

On the Formation of Prepositional Adverbs in Modern German

*A Case Study on darunter**

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In this paper, I defend the hypothesis that each prepositional adverb in Modern German is formed from an adverb and a preposition – and not from two adverbs, as recently suggested in the literature. As major support for this hypothesis, I show on the example of *darunter* that the intensions of the lexical meanings of non-idiomatic prepositional adverbs are compositionally built from the intensions of preposition meanings by combining them in an appropriate way with the intension of an adverb meaning.

The proposed analysis, formulated within the general framework of Integrational Linguistics (IL), also provides a solution for the animacy problem of prepositional adverbs, i.e. the problem that many prepositional adverbs in Modern German do not phorically take up animated entities, in particular, persons. This restriction follows, it is argued, from a sortal restriction inherited from the preposition meaning. While syntactic semantics can accommodate preposition meanings in order to properly relate preposition complement interpretations, there is no such accommodation in the case of prepositional adverbs, their valence being lexically reduced by one.

1 Introduction

In this paper, I shall defend the following hypothesis on the formation of prepositional adverbs¹ in Modern German:

- (1) For each prepositional adverb in Modern German, there is an adverb and a preposition from which it is formed.

At first glance, this hypothesis may appear to be reasonable and straightforward. In the literature, however, it is not uncontroversial.

Recently, Krause (2003, 2007) suggested, somewhat hesitatingly, that prepositional adverbs in Modern German do not result from combining an adverb – deictic *da* ('there'), deictic *hier* ('here'), or interrogative and relative *wo* ('where') – with a preposition, but with a homonymous adverb which

* I am grateful to Manfred Bierwisch, Hardarik Blühdorn, Jürg Fleischer, Ellen Fricke, Brigitte Handwerker, Maxi Krause, Hans-Heinrich Lieb, Michaela Negele, and Bernd Pompino-Marschall for discussions on the subject matter. Monika Budde, Kerstin Schwabe, and an anonymous reviewer have provided valuable comments on earlier versions of this paper. It was revised during a stay at the hospitable International Academy Traunkirchen.

¹ I assume here the restrictive extension of the term “prepositional adverb” (“Präpositionaladverb”) as used, for example, by Zifonun *et al.* (1997) and the Dudenredaktion (2009), which includes forms like *darunter*, *hierunter*, and *worunter*, but excludes, for instance, *hinunter* and *unterdessen*. Prepositional adverbs are also called “pronominal adverbs”. In my view, this is a misnomer, as the words under discussion are not *pronominal*: as a rule, they do not substitute for nominal expressions.

diachronically underlies this preposition. Evidence for this analysis, which can be traced back at least to Paul (1916–1920: vol. 3, 154), comes from syntactic and phonological data.

In non-standard or dialectal varieties of German (especially in the north), prepositional adverbs such as *dazu* (literally, ‘to there’) may occur discontinuously – a syntactic construction known as the ‘splitting construction’ (for details, cf. Fleischer 2002: chap. II.2; Negele 2012: sect. II.C.2):

- (2) *Ich hab da gestern nicht die Zeit zu gehabt [...].* (S5)
 I have there yesterday not the time to had
 ‘I didn’t have the time to yesterday.’

(“S5” refers to an entry in the list of sources at the end of this chapter.) For Krause (2003: 132, 2007: 469–477), the existence of this construction suggests that prepositional adverbs in German are formed from two adverbs, and not from an adverb and a preposition. Both analyses alike, however, have to explain why such bipartite words can be syntactically split up under certain conditions (that is, unless their word status is denied altogether). A solution for this problem might be to assume that, in these varieties, there are syntactically complex prepositional adverbs, consisting of more than one syntactic atom. Thus, the ‘splitting construction’ provides neither an argument in favour nor one against the hypothesis stated in (1).

A further argument concerns the phonological form of prepositional adverbs and their bases. *Zu* (‘to’), for instance, has three counterparts in Bavarian (Merkle 1975: 187 f.): *zuà* with primary lexical accent,² *zu* without primary lexical accent, and unsyllabic *z*. Merkle classifies *zu* and *z* as prepositions and *zuà* as an adverb, from which the prepositional adverb *dàzuà* and its complex variant *dâ dâzuà* are formed (Merkle 1975: 177). This parallels the situation in Middle High German, where *dazuo* is formed from the adverb *zuo*, and not from the preposition *ze* (cf. Paul 1916–1920: vol. 4, 4). A similar case can be made for other prepositional adverbs in earlier stages or dialectal varieties of German (cf. Wolfrum 1970: 303 f.; Krause 2007: 472 f.). In non-dialectal Modern German, however, there are only a few free adverbs formally matching the second part of a prepositional adverb; in addition, those adverbs generally have an inappropriate meaning. *Zu*, for example, means ‘closed’ as a free adverb:³

- (3) *Die Tür ist zu.*
 the door is closed
 ‘The door is closed.’

‘Closed’, however, is not a component of any meaning of the prepositional adverb *dazu*. Rather, it appears that the lexical meanings of non-idiomatic prepositional adverbs in Modern German are built from preposition meanings (also acknowledged by Krause 2003: 102 f., 2007: 458, 477). If so, then the synchronic hypothesis in (1) should be maintained. The present paper aims to show that this is indeed the case.

² The grave accent in *zuà* is Merkle’s (1975: 9) indication of a fronted *a* vowel and has nothing to do with lexical accents. Back *a* is notated as *â*.

³ In former stages or dialectal varieties of (Low) German, free *zu* may also occur as a ‘preposition without overt complement’ (cf. Fleischer 2002: chap. II.6; Negele 2012: sect. II.C.5):

- (i) *ich habe nicht die Zeit zu gehabt* (Prince Friedrich I, 1670; cited from Negele 2012: 115)
 I have not the time to had
 ‘I didn’t have time to.’

According to Krause (2007: 473–476), this syntactic construction provides further evidence for a purely adverbial formation of prepositional adverbs in German. Whether *zu* in (i) is a preposition with an unrealised optional complement or rather a homonymous adverb, however, is a problem in itself. In any case, hypothesis (1) does not exclude either alternative.

In order to do so, I shall choose *darunter* (literally, ‘under there’ or ‘below there’) as an example. The reduced variant *drunter* and the complex *da drunter* will not be considered here; they raise specific problems which do not arise in the case of simple, unreduced *darunter*.⁴ I shall show that the lexical meanings of *darunter* – there are at least eleven of them, I shall argue – can in fact be composed from the lexical meaning of the deictic adverb *da* and a lexical meaning of the preposition *unter*. Note that the converse does not hold. For the meaning of *unter* in (4), for instance, there is no corresponding *darunter* meaning (cf. Krause 1994: 367, 374):⁵

- (4) *unter dem Läuten der Glocken*
 during the ringing the bells
 ‘during the ringing of the bells’

The semantics proposed here for *darunter* will also provide a solution for the notorious *animacy problem* of prepositional adverbs. In general, prepositional adverbs in Modern German do not phorically take up animated entities, in particular, persons. There are, however, notable exceptions, such as *darunter* in the meaning ‘among a multitude there (static)’ (among-mult-there_{stat}, for short):

- (5) *Viele Touristen, darunter zahlreiche Ausländer, besuchen alljährlich diese Sehenswürdigkeit.* (Klappenbach and Steinitz 1980: vol. 1, 761; cited from Krause 1994: 362)
 many tourists among-mult-there_{stat} numerous foreigners visit every year this sight
 ‘Every year, many tourists, among them numerous foreigners, visit this sight.’

In a nutshell, the solution consists in sortally restricting (or, for that matter, not restricting) preposition meanings in lexical semantics, given the assumption that syntactic semantics can accommodate preposition meanings in order to properly relate them to the interpretations of nominal preposition complements, while there is no such accommodation in the case of prepositional adverbs, their valence being lexically reduced by one. I am hopeful that the proposed analysis carries over to prepositional adverbs which are based on different prepositions.

Theoretically, this paper presupposes the conception of words, stems, and meanings of Integrational Linguistics (IL) (Lieb 1983, 1992; for a recent overview, cf. Nolda 2007 b: chap. 7, 2012: chap. 4). *Word forms*, modelled in IL as sequences of syntactically inseparable atoms, are the forms of *lexical words*, which in turn are conceived as pairs of a word paradigm and a lexical meaning. For the purposes of this paper, we can leave the nature of word paradigms unspecified. *Lexical meanings* are concepts of a certain sort, which are uniquely determined by their intension (for details, cf. Lieb 1985). Together with the interpretations of syntactic categories and syntactic functions, lexical meanings provide the basis for determining *syntactic meanings*, which, as a rule, involve speakers and utterances. In addition to monosemous lexical words, I also assume potentially polysemous *lexicological words* (Nolda 2007 a, 2012), which are modelled as non-empty sets of lexical words of the same part-of-speech. For each member of a non-singleton lexicological word, there is another member to which it is formally and semantically related. Two lexical words are *formally related* if their paradigms overlap; they are *semantically related* if there is a semantic relation such as metonymy or metaphor between their lexical meanings (for a list of relevant semantic relations from a cognitive,

⁴ These problems include: the (non)interchangeability of *drunter* and *da drunter* with *darunter*; the word status of separable *da drunter*; the use of *drunter* in pleonastic constructions like *unter dem Bett drunter* (literally, roughly, ‘under the bed under there’); etc. (For an in-depth empirical study of all variants of prepositional adverbs in colloquial varieties of Modern German, cf. Negele 2012.)

⁵ This is also the case for other prepositional adverbs and their prepositional bases (cf. Krause 2003: 104–106, 2007: 458–462).

speaker-centric perspective, cf. Blank 2003). A lexicological word is *polysemous* if it includes several semantically distinct lexical words.⁶ Analogous distinctions apply to *stem forms*, *lexical stems*, and *lexicological stems*.

Regarding *darunter*, I shall assume a single lexicological word, to be called “*darunter*^{LW}”, which contains at least eleven lexical words, referred to as “*darunter*₁^W” to “*darunter*₁₁^W”. Each of these prepositional adverbs is formed from the deictic adverb *da*₁^W and one of the prepositions *unter*₁^W to *unter*₁₁^W (a proper subset of the members of the lexicological word *unter*^{LW}). The word-formation relations between these lexical words *darunter*_{*i*}^W, *da*₁^W, and *unter*_{*i*}^W are based on word-formation relations between their lexical stems *darunter*_{*i*}St, *da*₁St, and *unter*_{*i*}St ($1 \leq i \leq 11$).⁷ Formally, one of the stem forms of *da*₁St is concatenated with the stem form *unter*. It is a matter of debate whether the relevant stem form of *da*₁St is *dar* or – as suggested by Zifonun *et al.* (1997: vol. 1, 54) and the Dudenredaktion (2009: 579) – *da*, followed by an interfix *r*.⁸ In the latter case, the product stem form would not be bipartite *dar unter*, but tripartite *da r unter*, built through both concatenation and interfixation.⁹ Due to the synonymy of lexical words with their lexical stems, however, we can ignore these complications in the following and concentrate on the corresponding lexical words as far as semantics is concerned.

