

On directional readings of locative prepositions

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This paper discusses data from English, Dutch, and German and argues that these languages have no spatial prepositions that are lexically ambiguous between a locative and a directional reading. Rather, prepositions like *in*, *on*, *under* or *behind* always denote places and any meaning of directionality has to be licensed by other means. These means include additional directional prepositions, resultative verbs, certain movement operations, case and/or contextual or reference axes that will be discussed in detail in the course of the paper.

1. Introduction

This paper addresses the issue under which circumstances locative PPs can be interpreted directionally or as a constituting part of a directed motion event. For this purpose, I will concentrate on the locative prepositions *in*, *on*, *under*, and *behind* and their equivalents in three closely related languages, namely Dutch, English, and German.

It is generally assumed that the distinction between a locative and a directional meaning in the spatial domain manifests itself both in the semantics and the syntax of prepositions or prepositional phrases (PPs). The denotation of locative PPs can be treated as sets of Places (locations) in semantics, whereas directional PPs denote sets of Paths made up of Places (Jackendoff 1983; Zwarts 1997, 2005a; Zwarts & Winter 2000; Kracht 2005; among others). Syntactically, then, locative PPs are associated with Place structure, directional PPs with Path structure which embeds Place structure (van Riemsdijk 1978, 1990; Huybregts & van Riemsdijk 2002; Koopman 1997; Helmantel 2002; den Dikken 2003; Svenonius 2004; among others). A question that arises under this distinction is whether there are adpositions that are in principle (lexically) ambiguous between a directional and a locative reading and can thus license both Place and Path structure. I will argue for the three languages under discussion that this is not the case and that adpositions are either locative or directional.

A second issue to be addressed in this paper is a typological one. Talmy (1985, 2000) distinguishes between verb-framed and satellite-framed languages. According to this distinction, verb-framed languages (e.g. Romance, Semitic, Polynesian) have verbs that conflate motion and path semantics but any component of manner has to be expressed separately, for example in a subordinate clause, or is left out entirely:

- (1) Il est **entré** dans la chambre (**en dansant**). French
 he is entered in the room (dansing)
 ‘He entered the room (dancing).’

In contrast, verbs in satellite-framed languages (e.g. Germanic, Chinese) conflate manner and motion but do not encode path; paths are described by additional elements like PPs or particles, so-called satellites:

- (2) He **danced into** the room. English

A question that arises under this typology is whether there are any genuinely Germanic verbs that encode path and motion at the same time. I will argue that there are such verbs, and that the locative PPs under discussion can obtain a directional reading only due to the directional component provided by these verbs. An overview of the data will be given in section 2 with subsequent sections addressing semantic and syntactic issues raised during this data discussion.

2. Locative PPs in West Germanic

2.1. in and on

Experimental work by Thomas (2001, 2003) and Nikitina (2006) shows that English *in* and *on* cannot be understood directionally in all contexts. In particular, only certain verbs such as non-iterative *jump*, *throw*, *put*, *fall*, among others, henceforth *put*-verbs, can trigger a directional reading. For demonstration, I will use data with *in* but the same holds for *on*:

- (3) Oscar **jumped in** the lake. (locative / directional-goal)

(3) is ambiguous between a reading where Oscar jumped on a path which leads to a place inside the lake (directional-goal) and a reading where Oscar did one or more jumps (up and down) in one location, namely inside the lake (locative).

With manner of motion verbs (Levin 1993), i.e. motion verbs with a strong manner component like *crawl*, *walk*, *swim*, among others, henceforth *swim*-verbs, these prepositions only get a locative reading:

- (4) Oscar **swam in** the lake. (locative / *directional)

(4) can only have the locative reading where Oscar swam around in the lake, but not the directional reading where he, for example, swims from a river into the lake.

Dutch *in* ‘in’ and *op* ‘on’ behave similarly:

- (5) a. Oskar **heeft / is in** het meer **gesprongen**. (locative / directional-goal)
 Oskar has / is in the lake jumped
 ‘Oskar jumped in the lake.’
 b. Oskar **heeft / ?? is** in het meer **gezwommen**. (locative / ??directional)
 Oskar has / is in the lake swum
 ‘Oskar swam in the lake.’

Dutch motion verbs generally select different auxiliaries when they refer to a locative (manner of) motion (HAVE) or a directed motion (BE). (5) b. with the BE-auxiliary is out or at least heavily degraded, which shows that the *in*-PP cannot be understood directionally. This is different with directional PPs:

- (6) Oskar ***heeft / is naar** het meer **gezwommen**. (*locative / directional-goal)
 Oskar has / is to the lake swum
 ‘Oskar swam to the lake.’

Under certain conditions, English and Dutch *swim*-verbs in combination with *in* and *on/op* can be part of a directed motion event. In such cases, English makes use of the complex prepositions *into* and *onto*, where the locative prepositions *in* and *on* combine with the directional preposition *to*. Dutch uses *in* and *op* in postposition¹ (cf. van Riemsdijk 1978; Koopman 1997; den Dikken 2003):

- (7) a. English: Oscar swam **into** the lake. (*locative / directional-goal)
 b. Dutch: Oskar zwom het meer **in**.

Hence, the addition of a directional element *to* in English and a change in the syntactic structure in Dutch bring about a directional reading with *in* and *on*. The lexical semantics of these prepositions, however, still remains the same, as will be argued for in section 3.

