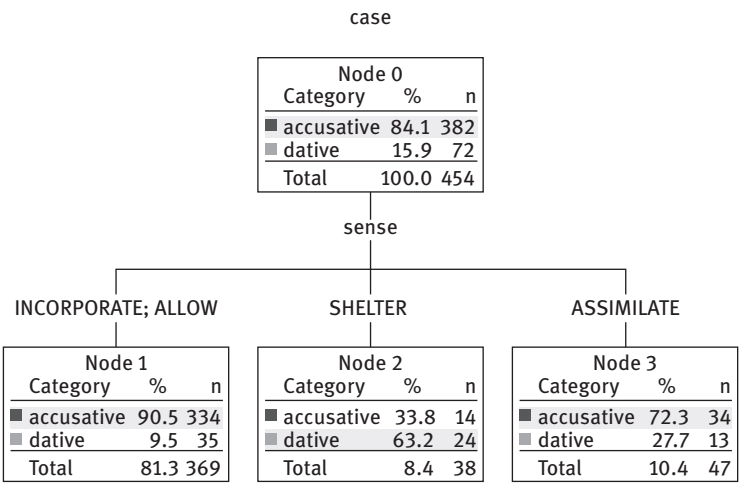

Figure 7: Classification tree for *aufnehmen in*.

Table 6: Classification table for the estimated classification tree for *aufnehmen in*.

Observed	Predicted		
	ACC	DAT	Correct
ACC	368	14	96.3%
DAT	48	24	33.3%
Overall percentage	91.6%	8.4%	86.3%

environment (i.e., no combination of factors included in the model) in which DAT clearly outranks ACC as the preferred case. The ACC, on the other hand, was correctly predicted for 96.3% of the observations.

Aufnehmen in shows a preference for ACC with three out of the four conventionalized senses we have distinguished, viz. INCORPORATE, ALLOW (AS A MEMBER) and ASSIMILATE MENTALLY. This is consistent with the assumption that the PP in the transitive construction defaults to ACC (Figure 2). The distinction between the two senses ALLOW (AS A MEMBER) and INCORPORATE turned out to be insignificant. There is, however, a preference for DAT in the conventionalized sense SHELTER.

Recall that, contrary to *aufsetzen auf*, the PV *aufnehmen in* is confined to the transitive argument structure construction. The basic hypothesis that in this construction the default case of the PP is ACC is to a considerable extent borne out by the data. There is, however, a non-negligible number of occurrences with DAT PPs. Given that in our data set *aufnehmen in* did not occur in the intransitive argument structure construction, there is no possibility that the transitive constructional meaning is overridden by the intransitive constructional meaning, which proved strongly associated to DAT with *aufsetzen auf*. Moreover, because no morphosyntactic factors were found to be statistically significant, it may seem as though there is no evidence that other sources of constructionally relevant divergences (particularly voice) play a role in the occurrence of DAT. However, we believe that the peculiarities of the case alternation with *aufnehmen in* are again amenable to a constructional analysis.

The main challenge for a coherent account of the data amounts to developing plausible explanations for the following three observations: What could motivate the preference for DAT of *aufnehmen in* in one of the conventionalized senses, viz. SHELTER? Even if the senses INCORPORATE and ALLOW (AS A MEMBER) strongly correlate with the expected ACC, what could account for the 9.5% of occurrences with DAT? And why is the preference for ACC less outspoken with the sense ASSIMILATE MENTALLY than with the senses INCORPORATE and ALLOW (AS A MEMBER)?

From a constructional point of view, there is again the striking observation that sentences in which the pattern of the transitive construction is fully realized alternate with sentences in which no PP is present. Compare (34)–(35) and (36)–(37):

(34) ***In einem Kleinstadtkrankenhaus der Region*** *nimmt* *man*
in a small-town hospital.DAT of the region takes one.NOM
den Patienten *auf.*
the patient.ACC PVPARTICLE
'They admitted the patient into a small-town hospital in the region.'

(35) *Kurz vor Kriegende* *musste* *der zuckerkranke Löwit*
shortly before end of war had to the diabetic Löwit.NOM
in die Klinik, *schwer* *für einen Mann mit Judenstern.*
into the hospital.ACC, difficult for a man with Jews' star.
Das Theresienkrankenhaus *nahm* *ihn* *auf.*
The Theresien hospital.NOM took him.ACC PVPARTICLE
'Just before the end of the war, Löwit who suffered from diabetes had to go to the hospital, which was difficult for a man with a yellow badge. The Theresien hospital accommodated him.'