The paper is structured as follows. In Section 2, I shall determine the lexical meaning of *da*₁^W, the *adverbial basis* for forming the prepositional adverbs *darunter*₁^W to *darunter*₁₁^W. Section 3 then discusses the lexical meanings of the *prepositional bases*: *unter*₁^W to *unter*₁₁^W. Section 4 shows how to compose the lexical meanings of the prepositional adverbs from the lexical meanings of the bases. The paper concludes with a summary of the results in Section 5. Instead of exclusively relying on introspection, somewhat ‘fancier’ examples will be cited from original sources in the German National Corpus (*Deutsches Referenzkorpus*, Institut für deutsche Sprache, Mannheim) or on the Internet. Bibliographic entries for them can be found in the list of sources.

2 The adverbial basis

According to the analysis proposed here, all members of *darunter*^{LW} are formed from the deictic adverb *da*₁^W and a member of *unter*^{LW}. The adverb *da*₁^W is deictic because its lexical meaning is deictic, too. What makes a meaning deictic, however, is controversial (for an overview, cf. Fricke 2007: 13–53). According to one tradition, deictic meanings are speaker- and utterance-relative. This view also underlies the standard conception of deictic lexical meanings in IL (cf. Richter 1988). According to another tradition, deictic meanings involve a *deictic space* (Bühler’s 1934 *Zeigfeld*) and an *origo*, which in the default case coincides with the speaker’s orientation at utterance time. Recently, this view has been defended by Fricke (2007) in her seminal study on verbal and non-verbal local deixis in Modern German. A major advantage of such an approach to deixis is that it can easily account for origo relocation phenomena, which are pervasive in the local domain (cf., *inter alia*, Klein 1978: 24–28; Fricke

⁶ Similar distinctions between monosemous ‘lexical units’ and potentially polysemous ‘lexemes’ or ‘vocables’ are made by Cruse (1986: chap. 3) and Mel’čuk (1995: 206 f., 250). The term “lexicological word” is due to François Filandre (p.c.).

⁷ For a formal account of word-formation relations, cf. the *Pattern-and-Restriction Theory* of word formation, introduced in Nolda (2012).

⁸ Diachronically, *dar* goes back to Old High German *dara* or *thara* (‘there (dynamic)’), while *da* is the successor of Old High German *dâr* or *thâr* (‘there (static)’ (cf. Paul 1916–1920: vol. 3, 154 f.). In Modern German, the semantic distinction is not retained.

⁹ As a matter of fact, *unter* in *darunter* is phonetically vowel-initial. In isolation, however, *unter* begins – at least in northern varieties – with a glottal stop. Provided that this phonetic difference carries over to phonology, the concatenation (and, possibly, interfixation) operation would have to be preceded by an operation deleting the initial glottal stop in *unter*.

2007: 133–139). For the purposes of this paper, I shall closely follow Fricke (2007). Although she does not formally specify deictic lexical meanings, it should be consistent with her intent to assume that deictic concepts have *deictic places* for a deictic space and an origo.

Regarding the lexical meaning of da_1^W – a concept to be called “‘there’” – further problems arise through the possibility to contrast *da* with either proximal *hier* or distal *dort*. It would be beyond the scope of this paper to go into this matter here. Rather, I shall assume with Diewald (1991: 154–158), Klabunde (2000: 198 f.), and Fricke (2007: 94) that ‘there’ is neutral with respect to the distance from the origo, and refer the interested reader to the empirical arguments presented there.

The concept ‘there’ is uniquely determined by its intension, an attribute to be named “THERE”.¹⁰ This attribute (or rather its name) can be defined in the following, semi-formal way as a three-place intensional relation between an entity x_1 , a deictic space x_2 , and an origo x_3 :¹¹

$$(6) \quad \text{THERE} =_{\text{def}} (\lambda x_1 x_2 x_3) (\exists x_4) \left(\begin{array}{l} x_2 \text{ is a deictic space} \wedge \\ x_3 \text{ is the origo of } x_2 \wedge \\ x_4 \text{ is a location in } x_2 \wedge \\ ((x_1 = x_4) \vee (x_1 \text{ is designated by } x_4)) \end{array} \right)$$

Put differently, THERE holds between x_1 , a deictic space x_2 , and its origo x_3 if, and only if, x_1 is a location x_4 in x_2 or *designated* by that location (in a sense to be discussed presently). In an utterance of da_1^W , x_4 functions as the *demonstratum* in the sense of Fricke (2007) and serves to identify the *denotatum* x_1 .¹² The variable “ x_1 ” itself will be called “the denotatum argument”. In the view taken here, the variable “ x_4 ” for the demonstratum is not externally visible in semantics and is therefore existentially bound in (6).

It is a cornerstone of Fricke’s theory that the demonstratum and the denotatum may, but need not, coincide. Let us first consider the case of *deixis in the non-sign space* in the sense of Fricke (2007: 123–133), where the denotatum is identical with the demonstratum. In an utterance of (7 B), for instance, the demonstratum and the denotatum can be a location in a physical deictic space:

- (7) A: *Wo hast du es versteckt?*
 where have you it hidden
 ‘Where have you hidden it?’
 B: *Ich habe es dà versteckt.*
 I have it there hidden
 ‘I have hidden it there.’

(The symbol “˘” denotes a syntactic fall accent and underlining an accompanying pointing gesture.) In the case of *deixis in the sign space*, however, the demonstratum is interpreted by the speaker as a Peircian sign for the denotatum. This is what is meant in (6) by saying that x_1 , the denotatum, is designated by x_4 , the demonstratum. An example at hand would be an utterance of (8) where the speaker points at a location on a photograph while uttering *da*:

- (8) *Hier stehe ich, und dá steht mein Bruder.*
 here stand I and there stands my brother
 ‘I am standing here, and my brother is standing there.’

¹⁰ In the standard IL conception, the intension of a concept is actually a *set* of attributes. All empirical analyses in this framework which I am aware of, however, take these sets to be singletons. We can therefore safely identify the intension of a concept with its unique element (cf. also Nolda 2012: sect. 4.3.3).

¹¹ For the interpretation of n -place lambda expressions, cf. Carnap (1958: sect. 33).

¹² The denotatum is not to be confused with the denotation, or extension, of a concept. Fricke (2007) calls the denotatum “the intended reference object”. The term “referent”, however, is better avoided here, as it is debatable whether adverbs are referring expressions.

(The symbol “˘” denotes a syntactic rise accent.) Here, the photograph provides a two-dimensional deictic space. The location on the photograph pointed at during the utterance of *da* is interpreted by the speaker as a sign for a location in physical space, occupied by the speaker’s brother at the time the photograph was taken. As a consequence, the denotatum belongs to a different space than the demonstratum designating it.

Example (9) illustrates a special case of deixis in the sign space:

- (9) *Im Deutschen ist er sehr gut, aber leider nicht in Mathematik. Da sind seine Leistungen nur mittelmäßig.* (Klappenbach and Steinitz 1980: vol. 1, 732)
 in.the German is he very good but unfortunately not in mathematics there are his results only average
 ‘He is very good at German, but unfortunately not at mathematics. There, his results are only average.’

In a normal utterance of (9), the demonstratum is a location in a textual deictic space: the utterance part *in Mathematik*.¹³ The demonstratum, in turn, is interpreted as a sign for a non-textual denotatum – roughly, a circumstance like ‘with respect to mathematics’. Such a use of da_1^W gives rise to *metadeixis in the sign space*, or *text phorics*, in the sense of Fricke (2007).¹⁴

Entities designated by textual demonstrata in the text-phorics use of da_1^W must, as a rule, be compatible with the syntactic functions of an adverb and their possible interpretations; they include, for example, locations, times, circumstances, and states-of-affairs, but exclude individuals. These restrictions do not apply when da_1^W does not provide a syntactic constituent, but a word-formation basis, such as in the formation of prepositional adverbs (see Section 4 below).

3 The prepositional bases

As mentioned in Section 1, there are at least eleven members of the lexicological word $unter^{LW}$ which function as prepositional bases for the formation of the members of $darunter^{LW}$. The meanings of these prepositions $unter_1^W$ to $unter_{11}^W$ are exemplified below:

1. $unter_1^W$ with the meaning ‘below a location (static)’ (below-loc_{stat}, for short):

- (10) *Zwei Meter unter der Decke hing eine Lampe.*
 two metres below-loc_{stat} the.DAT ceiling hung a lamp
 ‘Two metres below the ceiling, there was hanging a lamp.’

¹³ Normally, textual demonstrata are contained in the actual utterance cotext. They may, however, also be part of a textual space which is only understood. The same applies to other sign spaces as well (for an example of an imaginary demonstratum, cf. Fricke 2007: 129).

¹⁴ Cases like (8) are called “object deixis in the sign space” by Fricke (2007). Fricke also distinguishes between *object deixis in the non-sign space*, as in Example (7 B), and *metadeixis in the non-sign space*, like the use of *unten* in an utterance of *siehe unten* (‘see below’) for a certain textual location.

2. $unter_2^W$ with the meaning ‘below a location (dynamic)’ (below-loc_{dyn}):
- (11) *Er hängte die Lampe zwei Meter unter die Decke.*
 he hung the lamp two metres below-loc_{dyn} the.ACC ceiling
 ‘He put the lamp two metres below the ceiling.’
3. $unter_3^W$ with the meaning ‘below a degree (static)’ (below-deg_{stat}):
- (12) *Nachts kann die Temperatur auch einige Grad unter Null liegen.*
 at.night can the temperature also a.few degree below-deg_{stat} zero lie
 ‘At night, the temperature can even be a few degrees below zero.’
4. $unter_4^W$ with the meaning ‘below a degree (dynamic)’ (below-deg_{dyn}):
- (13) *Nachts kann die Temperatur auch einige Grad unter Null sinken.*
 at.night can the temperature also a.few degree below-deg_{dyn} zero sink
 ‘At night, the temperature can even fall a few degrees below zero.’
5. $unter_5^W$ with the meaning ‘identifiable by a linguistic or conceptual unit (static)’ (ident-by-lcu_{stat}):
- (14) *Unter dem Namen Non-Food-Produkte laufen alle Artikel, die man nicht essen kann.*
 ident-by-lcu_{stat} the.DAT name non-food.products go all articles which one not eat
 can
 ‘All articles which one cannot eat go by the name of non-food products.’
6. $unter_6^W$ with the meaning ‘identifiable by a linguistic or conceptual unit (dynamic)’ (ident-by-lcu_{dyn}):
- (15) *Man könnte Vertriebsrecht unter die Kategorie „Wirtschaftsrecht“ einordnen.*
 one could distribution.law ident-by-lcu_{dyn} the.ACC category business.law classify
 ‘One could file distribution law under the category “business law”.’
7. $unter_7^W$ with the meaning ‘under a location (static)’ (under-loc_{stat}):
- (16) *Unter seinem Pullover spürte er ihre Hand.*
 under-loc_{stat} his.DAT sweater sensed he her hand
 ‘He sensed her hand under his sweater.’
8. $unter_8^W$ with the meaning ‘under a location (dynamic)’ (under-loc_{dyn}):
- (17) *Sie schob ihre Hand unter seinen Pullover.*
 she put her hand under-loc_{dyn} his.ACC sweater
 ‘She put her hand under his sweater.’

9. *unter*₉^W with the meaning ‘caused by a burdening state of affairs’ (caused-by-a-burdening-soa):

- (18) *Sie litt sehr unter der Hitze.*
she suffered very caused-by-a-burdening-soa the.DAT heat
‘She suffered a lot from the heat.’

10. *unter*₁₀^W with the meaning ‘among a multitude (static)’ (among-mult_{stat}):

- (19) *Unter dem Mais waren auch ein paar Erbsen.*
among-mult_{stat} the.DAT maize were also some peas
‘There were also some peas among the maize.’

11. *unter*₁₁^W with the meaning ‘among a multitude (dynamic)’ (among-mult_{dyn}):

- (20) *Sie mischte noch ein paar Erbsen unter den Mais.*
she mixed in.addition some peas among-mult_{dyn} the.ACC maize
‘She also mixed some peas among the maize.’

As can be seen from this list, I take a polysemy approach to the problem of so-called ‘two-way prepositions’ (‘Wechselpräpositionen’) with alternating dative/accusative case government and corresponding static and dynamic readings. Instead of assuming, for instance, two lexical words *unter*₁^W and *unter*₂^W with the lexical meanings ‘below a location (static)’ and ‘below a location (dynamic)’, one could, in principle, also assume a single lexical word, either with the meaning ‘below a location (static)’ or with an underspecified meaning ‘below a location’. In the first case, the dynamic reading would be derived from the static meaning in syntactic semantics by interpreting the accusative case of its complement accordingly. In the second case, *both* readings would be derived from the underspecified lexical meaning in syntactic semantics (or perhaps only in pragmatics).

Although an approach which takes the ambiguity between static and dynamic readings of ‘two-way prepositions’ to be a matter of syntactic semantics (or pragmatics) might be preferable on economic grounds, it is, in my view, empirically ill-founded for prepositions in Modern German. Such an approach predicts that a preposition with a logically appropriate lexical meaning can be interpreted both statically and dynamically, according to the dative or accusative case of its complement. In non-dialectal Modern German, however, the preposition *bei* can only be interpreted statically:

- (21) a. *Sie stand bei der Laterne.*
she stood at the.DAT street.lamp
‘She stood at the street lamp.’
b. **Sie ging bei die Laterne.*
she went at the.ACC street.lamp

Obviously, there is no logical reason why a dynamic interpretation of *bei* is excluded. As a matter of fact, *bei* happened to be a ‘two-way preposition’, with both static and dynamic readings, in earlier stages of German (cf. Paul 1916–1920: vol. 4, 29 f.) and still is in certain dialectal varieties (cf. Fleischer 2002: 55).

Now, one could argue that the unavailability of a dynamic interpretation of *bei* in Modern German is an epiphenomenon of its case government: governing the dative but not the accusative, *bei* must be statically interpreted. This argument, however, does not carry over to prepositions like *zu* which also govern dative case despite their exclusively dynamic interpretation:

- (22) *Sie ging zu der / *die Laterne.*
she went to the.DAT the.ACC street.lamp
‘She went to the street lamp.’

Thus, there appears to be no uniform, general correlation between readings and case government of prepositions in Modern German.

Any attempt to derive static or dynamic interpretations from case governing breaks down when it comes to coping with the interpretation of prepositional adverbs, whose valence is lexically reduced by the corresponding place. Although most Modern German prepositional adverbs formed from ‘two-way prepositions’ have both static and dynamic readings, *darin* has only a static one:

- (23) a. *Der Schlüssel ist im Schloss stecken geblieben.*
 the key is in.the lock got.stuck
 ‘The key got stuck in the lock.’
 b. *Der Schlüssel ist darin stecken geblieben.*
 the key is in.there got.stuck
 ‘The key got stuck in it.’
- (24) a. *Sie steckte den Schlüssel ins Schloss.*
 she put the key in.the lock
 ‘She put the key in the lock.’
 b. **Sie steckte den Schlüssel darin.*
 she put the key in.there

Again, there is no logical reason for the exclusion of the dynamic reading of *darin*. Rather, it appears to be blocked by the coexistence of the dynamic variant *darein*, formed from dynamic *ein*, which, however, no longer exists as a free preposition.¹⁵

None of these empirical problems arise in a polysemy approach. In such an approach, the availability of static and/or dynamic readings of prepositions and prepositional adverbs alike is lexically determined through their lexical meanings. The case government of prepositions is also specified in the lexicon (in the IL framework in terms of syntactic *government categories*; cf. Lieb 1993: 448). Generalisations about semantic and syntactic correlations between static and dynamic preposition variants can then be stated as empirical hypotheses on the existence (or, for that matter, non-existence) of relevant preposition pairs, while hypotheses on the (non)existence of static and dynamic variants of prepositional adverbs involve word formation instead of syntax. Since static and dynamic variants are formally and semantically related (see Section 3.2 below), they are, in addition, members of the same lexicological words. In fact, I shall show below that all of the prepositions *unter*₁^W to *unter*₁₁^W belong to a single lexicological word, *unter*^{LW}. I shall now discuss the lexical meaning of each of these prepositions in turn.

3.1 ‘Below a location (static)’

The local preposition *unter*₁^W has the lexical meaning ‘below a location (static)’. Its intension is an attribute to be called “BELOW-LOC_{stat}”. This attribute can be defined as follows:

¹⁵ Krause (2007: 464, n. 47) argues that in Modern German, there is no prepositional adverb *darein*, but only a more or less synonymous adverb group *da rein* (orthographically also rendered as *darein*). In *da rein*, two independent adverbs co-occur, both with their own primary lexical accent: *da* and *rein*, the latter being an origo-neutral variant of the directional deictic adverbs *herein* and *hinein*. Whether or not *darein* still exists as a prepositional adverb in Modern German is irrelevant for the problem under discussion here.

$$(25) \text{ BELOW-LOC}_{\text{stat}} =_{\text{def}} (\lambda x_1 x_2 x_3) (\exists x_4) (\exists x_5) \left(\begin{array}{l} x_4 \text{ is a space with a vertical dimension } \wedge \\ x_1 \text{ and } x_2 \text{ are locations in } x_4 \wedge \\ x_5 \text{ is an appropriate distance scale for } x_4 \wedge \\ x_3 \text{ is a positive degree on } x_5 \wedge \\ \text{the position of } x_1 \text{ in the vertical dimension of } x_4 \\ \text{is less than the position of } x_2 \text{ by } x_3 \end{array} \right)$$

In other words, $\text{BELOW-LOC}_{\text{stat}}$ is a three-place intensional relation between two locations x_1 and x_2 in a space x_4 with a vertical dimension and a positive (non-zero and non-negative) degree x_3 on an appropriate distance scale x_5 for x_4 such that x_1 is lower than x_2 by x_3 . Here, x_1 functions as the *denotatum*, x_2 as the *relatum*, and x_3 as the *extent*; the variables “ x_1 ”, “ x_2 ”, and “ x_3 ” themselves will be referred to as “the denotatum argument”, “the relatum argument”, and “the extent argument”, respectively.¹⁶

The space x_4 typically is three-dimensional physical space, and x_5 a length scale such as metre or foot. Other spaces, however, may also have an intrinsic vertical dimension.¹⁷ Geographical space, for example, which usually is represented by a map or by the surface of a globe, has a vertical dimension which is determined by its north–south axis (cf. Klein 1991: 79). Distances in geographical space are not only measured by length scales, but also by degree scales like the latitude difference between two locations:

$$(26) \text{ Der Archipel liegt 2 Grad unter dem Äquator vor Kenyas Küste [...]}. \\ \text{the archipelago lies two degree below-loc}_{\text{stat}} \text{ the.DAT equator in.front.of Kenya's coast} \\ \text{(S8)}$$

‘The archipelago is located two degrees below the equator off the coast of Kenya.’

Texts, which are written in some way or another ‘from top to bottom’, thereby also have an intrinsic vertical dimension. Distances in texts are typically measured in terms of sentences, paragraphs, and the like.

According to (25), the vertical position of the denotatum is less than the vertical position of the relatum by a positive extent. This leaves it open whether or not the denotatum and the relatum are actually vertically aligned. Vertical non-alignment has to be allowed for cases like (27):

$$(27) \text{ die Hütte unter dem Gipfel} \\ \text{the hut below-loc}_{\text{stat}} \text{ the.DAT peak} \\ \text{‘the hut below the peak’}$$

An utterance of (27) does not imply that the location of the entity referred to by *die Hütte* is ‘directly below’ the location of the referent of *dem Gipfel*. Rather, the denotatum may be anywhere below the relatum, provided that it is in a contextually relevant neighbourhood region of the latter. In the view taken here, such contextual restrictions of the relation between the denotatum and the relatum are not a matter of lexical semantics, but of syntactic semantics or pragmatics. In IL, they can be accounted for in syntactic semantics by means of *contextualised attributes* (to be introduced in Section 4.1 below).

¹⁶ Note that the relatum variable in (25) is not bound by an existential quantifier, but by a lambda operator, which is compatible with both definite and non-definite interpretations of the relatum in syntactic semantics – irrespective of the paraphrase “below a location (static)” of the lexical meaning of *unter*₁^W with an indefinite article.

¹⁷ There is a general consensus that the vertical dimension can be determined without reference to an origo (or ‘viewpoint’ in the sense of Klabunde 2000: 196), in contrast to the front–back and the left–right dimensions, which are crucial for the interpretation of words like *vor* (‘in front of a location’) and *links* (‘left of a location’) (cf. the discussion in Lang 1991: 132–144). In my view, concepts like ‘in front of a location’, ‘left of a location’, etc. should be conceived as deictic ones, in the sense of involving an origo.

It is a matter of debate whether the lexical meanings of local prepositions should relate locations or, rather, the entities occupying those locations. Klein (1991: 102 f.) argues that the latter approach does not easily generalise from adnominal to adverbial constructions with spatial expressions like those in (28):

- (28) a. *Eine Gabel fehlte auf dem Tisch.* (Klein 1991: 102)
 a fork missed on the table
 'A fork was missing on the table.'
- b. *Es war sehr kalt draußen.* (Klein 1991: 102)
 it was very cold outside
 'It was very cold outside.'

In (28 a), there are no entities other than locations that could function as the denotatum of the preposition meaning, and in (28 b), the adverb meaning involves no such denotatum or relatum either. By contrast, the former alternative, Klein claims, allows for a unified treatment of constructions with spatial expressions. The specification in (25) of the intension of $unter_1^W$'s lexical meaning follows Klein in this respect. In order to properly relate its relatum argument to the interpretation of a corresponding nominal complement, I shall assume an *accommodating relation* LOC, which is defined as follows:¹⁸

$$(29) \text{ LOC}(x_1, x_2) \leftrightarrow_{\text{def}} \left((x_2 \text{ is a location} \wedge x_1 = x_2) \vee \right. \\ \left. (x_2 \text{ is not a location} \wedge x_2 \text{ has a location} \wedge x_1 \text{ is a location of } x_2) \right)$$

This accommodating relation is used to build conjunctive intensional relations like (30) from (25) in syntactic semantics:¹⁹

$$(30) (\lambda x_1 x_2 x_3) (\exists x_2') \left(\text{BELOW-LOC}_{\text{stat}}(x_1, x_2', x_3) \wedge \right. \\ \left. \text{LOC}(x_2', x_2) \right)$$

The LOC relation is also used for properly relating the denotatum argument of $\text{BELOW-LOC}_{\text{stat}}$ to the interpretation of nominal constituents which are modified by groups headed by a form of $unter_1^W$.²⁰

The extent x_3 of $\text{BELOW-LOC}_{\text{stat}}$, a degree on a distance scale, gives the difference between the vertical positions of the relatum and the denotatum, abstracting away from their horizontal positions. As a consequence, it coincides with the actual distance between the relatum and the denotatum only if both are vertically aligned. In (31), for example, the extent argument is expressed by the measure expression *hundert Meter* and specifies the degree by which the vertical position of the hut's location is lower than the vertical position of the peak's location.²¹

¹⁸ Cf. Bierwisch's (1988: sect. 2.1) one-place function *loc*, which achieves a similar effect. The locations x_2 which LOC relates to x_1 can be contextually restricted in syntactic semantics by a corresponding contextualised attribute in the sense of Section 4.1 below.