(36) *Dabei* *helfen* *sich* *Hundebesitzer* *gegenseitig* *und*
thereby help REFL dog-owners.NOM each other and
nehmen *für die Ferien* *einen weiteren Vierbeiner* ***in der Familie***
take for the holidays a further pet dog.ACC in the family.DAT
auf.
PVPARTICLE
'Owners of dogs help each other and adopt another pet dog into the family during the holidays.'

(37) *der kleine Hund [...] wurde* *wohl* *von seinen Besitzern*
the little dog.NOM was probably by its owners
in Südengland *ausgesetzt,* *als* *sie* *dies* *merkten.*
in South-England dumped, when they.NOM that noticed.
Eine Familie *nahm* *ihn* *auf.*
A family.NOM took it.ACC PVPARTICLE
'the little dog was probably dumped in the south of England by the owners when they noticed that. A family adopted it.'

Not only (34) and (36) but also (35) and (37) realize the conventionalized sense SHELTER. In (35) and (37), the pattern without a PP realizes this sense with a

subject argument that is typically destined to show up as the PP in the pattern with a PP, as in (34) and (36).

In order to measure the correlation between the presence or absence of a PP and each of the four different conventionalized senses we have identified, we compiled a separate data set (N = 119) of sentences with *aufnehmen* on the basis of DeReKo. The occurrence rate of each sense was then put against the rates in our main data set of sentences with the PV *aufnehmen in*. The resulting ratios are as follows:

Table 7: Occurrences of the different senses of *aufnehmen in* with and without a PP.

conventionalized sense	without PP (N)	with PP (N)	ratio	PP with DAT(%)
SHELTER	100	38	2.63	63.2%
ASSIMILATE MENTALLY	6	47	0.13	27.7%
ALLOW (AS A MEMBER)	10	170	0.06	11.2%
INCORPORATE	3	199	0.02	8.0%

The figures in Table 7 indicate that the sense SHELTER is much more often realized in the pattern without a PP than the other three conventionalized senses. This finding is consistent with the assumption that the case of the PP is influenced by the position one can assign to a constructional pattern on a continuum of interrelated patterns, as already illustrated in Figure 6 with respect to the transitive construction with *aufsetzen auf*. The stronger the evidence that the pattern at the left end of the cline is instantiated, the stronger the motivation for ACC to be chosen. This entails that the PP tends to have full complement status. By contrast, the more the instantiation tends to the right end of the cline, the greater the possibility that DAT is chosen. This is to be expected, given that the PP gradually loses its complement status when proceeding from left to right on the cline, being a less profiled phrase in the pattern

[X Verb Y (Prep Z)] trans

and an adjunct or altogether dispensable in the pattern

[X Verb Y] trans.

Sentence pairs such as (34)–(35) and (36)–(37) show that when the conventionalized sense SHELTER is realized, the place of shelter is preferably designated as the subject of the sentence ([35] and [37]) or else by means of a DAT PP ([34] and [36]). In the pattern without a PP, the X and Z roles merge in the subject argument; schematically:

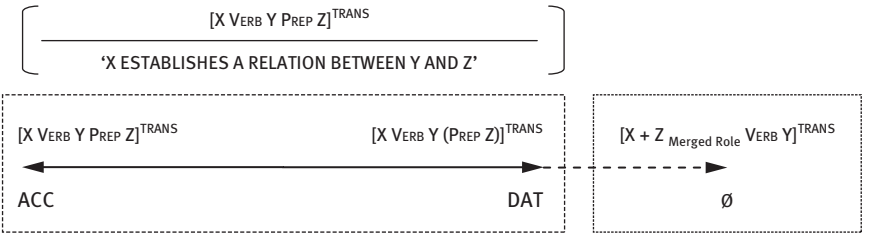

Figure 8: Subconstructional patterns of the transitive prepositional argument structure construction with *aufnehmen in*.

Note that we again do not posit a clear cut-off point on the cline which marks whether a PP is either a complement or an adjunct. This is in line with the view expressed in Section 2.1. A constructional account of argument structure constructions with complex PVs explicitly acknowledges the possibility that a PP is in-between a complement and an adjunct rather than that a strict boundary can be maintained. Other occurrences with the PV *aufnehmen in* in our data set confirm this view. For example, in the large majority of the sentences in which *aufnehmen in* takes on the sense ALLOW (AS A MEMBER), ACC is used. In only 19 out of 170 sentences DAT occurs. (38) below is an example with DAT:

(38) *Im Jahr 1957* *nahm* *die Gesellschaft*
in the year 1957 took the association.NOM
den damals 21-Jährigen ***in ihren Reihen*** *auf.*
the then 21-year.old.man.ACC in their ranks.DAT PVPARTICLE
'In 1957, the association received the then 21-year-old man as a member.'