¹⁹ In (30) and below, I use the names of attributes autologically as logical predicates, to be interpreted in the following way:

(i) Let P be an n -place attribute, with $n \geq 1$.
 $P(x_1, \dots, x_n) \leftrightarrow \langle x_1, \dots, x_n \rangle$ has P .

Note that (30) presupposes an appropriate capture-avoiding substitution of variables.

²⁰ Spatial entities can, in principle, occupy different locations at different times. Time-relativity is not specific to local properties, though; cf.: *Der Kranke ist wieder gesund* ('The ill person has recovered'). Such effects can be accounted for by relativising syntactic meanings to times where appropriate. I abstract away from this complication here.

²¹ There may be different conventions for measuring the extent between vertical positions of locations, depending on the nature of the entities occupying those locations. Regarding the example of a hut below a peak, the extent between the vertical positions of their locations is by convention measured by reference to the ground of the hut (otherwise the

- (31) *die Hütte hundert Meter unter dem Gipfel*
 the hut hundred metres below-loc_{stat} the.DAT peak
 ‘the hut one hundred metres below the peak’

Unless the hut is ‘directly under’ the peak, the actual distance between both locations is larger than that extent.²²

Measure expressions like *hundert Meter* in (31) or *zwei Meter* in (10) are analysed here as an additional, optional, complement of *unter*. Such an analysis of measure expressions (also considered by Bierwisch 1988: 3 f., 48 f. on the analogy of dimensional adjectives)²³ is by no means conceptually necessary – and indeed is rejected by authors such as Zifonun *et al.* (1997: vol. 3, 2090–2095). Empirically, however, it predicts that the preposition meaning determines the way in which the extent denoted by a measure expression is related to the denotatum and the relatum, a prediction which is in fact borne out. This will become clear when we consider further preposition meanings below.

3.2 ‘Below a location (dynamic)’

I now turn to ‘below a location (dynamic)’, which is the lexical meaning of *unter*₂^W, the dynamic variant of *unter*₁^W. The intension of this meaning, the attribute BELOW-LOC_{dyn}, is built from BELOW-LOC_{stat} in the following way:²⁴

$$(32) \text{ BELOW-LOC}_{\text{dyn}} =_{\text{def}} (\lambda x_1 x_2 x_3) \left(x_1 \text{ is a path} \wedge \text{BELOW-LOC}_{\text{stat}}(\text{fin}(x_1), x_2, x_3) \right)$$

Put differently, BELOW-LOC_{dyn} is a three-place intensional relation between a path x_1 (the denotatum), a location x_2 (the relatum) in an understood space x_4 with a vertical dimension, and a positive degree x_3 (the extent) on an appropriate distance scale for x_4 such that the final part of x_1 (denoted by “fin(x_1)” in (32)) is a location in x_4 which is lower than x_2 by x_3 . A path is taken here to be a – temporal or atemporal – sequence of locations or other entities in a certain configuration,²⁵ such as the sequence of the locations passed through a diving event:

extent would be a function of the hut’s height). In the case of a lamp hanging below a ceiling, however, it is typically measured from the top of the lamp to the bottom of the ceiling. In my view, contextual dependencies of this sort are not a matter of lexical semantics, but of syntactic semantics or pragmatics. In IL, they may be accounted for in syntactic semantics by contextualised attributes (cf. Section 4.1 below).

²² An anonymous reviewer noted that in English, *the cabin one hundred metres below the peak* can mean ‘the hut one hundred metres along the trail down from the peak’, the extent argument specifying “the actual distance between the relatum and the denotatum even when the two are not vertically aligned”. In the German examples I have been able to find, this appears not to be the case, cf.:

- (i) *Als Bergsteiger schaffte er 2011 am Putha Hiunchuli in Nepal mit 7150 Metern seine persönliche Rekordhöhe, musste aber hundert Meter unter dem Gipfel umkehren.* (S1)
 as mountaineer achieved he 2011 at.the Putha.Hiunchuli in Nepal with 7150 metres his personal height.record had.to but hundred metres below-loc_{stat} the.DAT peak turn.back
 ‘As a mountaineer, he achieved his personal height record – 7150 metres – on Putha Hiunchuli in 2011, but had to turn back one hundred metres below the peak.’

Putha Hiunchuli is 7246 metres high.

²³ Bierwisch (1988: 49) ultimately rejects the inclusion of extent arguments in the lexical meaning of a preposition like *unter* for two reasons: the problem of the proper correspondence between static and dynamic meanings (cf. Note 38 in Section 3.8 below), and the problem of excluding the co-occurrence of measure expressions with preposition modifiers like *weit* (‘far’).

²⁴ For the autological use of the attribute name “BELOW-LOC_{stat}” as a logical predicate in (32), cf. Note 19.

²⁵ Cf. Bierwisch (1988: sect. 2.4) for a formalisation of paths and of the fin function from paths to their final part.

- (33) *Das U-Boot taucht bis zu 45 Meter unter die Wasseroberfläche.* (S3)
 the submarine dives up.to 45 metres below-loc_{dyn} the.ACC water.surface
 ‘The submarine dives up to 45 metres below the water surface.’

As in the case of the static variant, the measure expression specifies the difference between two vertical positions; in the example under discussion, it is the degree by which the final part of the path described by the diving event is lower than the vertical position of the water surface.

In Section 1, it was stated that two lexical words are formally related if their paradigms overlap, and semantically related if there is a semantic relation such as metonymy or metaphor between their lexical meanings. The paradigms of $unter_1^W$ and $unter_2^W$ overlap at their common form $unter$.²⁶ Their lexical meanings ‘below a location (static)’ and ‘below a location (dynamic)’ are related through metonymy: there is a part–whole relation between the final part of a path and the path itself. The semantic relation between the two prepositions is a ‘regular’ one (a case of ‘rule-based polysemy’ in the sense of Blank 2003: 285 f.), which allows for defining $BELOW-LOC_{dyn}$, the intension of the lexical meaning of $unter_2^W$, in terms of $BELOW-LOC_{stat}$, the intension of the lexical meaning of $unter_1^W$, as in (32) above.²⁷ Given the formal and semantic relatedness of these lexical words, both are to be included in the same lexicological word, viz. $unter^{LW}$.

3.3 ‘Below a degree (static)’

The next preposition meaning to be considered is ‘below a degree (static)’, the lexical meaning of $unter_3^W$. Its intension may be defined as in (34):

$$(34) \quad BELOW-DEG_{stat} =_{def} (\lambda x_1 x_2 x_3) (\exists x_4) \left(\begin{array}{l} x_4 \text{ is a scale } \wedge \\ x_1 \text{ and } x_2 \text{ are degrees on } x_4 \wedge \\ x_3 \text{ is a positive degree on } x_4 \wedge \\ x_1 \text{ is less than } x_2 \text{ by } x_3 \end{array} \right)$$

Like $BELOW-LOC_{stat}$, $BELOW-DEG_{stat}$ is a three-place intensional relation between two entities x_1 and x_2 and a positive degree x_3 . In contrast to $BELOW-LOC_{stat}$, x_1 and x_2 are not locations in a space with a vertical dimension, but (positive or negative) degrees on the same scale as x_3 such that x_1 is less than x_2 by x_3 . In (12), for example, x_1 , x_2 , and x_3 are degrees on a temperature scale (presumably, the Celsius scale), and x_1 is less than x_2 (0 °C) by x_3 (some positive degrees Celsius).

Due to its formal and semantic relatedness to $unter_1^W$, $unter_3^W$ is another member of the lexicological word $unter^{LW}$. Formally, the paradigms of the two lexical words are identical and thus trivially overlap.²⁸ Semantically, their lexical meanings can be related through metaphor. Temperature degrees, for instance, are traditionally measured by means of a liquid-in-glass thermometer, which may

²⁶ If one analysed preposition–article contractions like *unterm* or *unters* as preposition forms, as Hinrichs (1986) does, and included *unterm* as a dative singular masculine/neuter form in the paradigm of the dative case governing preposition $unter_1^W$ and *unters* as an accusative singular neuter form in the paradigm of the accusative case governing preposition $unter_2^W$, then the paradigms of $unter_1^W$ and $unter_2^W$ would still overlap at the categorially unspecified preposition form *unter*.

²⁷ The definiens in (32) may be determined in lexical semantics by means of an operation which takes attributes like $BELOW-LOC_{stat}$ as arguments. This operation, to be called ‘DYN’ here, is easily defined as follows:

(i) Let P be an n -place ‘static’ attribute, with $n \geq 1$.
 $DYN(P) =_{def} (\lambda x_1 \dots x_n) (x_1 \text{ is a path } \wedge P(\text{fin}(x_1), \dots, x_n))$

Of course, not only $BELOW-LOC_{dyn}$ can be built from $BELOW-LOC_{stat}$ by DYN, but also the intensions of the lexical meanings of the dynamic variants to be discussed below.

²⁸ This also holds if the contracted form *unterm* is included in the paradigms of $unter_1^W$ and $unter_3^W$, which both govern dative case (cf. Note 26 above).

be conceived as a one-dimensional space with an intrinsic vertical dimension. If so, then the locations of the degree marks on the thermometer are ordered by BELOW-LOC_{stat} (the intension of the lexical meaning of *unter*₁^W) in the same way as the degrees themselves are ordered by BELOW-DEG_{stat} (the intension of the lexical meaning of *unter*₃^W). Nevertheless, this kind of semantic relation is not a ‘regular’ one: there is no obvious way in which to define BELOW-DEG_{stat} in a general way in terms of BELOW-LOC_{stat}. Rather, this is an ‘idiosyncratic’ semantic relation (or ‘idiosyncratic polysemy’ in the sense of Blank 2003: 286 f.).²⁹

3.4 ‘Below a degree (dynamic)’

The dynamic variant of *unter*₃^W is *unter*₄^W.³⁰ The intension of the latter’s lexical meaning ‘below a degree (dynamic)’ can be built from the intension of the former’s lexical meaning ‘below a degree (static)’ in the same way as in the case of the lexical meanings of *unter*₁^W and *unter*₂^W:

$$(35) \text{ BELOW-DEG}_{\text{dyn}} =_{\text{def}} (\lambda x_1 x_2 x_3) \left(\begin{array}{l} x_1 \text{ is a path } \wedge \\ \text{BELOW-DEG}_{\text{stat}}(\text{fin}(x_1), x_2, x_3) \end{array} \right)$$

BELOW-DEG_{dyn} thus is a three-place intensional relation between a path x_1 , a degree x_2 on a scale x_4 , and a positive degree x_3 on x_4 such that the final part of x_1 is a degree on x_4 which is less than x_2 by x_3 . Accordingly, the path x_1 consists itself of degrees.

It is obvious that *unter*₄^W is formally and semantically related to *unter*₃^W in the same way as *unter*₂^W is related to *unter*₁^W (cf. Section 3.2 above). In particular, there is the same kind of semantic relation between them, which allows for defining BELOW-DEG_{dyn} in terms of BELOW-DEG_{stat}. Therefore, *unter*₄^W is a member of the same lexicological word as *unter*₃^W and – by transitivity – *unter*₁^W and *unter*₂^W.

3.5 ‘Identifiable by a linguistic or conceptual unit (static)’

Next, I shall discuss *unter*₅^W, which is used in (14) as the head of a prepositional object of *laufen*, meaning ‘go by the name of’ here.³¹ Such preposition occurrences are known as *governed prepositions*. In the literature, it has been suggested that governed prepositions have no meaning at all (Heringer 1968: 434 f. is an early reference for this) or only a trivial lexical meaning, like the two-place concept ‘identical with’ (Lieb 2011: 264; Budde 2014: 344). Lerot (1982: 267 f.), however, cites numerous examples of governed prepositions which have the same meaning as their non-governed

²⁹ The preposition *unter*₃^W is also closely related to the ‘adnumeral’ *unter* in the sense of Plank (2004):

- (i) *unter zwei Meter hoch*
less.than two metres high
‘less than two metres high’

As an ‘adnumeral’, *unter* does not govern case. This distinguishes the ‘adnumeral’ from the preposition, which governs dative case:

- (ii) *Liegt die Höhe unter zwei Metern* [...]. (S7)
lies the height below-deg_{stat} two metres.DAT
‘If the height is below two metres ...’

³⁰ The existence of a dynamic variant of *unter*₃^W was pointed out to me by Monika Budde.

³¹ In the valence dictionary of Schumacher *et al.* (2004: 516), the *laufen* variant under discussion corresponds to the sublemma “laufen 12”, with the government category “NomE PräpE” (nominative complement and prepositional complement).

counterparts. A similar case can be made for $unter_5^W$; in (36), for example, it occurs as the head of a predicative modifier:

- (36) [...] *jetzt kommt sie unter dem Namen „Clever“ auch nach Deutschland.* (S11)
 now comes it ident-by-lcu_{stat} the.DAT name Clever also to Germany
 ‘Now it is also coming to Germany under the name of “Clever”.’

Still, the meaning of the non-governed *unter* in (36) does not differ from the meaning of the governed *unter* in (14): in both preposition groups, the meaning of *unter* relates some linguistic or conceptual unit (here: a name) to entities which can be identified by that unit.

I therefore suggest that the lexical meaning of $unter_5^W$ has the intension defined in (37):

- (37) IDENT-BY-LCU_{stat} =_{def} ($\lambda x_1 x_2$) $\left(\begin{array}{l} x_2 \text{ is a linguistic or conceptual unit } \wedge \\ x_2 \text{ can identify } x_1 \end{array} \right)$

IDENT-BY-LCU_{stat} is a two-place intensional relation between a sortally unrestricted entity x_1 and a linguistic or conceptual unit x_2 such that the former can be identified by the latter. This relation holds, for instance, between a product x_1 and its name x_2 , a dictionary entry x_1 and its lemma x_2 , or a book x_1 and its title x_2 . Note that this identification relation abstracts away from any distance between, say, a title page and the rest of a book. Accordingly, there is no extent argument involved in IDENT-BY-LCU_{stat}.

In this meaning, $unter_5^W$ may be related to $unter_1^W$ through metaphor. A written text, for instance, is space with an intrinsic vertical dimension (cf. Section 3.1 above), where a title or a heading provides a linguistic or conceptual unit which can identify the text part below it.³² Since $unter_5^W$ is not only semantically, but also formally, related to $unter_1^W$, $unter_5^W$, too, is a member of $unter^{LW}$.

3.6 ‘Identifiable by a linguistic or conceptual unit (dynamic)’

$Unter_5^W$ also has a dynamic variant: $unter_6^W$ with the lexical meaning ‘identifiable by a linguistic or conceptual unit (dynamic)’.³³ Its intension IDENT-BY-LCU_{dyn} is built from IDENT-BY-LCU_{stat} in the same way as in the case of the dynamic variants discussed above:

- (38) IDENT-BY-LCU_{dyn} =_{def} ($\lambda x_1 x_2$) $\left(\begin{array}{l} x_1 \text{ is a path } \wedge \\ \text{IDENT-BY-LCU}_{\text{stat}}(\text{fin}(x_1), x_2) \end{array} \right)$

IDENT-BY-LCU_{dyn} thus is a two-place intensional relation between a path x_1 and a linguistic or conceptual unit x_2 such that the final part of x_1 can be identified by x_2 . In Example (15), x_1 might be a path of abstract locations in conceptual space into the class of subconcepts of the concept ‘business law’, the latter functioning as an identificatory ‘category label’ for the former.

The formal and semantic relatedness of $unter_6^W$ and $unter_5^W$ parallels that of $unter_2^W$ and $unter_1^W$, or $unter_4^W$ and $unter_3^W$. Thus, $unter_6^W$ is also to be included in the lexicological word $unter^{LW}$.

3.7 ‘Under a location (static)’

I now come to the local preposition $unter_7^W$ and its lexical meaning ‘under a location (static)’. In contrast to the preposition meanings discussed above, this is not a dimensional concept, but a to-

³² It is by no means excluded that a member of a lexicological word may partake in multiple semantic relations. The preposition $unter_5^W$ might, for example, also be related to $unter_7^W$ (to be discussed in Section 3.7 below) through, say, the metaphor of a title page covering the text part under it (cf. also Krause 1994: 370 f.).

³³ This reading was suggested by an anonymous reviewer.

pological one, which does not involve spatial dimensions (for this distinction, cf. Wunderlich and Herweg 1991: 776–780). The intension of this concept can be defined as follows:³⁴

$$(39) \quad \text{UNDER-LOC}_{\text{stat}} =_{\text{def}} (\lambda x_1 x_2 x_3) (\exists x_4) (\exists x_5) \left(\begin{array}{l} x_4 \text{ is a space } \wedge \\ x_1 \text{ and } x_2 \text{ are locations in } x_4 \wedge \\ x_5 \text{ is an appropriate distance scale for } x_4 \wedge \\ x_3 \text{ is a positive degree on } x_5 \wedge \\ \text{the intrinsic underside of } x_2 \text{ covers } x_1 \text{ by } x_3 \end{array} \right)$$

Thus, $\text{UNDER-LOC}_{\text{stat}}$ is a three-place intensional relation between two locations x_1 and x_2 in a space x_4 and a positive degree x_3 on an appropriate distance scale for x_4 such that the intrinsic underside of x_2 covers x_1 by x_3 . Since no dimension is presupposed, the denotatum x_1 need not be below the relatum x_2 .³⁵

The extent argument “ x_3 ” specifies the degree by which the denotatum is covered by the intrinsic underside of the relatum, cf.:

$$(40) \quad \textit{Das Fahrzeug kam [...] zwei Meter unter dem Lkw zum Stillstand.} \quad (\text{S } 4)$$

the vehicle came two metres under-loc_{stat} the.DAT lorry to.a.standstill
‘The vehicle came to rest two metres under the lorry.’

Here, the path described by the event of ‘coming to a standstill’ provides a suitable ad-hoc dimension for determining the degree by which the vehicle is covered by the underside of the lorry (cf. also Wunderlich and Herweg 1991: 780). This might suggest that *zwei Meter* in (40) is not a preposition complement, but a verb modifier. Syntactically, however, *zwei Meter unter dem Lkw* behaves as a single constituent, which can occupy the prefield:

$$(41) \quad \textit{Zwei Meter unter dem Lkw kam das Fahrzeug zum Stillstand.}$$

two metres under-loc_{stat} the.DAT lorry came the vehicle to.a.standstill

I therefore provisionally analyse the measure expression here in the same way as a measure expression co-occurring with the prepositions discussed above – viz. as an additional, optional, complement of the preposition.

As a matter of fact, *unter* in (40) is ambiguous between a $\text{UNDER-LOC}_{\text{stat}}$ reading and a $\text{BELOW-LOC}_{\text{stat}}$ reading.³⁶ In the latter reading, the vehicle came to rest two metres vertically below the lorry. Here, the extent argument does not specify the degree by which the denotatum is covered by the underside of the relatum, but the difference between their vertical positions. These different interpretations of the measure expression are predicted by the lexical ambiguity approach taken here, while I do not see how to obtain them in an approach trying to derive these readings from a common lexical meaning.

Still, it is obvious that $\textit{unter}_7^{\text{W}}$ is semantically related to $\textit{unter}_1^{\text{W}}$. This semantic relation is perhaps best seen as one of semantic extension (in a purely synchronic sense, without the diachronic connotation that the more general meaning has actually evolved from the more restricted one).³⁷ For

³⁴ Cf. Krause (1994: 362 f.), who distinguishes, *inter alia*, a meaning of *unter* in Marcq’s (1988) axis-free System II where the preposition determines “la position du participant « recouvert » (par un participant « recouvrant ») [the location of the ‘covered’ participant (by a ‘covering’ participant)]”.

³⁵ For the role of the intrinsic underside of the relatum, cf. Nüse (2007: 49, *passim*).

³⁶ Cf. also Nüse (2007: 29 f.), who shows that *unter* ambiguously locates denotata with respect to relata such as pictures hanging on the wall. Here, the denotatum (say, a stain) may either be vertically below it or between the intrinsic underside of the picture (its backside) and the wall. The former reading corresponds to $\text{BELOW-LOC}_{\text{stat}}$, while the latter one is an $\text{UNDER-LOC}_{\text{stat}}$ reading.

³⁷ From a synchronic point of view, we could equally well relate $\textit{unter}_1^{\text{W}}$ to $\textit{unter}_7^{\text{W}}$ through semantic restriction. Either way, this would be a case of ‘taxonomic polysemy’ in the sense of Blank (2003: 269 f.).

the sake of the argument, let us assume that “covering” is understood as ‘hiding from view’ (for discussion, cf. Klein 1991: 100 f.). Then covering involves an implicit perspective from which the underside of a relatum totally or partially hides a denotatum. If that perspective is approximately aligned with the space’s vertical dimension in top–down direction, then the denotatum is not only under the relatum, but also below it; if the perspective is not aligned, then the denotatum is under the relatum, but not below it. In a sense, then, the concept ‘under a location (static)’ is a generalisation of the concept ‘below a location (static)’: the latter involves a specific spatial dimension (the vertical one), while the former does not. Thus, $unter_7^W$ and $unter_1^W$ are not only formally related, but also semantically, through an (‘idiosyncratic’) semantic relation of semantic extension. Since $unter_7^W$ is also formally related to $unter_1^W$, they are members of the same lexicological word.