Recall that in Duden (2007) a strong conceptual hypothesis is put forward about the case alternation with *aufnehmen in* (see Section 2.2). Our findings do not support this hypothesis. It is hard to see how one can avoid circular reasoning when trying to align the case alternation with the conceptual difference between a 'permanent' (ACC) and a 'temporary' (DAT) inclusion of a person or object. Compare:

(39) *Papst Benedikt XVI.* *hat* *jetzt* *vier Bischöfe aus dieser Gruppe*
Pope Benedict XVI.NOM has now four bishops.ACC from this group
wieder ***in die Kirche*** *aufgenommen.*
again in the Church.ACC PV:taken
'Pope Benedict XVI has now allowed four bishops from this group back into the Church.'

(40) *Folglich* *wird* *es* *in Zukunft* *erforderlich sein,*
consequently will it in future required be,
im Kaufvertrag *für Gebrauchtwaren*
in the purchase agreement.DAT for second-hand goods
eine Zustandsbeschreibung der Ware *aufzunehmen.*
a description.ACC of the conditions of the goods on-to-take
'Consequently, it will henceforth be necessary to include a description of the conditions of the goods in the purchase agreement for second-hand goods.'

It might be argued that in (39), the four bishops become lifetime members of the Catholic Church, and hence an integral part of it, which would explain ACC. Yet, the bond between the Church and the bishops is not necessarily permanent, given the fact that the bishops had previously been removed from the Church. Moreover, the assumed functions of ACC and DAT may be at odds with other cues in the sentence. In (40), for instance, the *Zustandsbeschreibung* 'description of the conditions' is to become an indispensable (*erforderlich*) part of the purchase agreement for second-hand goods in the future. ACC would thus be expected, but it is DAT that is actually used. These findings confirm our previous conclusion that the alternation of ACC and DAT with *aufnehmen in* cannot be accounted for on the basis of conceptual notions such as 'permanent' and 'temporary' inclusion without circularity (Section 2.2), and such conceptual explanations are ultimately unfalsifiable. It seems more plausible to explain the case variation by appealing to a constructional line of reasoning: with *aufnehmen in* the case marking of the PP aligns with its status on a cline, ACC meshes with full complement status and the profiling, or foregrounding, of the full constructional meaning 'X ESTABLISHES A RELATION BETWEEN Y AND Z'. DAT, on the other hand, entails that the PP is backgrounded. Only the relationship between the Agent X and the Patient or Theme Y in the constructional meaning is in focus and the establishment of a relation between Y and Z is not profiled (cf. Figure 8).

Finally, as pointed out in Figure 7, in our data the conventionalized sense ASSIMILATE MENTALLY correlates with ACC in 34 out of 47 sentences. The fact that the preference for ACC is less outspoken with the sense ASSIMILATE MENTALLY than with the senses INCORPORATE and ALLOW (AS A MEMBER) is illustrated by the following pair of sentences:

(41) *"Es* *war eine Welt,* *die* *ich* *nie* ***in mir***
it was a world.NOM, that.ACC I.NOM never in me.DAT
aufnehmen *konnte",* *sagte* *der Erfolgstrainer.*
on-take can, said the successful.coach.NOM
'"It was a world that I could never fully grasp", the successful coach said.'

(42) *"Es ist eine Welt, die ich nie* ***in mich***
it is a world.NOM, that.ACC I.NOM never in me.ACC
aufnehmen kann", erklärte Trapattoni.
on-ake can, explained Trapattoni.NOM
'"It's a world that I can never fully grasp", Trapattoni explained.'

The two sentences are from different sources ("Mannheimer Morgen" 14.04.1998 and "Rhein-Zeitung" 14.04.1998, respectively) and convey the same statement, but with two major differences in the phrasing: simple past and DAT in (41), simple present and ACC in (42). The original quote comes from Italian football manager and coach Giovanni Trapattoni, who was well-known for his broken German. Two different journalists apparently settled for either DAT or ACC according to their own preference. Only one journal (the "Rhein-Zeitung") cited the phrase with ACC, it was found in four other newspapers with DAT, always correlating with the past tense. Sentence (43) below shows that DAT also occurs with the present tense:

(43) *Mozarts Musik bedeutet für mich die Möglichkeit,*
Mozart's music.NOM means for me.ACC the possibility.ACC,
mit geradezu schwelgerischem Genuss seine Musik ***in mir***
with almost rapturous pleasure his music.ACC in me.DAT
aufzunehmen.
on-to-take
'To me, the meaning of Mozart's music is the possibility to absorb his music with almost rapturous pleasure.'