3.8 ‘Under a location (dynamic)’

The concept ‘under a location (dynamic)’ is the lexical meaning of $unter_8^W$. Its intension is built, as usual, from the intension of the lexical meaning of the static variant, $unter_7^W$:

$$(42) \text{ UNDER-LOC}_{\text{dyn}} =_{\text{def}} (\lambda x_1 x_2 x_3) \left(x_1 \text{ is a path} \wedge \text{UNDER-LOC}_{\text{stat}}(\text{fin}(x_1), x_2, x_3) \right)$$

In other words, $\text{UNDER-LOC}_{\text{dyn}}$ is a three-place intensional relation between a path x_1 , a location x_2 in an understood space x_4 , and a positive degree x_3 on some appropriate distance scale for x_4 such that the final part of x_1 is a location in x_4 , and the underside of x_2 covers that location by x_3 . In (43), for example, the extent x_3 is the amount by which the final part of the denotatum – i.e., the final part of the path described by a pushing event – is covered by the underside of the relatum – the underside of a semi-trailer:

- (43) *Der Kombi wurde rund eineinhalb Meter unter den Sattelanhänger*
the estate.car was around one.and.a.half metres under-loc_{dyn} the.ACC semi-trailer
gestoßen [...]. (S2)
pushed
‘The estate was pushed under the semi-trailer by about one and a half metres.’

Thus, the way in which the extent is related here to the denotatum and the relatum patterns with the other topological meaning ‘under a location (static)’, but differs from the dimensional preposition meanings.³⁸

The preposition $unter_8^W$ is formally and semantically related to $unter_7^W$ in the same way as $unter_2^W$, $unter_4^W$, and $unter_6^W$ are related to their static variants. As a consequence, $unter_8^W$ is another member of $unter^{\text{LW}}$.

³⁸ One of the reasons why Bierwisch (1988: 49) ultimately rejects the inclusion of extent arguments in the lexical meaning of prepositions is the problem of the proper correspondence between static and dynamic meanings:

[...] the directional use of P in many cases requires an interpretation of MP [measure phrase; A. N.] that differs from that appropriate for the locational use. Thus *2 Meter unter den Tisch* does not generally denote a path that ends 2 meters below the table, but rather a path the final two meters of which are below the table.

(Cf. also Section 3.7 above.) In the analysis presented here, this problem does not arise: all dynamic meanings which involve an extent argument are properly related to a static meaning in the same way, and *vice versa*.

3.9 ‘Caused by a burdening state of affairs’

$Unter_9^W$, the preposition to be considered next, occurs in (18) as the head of a prepositional object.³⁹ In Section 3.5, I have shown that $unter_5^W$ can be used both as a governed or non-governed preposition. This holds also for $unter_9^W$, which occurs in (44) as the head of an adverbial modifier:

- (44) *Unter dem Druck des Wassers gaben die Mauern nach und stürzten ein.*
 caused-by-a-burdening-soa the.DAT pressure the water gave the walls in and collapsed
 (S 13: 260; cited from Krause 1994: 369)
 ‘Under the pressure of the water, the walls gave in and collapsed.’

From the Examples (18) and (44), it appears that $unter_9^W$ expresses a relation between a physical or psychological burden and a state or event caused by it.⁴⁰ At first glance, the burden can be identified with the denotatum of the meaning of the preposition complement (such as the heat in (18) or the pressure in (44)). Closer inspection, however, reveals that the preposition complement is actually understood as a state of affairs, which may be accommodated from its literal meaning. Consider the following example:

- (45) *Sie litt unter ihrem Mann.*
 she suffered caused-by-a-burdening-soa her.DAT husband
 ‘She suffered from her husband.’

Here, it is not the husband who is the direct cause of her suffering but rather her husband’s behaviour (say, his betraying her). This state of affairs can be made explicit in correlate constructions with an infinitival or a clausal constituent:

- (46) a. *Sie litt darunter, von ihrem Mann betrogen zu werden.*
 she suffered caused-by-a-burdening-soa-there by her husband being.betrayed
 ‘She suffered from being betrayed by her husband.’
 b. *Sie litt darunter, dass ihr Mann sie betrog.*
 she suffered caused-by-a-burdening-soa-there that her husband her betrayed
 ‘She suffered from the fact that her husband betrayed her.’

(For a discussion of the prepositional adverb occurring here, see Section 4.2 below.)

I therefore assume that $unter_9^W$ has the lexical meaning ‘caused by a burdening state of affairs’, the intension of which is given in (47):

$$(47) \text{ CAUSED-BY-A-BURDENING-SOA} =_{\text{def}} (\lambda x_1 x_2) \left(\begin{array}{l} x_2 \text{ is a state of affairs} \wedge \\ x_2 \text{ is a burden causing } x_1 \end{array} \right)$$

The attribute CAUSED-BY-A-BURDENING-SOA is a two-place intensional relation between an entity x_1 and a state of affairs x_2 such that the latter is a burden causing the former. If causal relations pertain between states of events, then it follows that x_1 is also a state of affairs, such as the state of affairs that someone is in a suffering state or that something undergoes a collapsing event. Note that the attribute CAUSED-BY-A-BURDENING-SOA has no extent argument. This does not come as a surprise: there is no meaningful measure for the relation denoted by this attribute.

³⁹ This object is governed by an occurrence of a verb corresponding in Schumacher *et al.* (2004: 522 f.) to the sublemma “leiden 2” and the government category “NomE (PräpE)” (nominative complement and optional prepositional complement).

⁴⁰ The causal nature of this relation was suggested to me by Kerstin Schwabe.

In order to properly relate the relatum argument “ x_2 ” to the interpretation of the corresponding nominal complement – which may, or may not, directly denote a state of affairs – I define an accommodating relation to be called “SOA”:

$$(48) \quad \text{SOA}(x_1, x_2) \leftrightarrow_{\text{def}} \left(\begin{array}{l} (x_2 \text{ is a state of affairs} \wedge x_1 = x_2) \vee \\ (x_2 \text{ is not a state of affairs} \wedge x_1 \text{ is a state of affairs involving } x_2) \end{array} \right)$$

By means of SOA, accommodated intensional relations like (49) are built from (47) in syntactic semantics:

$$(49) \quad (\lambda x_1 x_2) (\exists x'_2) \left(\begin{array}{l} \text{CAUSED-BY-A-BURDENING-SOA}(x_1, x'_2) \wedge \\ \text{SOA}(x'_2, x_2) \end{array} \right)$$

In order to be a member of the lexicological word unter^{LW} , $\text{unter}_9^{\text{W}}$ has to be formally and semantically related to another member. In my view, the most closely related lexical word is $\text{unter}_1^{\text{W}}$. Their formal relatedness is obvious. Semantically, the lexical meaning ‘caused by a burdening state of affairs’ of $\text{unter}_9^{\text{W}}$ may be metaphorically related to the lexical meaning ‘below a location (static)’ of $\text{unter}_1^{\text{W}}$ in the following way. Let us assume that someone is carrying a heavy physical burden. This implies that the former is vertically below the latter. States of affairs of this kind typically cause further states of affairs, such as suffering from the weight of the burden or collapsing under it.

As far as I can see, there is no dynamic variant of $\text{unter}_9^{\text{W}}$. At any rate, I have not been able to find convincing examples for such a reading.

3.10 ‘Among a multitude (static)’

The concept ‘among a multitude (static)’ is the lexical meaning of $\text{unter}_{10}^{\text{W}}$. Its intension is the attribute defined in (50):

$$(50) \quad \text{AMONG-MULT}_{\text{stat}} =_{\text{def}} (\lambda x_1 x_2) \left(\begin{array}{l} x_2 \text{ is a multitude} \wedge \\ x_2 \text{ encompasses } x_1 \end{array} \right)$$

This two-place intensional relation holds between a sortally unrestricted entity x_1 and a multitude x_2 encompassing the former. (“Multitude” is used here as a cover term for “mass” and “plurality”). I could not find any examples where $\text{unter}_{10}^{\text{W}}$ is used together with a measure expression. So there is no reason to assume an extent argument here.

Now, is there a relevant semantic relation between $\text{unter}_{10}^{\text{W}}$ and one of the prepositions discussed above? From a diachronic point of view, one might negate this question. As a matter of fact, there happen to be two roots of *unter* words, one corresponding to Latin *infra* and another to *inter* (cf. Paul 1916–1920: vol. 4, 3). Obviously, $\text{unter}_{10}^{\text{W}}$ belongs to the *inter* group, while the other prepositions discussed so far fall into the *infra* group.⁴¹ From a synchronic point of view, however, one might semantically relate $\text{unter}_{10}^{\text{W}}$ to $\text{unter}_7^{\text{W}}$ through semantic extension (also used for relating $\text{unter}_7^{\text{W}}$ to $\text{unter}_1^{\text{W}}$ in Section 3.7 above). An anonymous reviewer suggests the following connection between their lexical meanings: “Roughly speaking, an individual who is among a multitude of objects will often be difficult to see, hence essentially covered by that group of objects [...]”. Put differently, an entity encompassed by a multitude may be effectively hidden by it as if the multitude covered it. Insofar as covering is a case of hiding from view (cf. Section 3.7 above), the concept ‘among a multitude (static)’ can be seen as a generalisation of the concept ‘under a location (static)’. If so, then $\text{unter}_{10}^{\text{W}}$

⁴¹ It seems to be this very fact which makes Krause (2007: 457, n. 14) believe that *unter* is the only simple preposition in German with two different *signifiés*.

would be synchronically related to $unter_7^W$ both formally and semantically despite their different diachronic roots, and $unter_{10}^W$ would be a member of the lexicological word $unter^{LW}$, too.⁴²

3.11 ‘Among a multitude (dynamic)’

The preposition $unter_{10}^W$ also has a dynamic variant: $unter_{11}^W$. The intension of its lexical meaning ‘among a multitude (dynamic)’ is built in the familiar way:

$$(51) \text{ AMONG-MULT}_{\text{dyn}} =_{\text{def}} (\lambda x_1 x_2) \left(x_1 \text{ is a path } \wedge \text{ AMONG-MULT}_{\text{stat}}(\text{fin}(x_1), x_2) \right)$$

Thus, $\text{AMONG-MULT}_{\text{dyn}}$ is a two-place intensional relation between a path x_1 and a multitude x_2 such that the latter encompasses the final part of the former.

It should be needless to say that $unter_{11}^W$ is formally and semantically related to $unter_{10}^W$ and thereby also a member of $unter^{LW}$.

4 The prepositional adverbs

Having determined the adverbial basis da^W in Section 2 and the prepositional bases $unter_1^W$ to $unter_{11}^W$ in Section 3, I shall now show how to compose from their lexical meanings the meanings of the prepositional adverbs $darunter_1^W$ to $darunter_{11}^W$, which are exemplified below:

1. $darunter_1^W$ with the meaning ‘below a location there (static)’ (below-loc-there_{stat}):

$$(52) \text{ Zwei Meter } \textit{darunter} \quad \textit{hing eine Lampe.}$$

two metres below-loc-there_{stat} hung a lamp
‘Two metres below it, there was hanging a lamp.’

2. $darunter_2^W$ with the meaning ‘below a location there (dynamic)’ (below-loc-there_{dyn}):

$$(53) \text{ Er h} \textit{ängte die Lampe zwei Meter } \textit{darunter.}$$

he hung the lamp two metres below-loc-there_{dyn}
‘He put the lamp two metres below it.’