Although these examples do not contradict our constructional assumption that ACC correlates with a profiling of the full constructional meaning and the foregrounding of the PP, whereas DAT correlates with the backgrounding of the PP, it seems that the case variation with *aufnehmen in* in the sense ASSIMILATE MENTALLY pushes any analytical framework to its limits. Still, the following observations from a constructional perspective should be borne in mind. First, the sense ASSIMILATE MENTALLY is confined to a pattern of the transitive construction in which the PP is a reflexive pronoun, which entails that the referent is designated twice in the sentence. This creates a structure that to a certain extent is redundant, which may favour DAT as the case shown to be associated with backgrounding. Second, the majority of the occurrences of *aufnehmen in* with the sense ASSIMILATE MENTALLY had to be discarded from our data set because the case alternation is only overt in the first and second person singular; in all other persons, reflexive pronouns

are syncretic for ACC and DAT marking (e.g. 3rd person *sich*). As a matter of fact, most occurrences feature a syncretic pronoun form in the PP. In a random DeReKo sample of 200 occurrences of the pattern [X *aufnehmen* Y *in* Z]^{trans} which realized the conventionalized sense ASSIMILATE MENTALLY and with Z surfacing as a reflexive pronoun, no less than 180 sentences (90%) had a syncretic pronoun form. Although this in itself does not account for why DAT is relatively more frequent with the sense ASSIMILATE MENTALLY, the high incidence of syncretic pronoun forms may have an effect on the case alternation, if only because a particular case is formally less entrenched than normally.

5 The constructional approach and Paul's (1920) account of the case alternation

To conclude our analysis, we briefly elaborate on the complementarity of the constructional approach presented in Section 4 and the account of the semantics of ACC and DAT with two-way prepositions provided by H. Paul in his *Deutsche Grammatik* (1920). For Paul, cases and prepositions are means to express dependency relations. With two-way prepositions, ACC is selected when a (spatial) relationship is being established, DAT when the relationship is conceived of as already established ("existing") (Paul 1920: 5) (cf. Leys 1989 and Willems 2011a for discussion). The constructional meaning of the transitive prepositional argument structure construction shares many features with the meaning Paul assumes for ACC (cf. Hopper & Thompson 1980 for a discussion of transitivity parameters). The agentivity involved in 'X ESTABLISHES A RELATION BETWEEN Y AND Z' matches the assumption that ACC designates a relationship which is being established, the relationship between X and the 'Ground' Z is the goal of X's action. By contrast, no agentivity is explicitly designated in the constructional meaning of the intransitive prepositional argument structure construction and 'X/Y PROCEEDS IN RELATION TO Z' fits in naturally with Paul's assumption that DAT designates an already established relationship between Z and X/Y.

The complementarity of our constructional analysis and Paul's explanation is furthermore reflected in our account of instances of exceptional case marking with *aufsetzen auf* and *aufnehmen in*. Paul (1920: 5) points out that case variation may be due to the fact that speakers have a certain amount of freedom of choice to interpret the contrast between ACC and DAT, for example, as when they choose DAT with PVs that normally take ACC. To the

extent that DAT designates an existing relationship, preference for DAT is likely when a speaker wishes to convey the relationship between the PP and the sentence argument(s) as a background of the message. Conversely, using ACC entails that this relationship is highlighted, or foregrounded, which is more probable when it is not conceived of as already established. Our constructional account of the ACC/DAT alternation and Paul's definitions of the meanings of ACC and DAT with two-way prepositions are therefore also compatible with the outcome of the discussion of the complement/adjunct distinction in the previous sections. Paul's definition of the DAT squares with the default case marking of prepositional adjuncts in German. The constructional meaning of the intransitive construction, 'X/Y PROCEEDS IN RELATION TO Z', bears out why the PP in the intransitive prepositional argument structure construction defaults to a case that designates an 'established relationship': the action or event expressed in the sentence is profiled against a background of an existing relationship, hence a preference for DAT in marking the 'Ground' Z. Paul's definition of the ACC squares with the agentivity of the transitive prepositional argument structure construction and its constructional meaning 'X ESTABLISHES A RELATION BETWEEN Y AND Z': the action or event initiated by the Agent aims at establishing a relationship between the Patient or Theme Y and the 'Ground' Z expressed in the prepositional object, which accordingly is likely to be a complement. We thus maintain that there is a constructional correlation between the designation of an established relationship (DAT) and the likelihood that the PP with a PV is construed as an adjunct, as well as a constructional correlation between the designation of a relationship that is being established (ACC) and the likelihood that the PP is construed as a complement.