3. $darunter_3^W$ with the meaning ‘below a degree there (static)’ (below-deg-there_{stat}):

$$(54) \text{ Nachts } \textit{kann die Temperatur auch einige Grad } \textit{darunter} \quad \textit{liegen.}$$

at.night can the temperature also a.few degree below-deg-there_{stat} lie
‘At night, the temperature can even be a few degrees below it.’

4. $darunter_4^W$ with the meaning ‘below a degree there (dynamic)’ (below-deg-there_{dyn}):

$$(55) \text{ Nachts } \textit{kann die Temperatur [...] auch einige Grad } \textit{darunter} \quad \textit{sinken.} \quad (\text{S12})$$

at.night can the temperature also a.few degree below-deg-there_{dyn} sink
‘At night, the temperature can even fall a few degrees below it.’

5. $darunter_5^W$ with the meaning ‘identifiable by a linguistic or conceptual unit there (static)’ (ident-by-lcu-there_{stat}):

⁴² In Blank’s (2003: 277) terminology, this would be a case of ‘secondary polysemy’: “original homonymy is re-interpreted as polysemy by speakers who feel a semantic relation between the two senses in question”.

- (56) *Non-Food-Produkte, der Name sagt es: darunter laufen alle Artikel, die man nicht essen kann [...].* (S10)
 non-food.products the name says it ident-by-lcu-there_{stat} go all articles which one not eat can
 ‘Non-food products – the name speaks for itself: all articles which one cannot eat go by it.’
6. *darunter*₆^W with the meaning ‘identifiable by a linguistic or conceptual unit there (dynamic)’ (ident-by-lcu-there_{dyn}):
- (57) *Falls es eine Kategorie „Wirtschaftsrecht“ gäbe, könnte man Vertriebsrecht sicher darunter einordnen.* (S9)
 if it a category business.law would.exist could one distribution.law surely ident-by-lcu-there_{dyn} classify
 ‘If there were a category “business law”, one could certainly file distribution law under it.’
7. *darunter*₇^W with the meaning ‘under a location there (static)’ (under-loc-there_{stat}):
- (58) *Darunter spürte er ihre Hand.*
 under-loc-there_{stat} sensed he her hand
 ‘He sensed her hand under it.’
8. *darunter*₈^W with the meaning ‘under a location there (dynamic)’ (under-loc-there_{dyn}):
- (59) *Sie schob ihre Hand darunter.*
 she put her hand under-loc-there_{dyn}
 ‘She put her hand under it.’
9. *darunter*₉^W with the meaning ‘caused by a burdening state of affairs there’ (caused-by-a-burdening-soa-there):
- (60) *Sie litt sehr darunter.*
 she suffered very caused-by-a-burdening-soa-there
 ‘She suffered a lot from it.’
10. *darunter*₁₀^W with the meaning ‘among a multitude there (static)’ (among-mult-there_{stat}):
- (61) *Darunter waren auch ein paar Erbsen.*
 among-mult-there_{stat} were also some peas
 ‘There were also some peas among it.’
11. *darunter*₁₁^W with the meaning ‘among a multitude there (dynamic)’ (among-mult-there_{dyn}):
- (62) *Sie mischte noch ein paar Erbsen darunter.*
 she mixed in.addition some peas among-mult-there_{dyn}
 ‘She also mixed some peas among it.’

As the reader will have noticed, the lexical meanings listed here systematically correspond to the preposition meanings discussed in the previous section. As a consequence, the semantic relations between the former parallel those between the latter. It goes without saying that the lexical words *darunter*₁^W to *darunter*₁₁^W are also formally related. I therefore assume that these lexical words are all members of one and the same lexicological word, viz. *darunter*^{LW}. Instead of going into the lexical meaning of each of them, I shall focus the discussion on the prepositional adverbs *darunter*₁^W, *darunter*₉^W, and *darunter*₁₀^W. I am confident that the reader will readily generalise the proposed analysis to the rest of them.

4.1 ‘Below a location there (static)’

The intension of the lexical meaning of the prepositional adverb $darunter_1^W$, to be called “BELOW-LOC-THERE_{stat}”, is compositionally built from the intension THERE of the lexical meaning of the deictic adverb da_1^W and the intension BELOW-LOC_{stat} of the lexical meaning of the local preposition $unter_1^W$ as follows. The attribute BELOW-LOC-THERE_{stat} inherits the denotatum argument, the relatum argument, and the extent argument from BELOW-LOC_{stat} as well as the deictic places of THERE, while the denotatum argument of THERE is identified with the relatum argument of BELOW-LOC_{stat}.⁴³

$$(63) \text{ BELOW-LOC-THERE}_{\text{stat}} =_{\text{def}} (\lambda x_1 x_2 x_3 x_4 x_5) \left(\begin{array}{l} \text{THERE}(x_2, x_4, x_5) \wedge \\ \text{BELOW-LOC}_{\text{stat}}(x_1, x_2, x_3) \end{array} \right)$$

(63) amounts to the following. BELOW-LOC-THERE_{stat} is a five-place intensional relation between two locations x_1 and x_2 in some space x_6 with a vertical dimension, a positive degree x_3 on some appropriate distance scale for x_6 , a deictic space x_4 , and an origo x_5 such that:

1. x_2 is some location x_7 in x_4 or designated by that location, and
2. x_1 is lower than x_2 by x_3 .

(For the notion of designation, cf. Section 2 above.) Here, x_1 , x_2 , x_3 , and x_7 function as the *denotatum*, the *relatum*, the *extent*, and the *demonstratum* of BELOW-LOC-THERE_{stat}, respectively. Since BELOW-LOC-THERE_{stat} inherits the deictic places x_4 and x_5 of THERE, the lexical meaning of $darunter_1^W$ is deictic, too.

From BELOW-LOC_{stat}, BELOW-LOC-THERE_{stat} inherits the extent argument “ x_3 ”. Thereby it is predicted that $darunter_1^W$ likewise governs optional measure complements. As (52) and (64) show, this prediction is borne out:

- (64) *Selbst bei Minusgraden auf der Erdoberfläche herrschen einige Meter*
 even at sub-zero.temperatures on the earth’s.surface prevail several metres
darunter ca. 12 °C. (S6)
 below-loc-there_{stat} circa 12 °C
 ‘Even at sub-zero temperatures on the earth’s surface, several metres below it the
 temperature is ca. 12 °C.’

Example (64) illustrates the normal, text-phorics, use of a simple prepositional adverb like *darunter*. In a normal utterance of (64), the demonstratum (implicit in THERE and thereby also BELOW-LOC-THERE_{stat}) is a location in a textual deictic space: the utterance part *der Erdoberfläche*, which is interpreted as a sign for the relatum x_2 , the earth’s surface. Actually, it is the earth’s surface *qua* location⁴⁴ which is phorically taken up by *darunter* here, since the relatum is sortally restricted to locations in BELOW-LOC_{stat} and *mutatis mutandis* in BELOW-LOC-THERE_{stat}. In this use

⁴³ The definiens in (63) is determined in word formation by means of an operation combining attributes like THERE and BELOW-LOC_{stat} into attributes like BELOW-LOC-THERE_{stat}. Let us call this operation “COMB” and define it in the following, general way:

- (i) Let P_1 be an m -place attribute and P_2 an n -place attribute, with $m \geq 1$ and $n \geq 2$.
 $\text{COMB}(P_1, P_2) =_{\text{def}} (\lambda x_1 x_2 \dots x_n y_2 \dots y_m) (P_1(x_2, y_2, \dots, y_m) \wedge P_2(x_1, x_2, \dots, x_n))$

As the reader may verify, COMB can also build the intensions of the lexical meanings of the prepositional adverbs to be discussed below.

⁴⁴ This may remind the reader of Pustejovsky’s (1995) ‘dot objects’. I leave open whether the semantics of prepositional adverbs proposed here actually presupposes an ontology including such entities.

of the local prepositional adverbs, the demonstrata can even be expressions for animated entities, provided that these expressions are interpreted as signs for the latter's locations:

- (65) *Sie entdeckte eine Bäuerin, dahinter einen Hirten, daneben einen Hund, in unmittelbarer Nähe dazu eine Schafherde.*
 she noticed a farmer's.wife behind.a.location.there a shepherd
 next.to.a.location.there a dog immediately.near.a.location.there a sheep.flock
 (Dudenredaktion 2009: 582)
 'She noticed a farmer's wife, behind her a shepherd, next to him a dog, immediately near it a flock of sheep.'

Strictly speaking, a translation of (65) as in (66) would be more to the point:

- (66) 'She noticed a farmer's wife, behind her location a shepherd, next to his location a dog, immediately near its location a flock of sheep.'

According to Klabunde (2000: 198), the sortal restriction of the relatum to locations is the very semantic difference between local prepositional adverbs and the prepositions they are formed from:

Als Lokaladverb nimmt *da-* in den Pronominaladverbien nicht auf ein Referenzobjekt Bezug, sondern auf eine spezielle Raumregion, nämlich den Eigenort des Referenzobjekts. [...] Der Unterschied liegt in der Referenz auf das Referenzobjekt bei den Präpositionen vs. der Referenz auf den Eigenort des Referenzobjekts bei den Pronominaladverbien.

[Being a local adverb, *da-* does not refer, in pronominal adverbs, to a reference object, but to a special spatial region, viz. the proper location of the reference object. ... The difference lies in the reference to the reference object in the case of prepositions vs. the reference to the proper location of the reference object in the case of pronominal adverbs.]

I agree with Klabunde (2000) that lexical meanings of prepositional adverbs formed from local prepositions have an intension where the relatum is a location. I disagree with him as to the reason for this restriction, though: it is not the lexical meaning of the adverb which is responsible for it, but the lexical meaning of the preposition.

In fact, the denotatum of THERE is *not* necessarily a location. Rather, it is determined *via* the demonstratum: a location in a deictic space, which is identical with the denotatum or designates it. If the demonstratum is a location in a textual space and is interpreted as a sign for the denotatum of THERE, then the latter is *not* sortally restricted to locations (cf. Example (9) above). In the case of $darunter_{10}^W$, to be discussed in Section 4.3 below, the corresponding entity (the relatum x_2) likewise needs *not* be a location:

- (67) *In vielen Fächern, darunter Deutsch und Mathematik, war er einer der Besten.*
 in many subjects among-mult_{stat} German and mathematics was he one the best
 'In many subjects, among them German and mathematics, he was one of the best.'

Now, under the assumption that $darunter_1^W$ and $darunter_{10}^W$ are both formed from da^W , their semantic difference can only be traced back to the fact that they are formed from different prepositions ($unter_1^W$ and $unter_{10}^W$, respectively).

As the reader will recall from Section 3, the relatum x_2 is sortally restricted to locations in BELOW-LOC_{stat} (the intension of the lexical meaning of $unter_{10}^W$, from which $darunter_{10}^W$ is formed), while in AMONG-MULT_{stat} (the intension of the lexical meaning of $unter_1^W$), it can be a multitude –

a mass or plurality – of any sort. In Section 3.1, I have argued that syntactic meanings of local prepositions involve accommodating relations like LOC, relating the relatum argument of an intension like BELOW-LOC_{stat} to the denotatum argument of the preposition complement – typically, a non-location. Prepositional adverbs do not govern such complements, their valence being lexically reduced by one. As a consequence, there is no reason for syntactic semantics to apply an accommodating relation to the relatum argument of the intension of their lexical meaning. Thus, the lexical semantic restriction of the relatum to locations carries over to syntactic semantics.