Under the corpus-based constructional approach we advocate, Paul's account of the semantics of ACC and DAT with two-way prepositions has some important consequences for a deeper and more accurate understanding of the case alternation. The statistical findings show that the foregrounding and backgrounding of the PP may be lexicalized to different degrees, to the extent that a constructional pattern can be more or less specified for case at the item-specific level. For example, when *aufsetzen auf* is used in the conventionalized sense SET DOWN ON, the lexicalization pattern is largely in accordance with the default case marking of the PP: 90% of the transitive sentences have ACC PPs, 79% of the intransitive sentences have DAT PPs (see Figure 3). Conversely, when *aufsetzen auf* is used in the conventionalized sense LAND ON, the picture is very different, the observed preference for DAT being 100% for the intransitive construction and 91% for the transitive construction in our initial data set. This means that with this particular PV the relationship between an airplane and a landing

site (a 'Ground') is strongly lexicalized as an existing one, i.e. no relationship is being established as far as the language-specific resources are concerned. Exceptions with ACC (9% of the transitive sentences) are evidence that speakers may depart from the dominant idiosyncratic case marking for discourse reasons (see also the exceptional use of ACC in the intransitive sentence (32) from the control sample with the noun *Flugzeug* 'airplane'). For us, such differences in lexicalization patterns show that there is no point in belabouring the dichotomy between 'motion'/'directionality' and 'location'/'state' which is pervasive in the literature on two-way prepositions and particle verbs, for instance as when Ágel (2000: 165) maintains that the transitive sentence *Der Pilot setzte die Maschine sicher auf die Piste auf* ('The pilot put the plane down safely on the runway') calls for ACC because the causative meaning of [X *aufsetzen* Y *auf* Z] would entail directionality, whereas the inchoative meaning of intransitive [Y *aufsetzen auf* Z] in *Das Flugzeug setzte auf dem Boden auf* ('The plane landed on the ground') would correspond to a locative PP and DAT. Not only is this explanation refuted by the data, it leaves little room to account for the observable case variation in naturally occurring transitive and intransitive sentences. By contrast, combining a corpus-based constructional approach with Paul's (1920) account of the semantics of ACC and DAT with two-way prepositions allows for an approach that is both empirically adequate and theoretically flexible enough to accommodate the data.

6 Conclusions

In this chapter we have examined in what ways a constructional point of view allows one to capture the simultaneous effects of different factors that bear on the case alternation in argument structure constructions with PVs and two-way prepositions, in an attempt to steer clear of the traps of previous, essentially projectionist yet more speculative approaches to case meanings. We have applied a constructional framework to the findings of a quantitative study of prepositional argument structure constructions with two exemplary PVs, *aufsetzen auf* and *aufnehmen in*. A multifactorial, corpus-based approach allowed us to detect the influence of a number of morpho-syntactic and lexical-semantic factors. We used classification trees to gauge the effects of the factors on the case alternation and evaluated the quality of our fitted trees based on their predictive accuracy after cross-validation. We then explored the interlocking effects of the factors transitivity and conventionalized senses as they interact with various constructional patterns. We interpreted the findings according to

a "three-level" approach to meaning. This approach is based on the distinction between (i) the general systemic meaning of a PV as part of the lexicon, (ii) its conventionalized or default senses which pertain to "normal language use" and (iii) its unique, referential readings in particular contextualized occurrences. We hope to have shown that an accurate representation of the intermediary level of the conventionalized senses of the PVs is pivotal to a proper understanding of the mechanisms underlying the ACC/DAT alternation with two-way prepositions. At the same time, our findings are compatible with Paul's (1920) account of the meaning of ACC and DAT with this subset of prepositions in present-day German.

A general conclusion we draw from our case study is that case preferences at the lexically non-specific "higher" level of constructional patterns and case preferences associated with prepositional verb-specific "lower-level" idiosyncrasies are potentially competing motivations. In the approach advocated here, it is assumed that with regard to prepositional argument structure constructions instantiated by two-way prepositions in German, ACC is the default case in the transitive construction and DAT the default case in the intransitive construction. However, motivations for ACC and DAT marking may enter into competition with one another. In particular, DAT occasionally wins out notwithstanding ACC being the default case in the transitive construction. We saw, for example, that the unification of transitive *aufsetzen auf* in the conventionalized sense SET DOWN ON with the general constructional meaning 'X ESTABLISHES A RELATION BETWEEN Y AND Z' prompts a ("structural") ACC PP. On the other hand, if *aufsetzen auf* takes on the lexically more idiosyncratic sense LAND ON, then the default case marking of the PP of the general transitive construction is overridden by a preference for ("lexical") DAT PP. This finding is in stark contrast to common assumptions about the direct relationship between the case marking of *aufsetzen auf* and the morpho-syntactic factor transitivity (e.g., Duden 2007: 116). The constructional framework also proves helpful in explaining occasional occurrences of ACC with conventionalized senses that normally co-occur with DAT, and vice versa. We have argued that exceptional case marking is the outcome of different possible sources, either the idiosyncratic case or the case that is motivated by a higher-level constructional pattern. For example, the ACC PP with transitive *aufnehmen in* in the sense SHELTER indicates that priority may be given to the transitive constructional pattern even though with this particular sense occurrences with DAT PP outnumber those with ACC PP in the data set.