In contrast to other proposals for the meaning of prepositional adverbs (such as that of Wunderlich and Herweg 1991: 777), the relatum argument “ x_2 ” is not existentially bound in BELOW-LOC-THERE_{stat}.⁴⁵ The main motivation for this comes from the ‘uniqueness effect’ connected with the use of prepositional adverbs: in a normal utterance of a prepositional adverb, there is only one contextually relevant relatum x_2 for the speaker.⁴⁶ This effect can be accounted for by restricting the interpretation of prepositional adverbs in syntactic semantics to a ‘momentary universe of discourse at utterance time’. In IL tradition, such restrictions have been formalised by *reference basis* functions (Lieb 1983: chap. 18). As an alternative, I shall make use of *contextualised attributes* here, which are derived in syntactic semantics from attributes of lexical semantics. Contextualised attributes will be written like “BELOW-LOC-THERE_{stat} ^{$X_1, X_2, darunter$} ”, where X_2 is an utterance of a speaker X_1 , realising a syntactic unit in which *darunter* occurs. BELOW-LOC-THERE_{stat} ^{$X_1, X_2, darunter$} (x_1, x_2, x_3, x_4, x_5) holds if, and only if, X_1 is willing at the *darunter*-part of X_2 to assume that BELOW-LOC-THERE_{stat}(x_1, x_2, x_3, x_4, x_5) holds.⁴⁷ In particular, there may be *only one* contextually relevant x_2 such that X_1 is willing at utterance time to assume that BELOW-LOC-THERE_{stat}(x_1, x_2, x_3, x_4, x_5) holds. Syntactic semantic interpretations will then typically involve conjunctions of the following sort:⁴⁸

$$(68) \quad (\lambda x_1 x_2 x_3 x_4 x_5 X_1 X_2) \left(\begin{array}{l} \text{BELOW-LOC-THERE}_{\text{stat}}(x_1, x_2, x_3, x_4, x_5) \wedge \\ \text{BELOW-LOC-THERE}_{\text{stat}}^{X_1, X_2, \text{darunter}}(x_1, x_2, x_3, x_4, x_5) \end{array} \right)$$

A contextual restriction of the relatum x_2 along these lines would not work if x_2 were existentially bound in the definition of “BELOW-LOC-THERE_{stat}”. Rather, x_2 will be existentially bound only when (68) is further processed in syntactic semantics.

4.2 ‘Caused by a burdening state of affairs there’

The intension of the lexical meaning of the prepositional adverb *darunter*₉^W is built from the intensions of the lexical meanings of the deictic adverb *da*₁^W and the preposition *unter*₉^W in exactly the

⁴⁵ This does not conflict with the General Valency Hypothesis, as assumed by Lieb (1993: 448–451), if the relatum argument “ x_2 ” is taken to be another deictic place of the lexical meaning of *darunter*₁^W, in addition to the deictic places x_4 and x_5 , by which x_2 is determined.

⁴⁶ I owe this observation to Gisela Zifonun (p.c.).

⁴⁷ In general, contextualised attributes can be defined in the following schematic way:

- (i) Let P be an n -place attribute, with $n \geq 1$, and X_2 an utterance of X_1 realising a syntactic unit in which f occurs.
 $P^{X_1, X_2, f}(x_1, \dots, x_n) \leftrightarrow_{\text{def}} X_1$ is willing at the f -part of X_2 to assume that $P(x_1, \dots, x_n)$.

Note that the definiendum holds, too, if X_1 is erroneously willing at the f -part of X_2 to assume that $P(x_1, \dots, x_n)$, i.e., if $P(x_1, \dots, x_n)$ is actually false. In contrast, Lieb’s (1983: chap. 18) notion of reference basis also allows for the case that X_1 is willing at the f -part of X_2 to assume that $\neg P(x_1, \dots, x_n)$. I leave open here whether such a complication is actually necessary.

⁴⁸ Of course, such conjunctions are not restricted to the meanings of prepositional adverbs but apply across the board. Since the validity of contextualised attributes only depends on speaker attitudes and not on truth, non-contextualised attributes cannot be replaced, but only supplemented, by contextualised attributes in syntactic semantics. Where needed, both contextualised and non-contextualised attributes will be relativised to times (cf. Note 20 above).

same way as the intension of the lexical meaning of $darunter_1^W$ was built from the intensions of the lexical meanings of da_1^W and $unter_1^W$:

$$(69) \text{ CAUSED-BY-A-BURDENING-SOA-THERE} =_{\text{def}} (\lambda x_1 x_2 x_3 x_4) \left(\text{THERE}(x_2, x_3, x_4) \wedge \text{CAUSED-BY-A-BURDENING-SOA}(x_1, x_2) \right)$$

Here, the attribute CAUSED-BY-A-BURDENING-SOA-THERE is a four-place intensional relation between an entity x_1 , a state of affairs x_2 , a deictic space x_3 , and an origo x_4 such that:

1. x_2 is a location in x_3 or designated by such a location, and
2. x_2 is a burden causing x_1 .

As noted in Section 3.9, CAUSED-BY-A-BURDENING-SOA does not have an extent argument. As a consequence, neither does CAUSED-BY-A-BURDENING-SOA-THERE.

The fact that prepositional adverbs like $darunter_9^W$ in general do not phorically take up persons or other animated entities can now be explained as follows. In both CAUSED-BY-A-BURDENING-SOA and CAUSED-BY-A-BURDENING-SOA-THERE, the relatum x_2 is sortally restricted to states of affairs. Above, I have assumed that syntactic semantics accommodates the lexical preposition meaning ‘caused by a burdening state of affairs’ by means of the accommodating relation SOA in order to properly relate the relatum argument to the interpretation of nominal preposition complements, whose denotatum is not necessarily a state of affairs itself. Since prepositional adverbs do not govern such complements, syntactic semantics will not apply SOA to the relatum argument of CAUSED-BY-A-BURDENING-SOA-THERE. As a consequence, $darunter_9^W$ can only phorically take up entities which are readily interpreted as states of affairs. Such an interpretation is easy for, say, a heat state, but particularly difficult in the case of persons and other animated entities:

(70) *Die Hitze war unerträglich. Sie litt sehr darunter.*
the heat was unbearable she suffered very caused-by-a-burdening-soa-there
‘The heat was unbearable. She suffered a lot from it.’

(71) *#Kennst du ihren Mann? Sie litt sehr darunter.*
know you her husband she suffered very caused-by-a-burdening-soa-there

Since the relatum argument “ x_2 ” is not existentially bound in (69), the state of affairs expressed by it can be specified in correlate constructions by an infinitival or clausal complement, providing the implicit demonstratum (cf. the examples in (46) in Section 3.9 above). This is another reason not to bind the relatum argument by an existential quantifier in the intension of lexical prepositional adverb meanings.

4.3 ‘Among a multitude there (static)’

The intension of the lexical meaning $darunter_{10}^W$ is built in the now familiar way from the intensions of the lexical meanings of da^W and $unter_{10}^W$:

$$(72) \text{ AMONG-MULT-THERE}_{\text{stat}} =_{\text{def}} (\lambda x_1 x_2 x_3 x_4) \left(\text{THERE}(x_2, x_3, x_4) \wedge \text{AMONG-MULT}_{\text{stat}}(x_1, x_2) \right)$$

AMONG-MULT-THERE_{stat}, a four-place intensional relation, holds between an entity x_1 , a multitude x_2 , a deictic space x_3 , and an origo x_4 if, and only if:

1. x_2 is a location in x_3 or designated by such a location, and
2. x_2 encompasses x_1 .

Again, there is no extent argument involved in either AMONG-MULT_{stat} or AMONG-MULT-THERE_{stat}.

Given (72), we predict that *darunter*₁₀^W can phorically take up entities of any sort, in particular persons or other animated entities. As shown in Section 1, this prediction is in fact borne out (cf. Example (5) there).

5 Results

In this paper, I have defended the hypothesis that each prepositional adverb in Modern German is formed from an adverb and a preposition – and not from two adverbs. In particular, I have shown on the example of *darunter* that the intensions of the lexical meanings of non-idiomatic prepositional adverbs are compositionally built from the intensions of preposition meanings by combining them in an appropriate way with the intension of an adverb meaning.

In total, I have distinguished eleven lexical words *darunter*₁^W to *darunter*₁₁^W, which are each formed from the deictic adverb *da*^W and one of the prepositions *unter*₁^W to *unter*₁₁^W. (The converse was not assumed to hold: there are *unter* variants for which there is no corresponding prepositional adverb.) The intensions of the lexical meanings of the prepositional adverbs are built from the intensions of the lexical meanings of the bases by identifying the denotatum argument of the intension of the lexical meaning of the adverbial base with the relatum argument of the intension of the lexical meaning of the corresponding prepositional base. From the latter, the intension of the prepositional adverb meaning inherits an extent argument, if any. Syntactically, prepositional adverbs govern measure expressions if, and only if, their prepositional basis does.

The animacy problem – the problem that the relatum of the intension of many prepositional adverb meanings is sortally restricted to certain non-animated entities – has been solved by the following assumptions. The sortal restriction is inherited from the lexical meaning of the prepositional basis. Syntactic semantics can accommodate preposition meanings by an accommodating relation in order to properly relate the preposition complement meaning to the relatum argument. In the case of local prepositions like *unter*₁^W, *unter*₂^W, *unter*₇^W, or *unter*₈^W, this allows for animated denotata of preposition complements. Prepositional adverbs, however, do not govern such complements, their valence being lexically reduced by one. Syntactic semantics therefore does not apply an accommodating relation to the relatum argument of the intension of their lexical meaning. As a consequence, the lexical semantic restriction of relata to locations carries over to the syntactic semantics of *darunter*₁^W, *darunter*₂^W, *darunter*₇^W, and *darunter*₈^W. The same holds, *mutandis mutatis*, for prepositional adverbs like *darunter*₉^W; here, the intension of its lexical meaning is built from the intension of a preposition meaning with a sortal restriction of the relatum to states of affairs. As a rule, such prepositional adverbs can function as a correlate of an infinitival or clausal constituent, which makes the state of affairs explicit.

All in all, there is ample semantic evidence for the hypothesis stated in (1): prepositional adverbs in Modern German are best analysed as being formed from an adverb and a preposition – arguably by a non-productive, but fully transparent compounding pattern. Their dependency on a formally and semantically matching preposition can even lead to the loss of a prepositional adverb when its prepositional basis happens to vanish from the lexicon. A case in point is *ab*, which in Modern German no longer means ‘off’ as a preposition, but only as an adverb and a verb particle (cf. Paul 1916–1920: vol. 4, 3 f.). As a consequence, the prepositional adverb *darab*, based on this former preposition, has been lost in Modern German (though it still exists in German dialects where the corresponding preposition has survived; cf. Fleischer 2002: 48 f.). The suggestion that prepositional adverbs are formed from two adverbs may be diachronically correct, but can hardly be maintained for Modern German.

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