Of particular importance is furthermore the focus on item-specific relationships between related constructional patterns. We observed, for instance, that the verb *aufsetzen* is frequently attested in sentences without PP in certain

conventionalized senses that are similar to the senses of the PV *aufsetzen auf* (in particular the idiosyncratic designation of a telic activity intended to boil, cook etc. a substance and the semantic incorporation of a landing site). This observation is important in understanding why in occurrences with the PV the PP is preferably marked in the DAT, signaling its role as a less profiled complement.

Linking the case variation to the relationship between different but related constructional patterns provides the instruments for an explanation of the variation that does not rely on ultimately unfalsifiable assertions about the alleged 'dynamicity' of ACC and 'staticity' of DAT (compare, e.g., Smith 1995). The explanatory value of such concepts is more limited than is generally assumed (in particular, limited to semantically straightforward verbal constructions with unequivocal spatial meanings). Moreover, the focus on the role related constructional patterns play in the observed case variation with two-way prepositions ties in with a constructional account of the gradient distinction between complement and adjunct. We explicitly acknowledge that, whenever a particular constructional pattern is instantiated by a PV, the PP can be located on a cline ranging from full complement status over a less profiled ("backgrounded") complement status to plain adjunct status. Under the assumption that complement status aligns with a tendency for ACC-marking and adjunct status with a tendency for DAT-marking with regard to the subset of PVs with two-way prepositions we have investigated, we were able to show that the case marking in one pattern may influence the case marking in another one. To what extent this correlation holds across the entire subset of PVs with two-way prepositions and case alternation remains an issue for future research.

The various formal and semantic relationships between interrelated (sub) constructional patterns described in Section 4 are key to the constructional account of the case alternation we have offered. However, in conclusion it must be stressed that, although patterns in their own right pairing form and meaning, constructions and subconstructions are to be seen as structured tendencies, not "rules" such as those familiar from core syntax (e.g., article placement, case marking of core arguments, verb morphology etc.). This proviso is in accordance with the stance we have taken in this study (Section 3.3 above): the formal and semantic regularities of constructional patterns in naturally occurring utterances are intimately linked to the level of normal language use ("Level 2" senses), to be analyzed in both a quantitatively and qualitatively adequate manner. The semantic representations at the level of the grammatical system of a language ("Level 1" meanings) have proven too general to allow us to achieve the level of granularity required to elaborate an explanation for the case alternation under scrutiny. Importantly, normal language use, although partly highly

conventionalized and as such an important source domain of concrete discourse practices, is always variable and subject to language change. Synchronically, this variability is conspicuously reflected in the more exceptional occurrences of ACC and DAT that do not conform to the most common or even default case marking as outlined in Section 4. It should be borne in mind, though, that the occurrences of DAT or ACC in a construction that normally shows a statistically significant bias towards the other case are not "outliers", nor are they to be considered less grammatical or even ungrammatical because of their being few in numbers from a statistical point of view. They are, quite on the contrary, the observable manifestation of creative language use which is the driving force of language variation.

References

Ágel, Vilmos. 2000. *Valenztheorie*. Tübingen: Gunter Narr Verlag.

Baayen, Harald. 2008. *Analyzing linguistic data. A practical introduction to statistics using R*. Cambridge: Cambridge University Press.

Barðdal, Jóhanna. 2011. Lexical vs. structural case: a false dichotomy. *Morphology* 21. 619–654.

Baten, Kristof. 2009. Die Wechselpräpositionen im DaF-Unterricht. *Deutsch als Fremdsprache* 46. 96–104.

Baten, Kristof & Klaas Willems. 2012. Kasuserwerb in der Präpositionalphrase vom Standpunkt der Verarbeitbarkeitstheorie (Processability Theory). *Deutsche Sprache* 40. 221–239.

Boas, Hans C. 2008. Determining the structure of lexical entries and grammatical constructions in Construction Grammar. *Annual Review of Cognitive Linguistics* 6. 113–144.

Boas, Hans C. 2009. Verb meanings at the crossroads between higher-level and lower-level constructions. *Lingua* 120. 22–34.

Breiman, Leo, Jerome Friedman, Richard Olshen & Charles Stone. 1984. *Classification and regression trees*. New York: Chapman & Hall.

Coene, Ann & Klaas Willems. 2006. Konstruktionelle Bedeutungen. Kritische Anmerkungen zu Adele Goldbergs konstruktionsgrammatischer Bedeutungstheorie. *Sprachtheorie und germanistische Linguistik* 16. 1–35.

Coseriu, Eugenio. 1970. Bedeutung und Bezeichnung im Lichte der strukturellen Semantik. In: Peter Hartmann & Henri Vernay (eds.), *Sprachwissenschaft und Übersetzen*, 104–121. München: Max Hueber.

Coseriu, Eugenio. 1975. System, Norm und Rede (Spanish original 1952). In: Eugenio Coseriu, *Sprachtheorie und allgemeine Sprachwissenschaft*, 11–101. München: Wilhelm Fink.

Coseriu, Eugenio. 2001. *L'homme et son langage*. Louvain & Paris: Peeters.

Crawley, Michael J. 2007. *The R book*. Chichester: Wiley.

Croft, William. 2003. Lexical rules vs. constructions: A false dichotomy. In: Hubert Cuyckens, Rene Dirven & Klaus-Uwe Panther (eds.), *Motivation in language*, 49–68. Amsterdam & Philadelphia: John Benjamins.

Dal, Ingerid. 2014. *Kurze deutsche Syntax auf historischer Grundlage*, 4th rev. edn. Berlin & New York: W. de Gruyter.

De Backer, Maarten & Ludovic De Cuypere. 2012. The interpretation of masculine personal nouns in German and Dutch: a comparative experimental study. *Language Sciences* 34(3). 253–268.

Duden. 1999. *Das große Wörterbuch der deutschen Sprache*, 10 vols. Mannheim: Dudenverlag.

Duden. 2006. *Die Grammatik* (7th edn.). Mannheim: Dudenverlag.

Duden. 2007. *Richtiges und gutes Deutsch* (6th edn.). Mannheim: Dudenverlag.

Eisenberg, Peter. 2006. *Grundriss der deutschen Grammatik.* Vol. 1: *Das Wort* (3th edn.). Stuttgart/Weimar: J.B. Metzler.

Fillmore, Charles J. 1988. The mechanisms of 'Construction Grammar'. *Berkeley Linguistics Society* 14. 35–55.

Fried, Mirjam & Jan-Ola Östman. 2004. Construction Grammar. A thumbnail sketch. In: Miriam Fried & Jan-Ola Östman (eds.), *Construction Grammar in a cross-language perspective*, 11–86. Amsterdam & Philadelphia: John Benjamins.

Goldberg, Adele. 1995. *Constructions: A Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.

Goldberg, Adele. 1997. The relationship between verbs and constructions. In: Marjolijn Verspoor, Kee Dong Lee & Eve Sweetser (eds.), *Lexical and syntactical constructions and the construction of meaning*, 383–398. Amsterdam & Philadelphia: John Benjamins.

Goldberg, Adele. 2003. Constructions: a new theoretical approach to language. *Trends in Cognitive Sciences* 7. 219–224.

Grice, H. P. 1989 (1967). Logic and conversation. In: H. P. Grice. *Studies in the way of words*, 22–40. Cambridge, MA: Harvard University Press.

Gries, Stefan Th. 2003. *Multifactorial analysis in corpus linguistics: a study of particle placement*. London & New York: Continuum Press.

Gries, Stefan Th. & Anatol Stefanowitsch. 2004. Extending collostructional analysis: A corpus-based perspectives on 'alternations'. *International Journal of Corpus Linguistics* 9. 97–129.

Hopper, Paul J. & Sandra A. Thompson. 1980. Transitivity in grammar and discourse. *Language* 56. 251–299.

Klappenbach, Ruth & Wolfgang Steinitz (eds.). 1978. *Wörterbuch der deutschen Gegenwartssprache*. Berlin: Akademie Verlag.

Lakoff, George. 1987. *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago/London: University of Chicago Press.

Langacker, Ronald W. 1987. *Foundations of Cognitive Grammar*, Vol. I: *Theoretical prerequisites*. Stanford, Ca.: Stanford University Press.

Langacker, Ronald W. 1999. Assessing the cognitive linguistic enterprise. In: Theo Janssen & Gisela Redeker (eds.), *Cognitive Linguistics: foundations, scope, and methodology,* 13–59. Berlin & New York: Mouton de Gruyter.

Levinson, Stephen C. 2000. *Presumptive meanings. The theory of Generalized Conversational Implicature*. Cambridge: MIT Press.

Leys, Odo. 1989. Aspekt und Rektion räumlicher Präpositionen. *Deutsche Sprache* 17. 97–113.

Lindemann, Robert. 1998. Bedeutungserweiterungen als systematische Prozesse im System der Partikelverben. In: Susan Olsen (ed.), *Semantische und konzeptuelle Aspekte der Partikelverbbildung mit* ein-, 105–148. Tübingen: Stauffenburg Verlag.

Olsen, Susan. 1996. Pleonastische Direktionale. In: Gisela Harras & Manfred Bierwisch (eds.), *Wenn die Semantik arbeitet. Klaus Baumgärtner zum 65. Geburtstag*, 303–329. Tübingen: Niemeyer.

Paul, Hermann. 1920. *Deutsche Grammatik*, Vol. IV, Teil IV: *Syntax (Zweite Hälfte)*. Halle: Max Niemeyer.

Rehbein, Ines & Josef Van Genabith. 2006. German particle verbs and pleonastic prepositions. In: Boban Arsenijevic, Timothy Baldwin & Beata Trawinski (eds.), *Proceedings of the third ACL-SIGSEM workshop on prepositions*, 57–64. Trento: EACL.

Rostila, Jouni. 2011. Wege zur konstruktiven Kritik der Konstruktionsgrammatik. Eine Replik auf Leiss (2009a,b). In: *Zeitschrift für Germanistische Linguistik* 39. 120–134.

Rys, Jonah, Klaas Willems & Ludovic De Cuypere. 2014. Akkusativ und Dativ nach Wechselpräpositionen im Deutschen: eine Korpusanalyse von *versinken*, *versenken*, *einsinken* und *einsenken in*. In: Irene Doval & Barbara Lübke (eds.), *Raumlinguistik und Sprachkontrast: Neue Beiträge zu spatialen Relationen im Deutschen, Englischen und Spanischen*, 217–234. München: Iudicium.

Serra-Borneto, Carlo. 1997. Two-way prepositions in German: image and constraints. In: Marjolijn Verspoor, Kee Dong Lee & Eve Sweetser (eds.), *Lexical and syntactical constructions and the construction of meaning*, 187–204. Amsterdam & Philadelphia: John Benjamins.

Smith, Michael B. 1995. Semantic motivation vs. arbitrariness in grammar: toward a more general account of the dative/accusative contrast with German two-way prepositions. In: Irmengard Rauch & Gerald F. Carr (eds.), *Insights in Germanic linguistics I: Methodology in transition*, 293–323. Berlin & New York: Mouton de Gruyter.

Stefanowitsch, Anatol & Stefan Th. Gries. 2003. Collostructions: Investigating the interaction between words and constructions. *International Journal of Corpus Linguistics* 8. 209–243.

Sylla, Bernhard. 1999. Zum Problem der Kasuswahl nach Wechselpräpositionen. *Deutsch als Fremdsprache* 36. 150–155.

Tyler, Andrea and Vyvyan Evans. 2003. *The semantics of English prepositions: spatial scenes, embodied meaning, and cognition*. Cambridge: Cambridge University Press.

Tagliamonte, Sali & Harald Baayen. 2012. Models, forests, and trees of York English: Was/were variation as a case study for statistical practice. *Language Variation and Change* 24(2). 135–178.

Van der Gucht, Fieke, Klaas Willems & Ludovic De Cuypere. 2007. The iconicity of embodied meaning. Polysemy of spatial prepositions in the cognitive framework. *Language Sciences* 29. 733–754.

Vanderschueren, Clara & Ludovic De Cuypere. 2013. The inflected/non-inflected infinitive alternation in Portuguese adverbial clauses. A corpus analysis. *Language Sciences* 41, Part B. 153–174.

Willems, Klaas. 2001. Produktivität, syntaktische Struktur und Norm. Deskriptive Normregularitäten nominaler Wortbildungsmuster und kontrastive Wortbildungsforschung. *Zeitschrift für Germanistische Linguistik* 29. 143–166.

Willems, Klaas 2011a. The semantics of variable case marking (Accusative/Dative) after two-way prepositions in German locative constructions. Towards a constructionist approach. *Indogermanische Forschungen* 116. 324–366.

Willems, Klaas 2011b. Meaning and interpretation: The semiotic similarities and differences between Cognitive Grammar and European Structural Linguistics. *Semiotica* 185. 1–50.

Willems, Klaas. 2013. The linguistic sign at the lexicon-syntax interface: Assumptions and implications of the Generative Lexicon Theory. *Semiotica* 193. 1–55.
Wunderlich, Dieter. 1983. On the compositionality of German prefix verbs. In: Rainer Bäuerle, Christoph Schwarze & Armin von Stechow (eds.), *Meaning, use and interpretation of language*, 452–465. Berlin & New York: De Gruyter.