In German, locative and directional readings of PPs headed by *in* ‘in’ or *auf* ‘on’ are distinguished by dative and accusative case on the DP inside the PP, respectively, independent of the verb type:

- (8) a. Oskar **schwamm im** See. (locative / *directional)
 Oskar swam in-the.DAT lake
 ‘Oskar swam in the lake.’
 b. Oskar **sprang im** See.
 Oskar jumped in-the.DAT lake
 ‘Oskar jumped in the lake.’

¹ Neither English nor German can use *in* and *on* as postpositions.

- (9) a. Oskar **schwamm in den** See. (*locative / directional-goal)
 Oskar swam in the.ACC lake
 ‘Oskar swam into the lake.’
 b. Oskar **sprang in den** See.
 Oskar jumped in the.ACC lake
 ‘Oskar jumped into the lake.’

Again, a directional reading has to be marked additionally, here by accusative case on the DP. The directional meanings involved are goal readings with the location denoted by the *in/on*-phrase being the ending-point or the final location of some movement along a path.

2.2. “under” and “behind”²

English *under* and *behind* are different from *in* and *on* in that they can be understood directionally also with *swim*-verbs. However, in combination with the particular verb classes there are two types of directional readings one obtains with *under* and *behind*. I follow Jackendoff’s (1983) three-way distinction of path elements into sources, goals and routes (see section 3.1). Sources are paths with a definite starting-point but no defined ending-point, goals are paths with an ending-point but without a defined starting-point, and routes are paths that traverse via some ground or reference object but that have no defined starting- or end-point. With *swim*-verbs, then, *under* and *behind* either get a locative or a directional-route reading, but never a directional-goal reading, which in turn is possible with *put*-verbs (in addition to the locative reading). Again, I will use data with *under* but the same holds for *behind*:

- (10) a. The boat **floated under** the bridge. (locative / directional-route)
 b. He **kicked** the ball **under** the table. (locative / directional-goal)

Crucially, for the speakers I consulted³, the directional reading involved with the *swim*-verb *float* in (10a) is not one of the boat floating to a certain point under the bridge, so not to some goal, but rather floating from one side of the bridge to the other and thus describing the route or the trajectory of the boat. *Kick*, on the other hand, behaves like a *put*-verb, with which locative PPs can get a directional-goal interpretation.

German *unter* ‘under’ and *hinter* ‘behind’ have in common with *in* ‘in’ and *auf* ‘on’ that a directional-goal and a locative reading are distinguished by case on the DP inside the PP, again irrespective of the type of verb:

² In principle, one should expect other (projective) locative prepositions to behave similarly to *under* and *behind*, such as *between* (Dutch *tussen*, German *zwischen*) or *in front of* (Dutch *voor*, German *vor*).

³ The speakers I consulted are speakers of British English. There seems to be a difference between British and American English here, since American English speakers generally seem to be more accepting when it comes to directional readings with locative PPs (Nikitina 2006; see also section 5).

- (11) a. Das Boot **trieb unter der** Brücke. (locative / *goal / *route)
 the boat floated under the-bridge.DAT
 ‘The boat floated under the bridge.’
- b. Das Boot **trieb unter die** Brücke. (*locative / goal / *route)
 the boat floated under the-bridge.ACC
 ‘The boat floated to under the bridge.’
- c. Das Boot **trieb unter der** Brücke **durch**. (*locative / *goal / route)
 the boat floated under the-bridge.DAT through
 ‘The boat floated via under the bridge.’

Example (11c) shows that a route reading arises with the dative and an additional postpositional element *durch* ‘through’ or *(ent)lang* ‘along’ (the latter is also possible with *hinter* ‘behind’). Without this postposition the PP can only be understood locatively if the DP inside it bears dative case.⁴

Dutch *onder* ‘under’ and *achter* ‘behind’ are different from their English counterparts in that they by themselves, i.e. as prepositions combined with *swim*-verbs, only have a locative reading:

- (12) a. Het vliegtuig **vloog onder** de brug. (locative / *goal / *route)
 the plane flew under the bridge
 ‘The plane flew under the bridge.’
- b. Het vliegtuig **vloog onder** de brug **door**. (*locative / *goal / route)
 the plane flew under the bridge through
 ‘The plane flew via under the bridge.’
- c. *Het vliegtuig **vloog** de brug **onder**. (*goal)
 the plane flew the bridge under

Example (12b) shows that Dutch has in common with German that the addition of a postpositional element like *door* ‘through’ (or *langs* ‘along’) brings out a directional-route reading, whereas c. demonstrates that *onder* ‘under’ (just as *achter* ‘behind’) cannot be used in postposition to derive a goal reading.⁵ A goal reading arises with the additional point preposition *tot* ‘until’ (13a) or with *put*-verbs (13b). In the latter case, the sentence with *onder* is again ambiguous between a locative and a goal reading:

⁴ For some reason German *über* ‘over’ is different from *unter* ‘under’ in that it only gets a route but not a goal reading even with the accusative. Furthermore, *über* with an additional postpositional route element can also be used with an accusative DP for many speakers, although the dative is preferred. (see also den Dikken 2003; Zwarts 2005b; section 3.3)

⁵ According to Helmantel (2002), the use of *onder* as a postposition is regionally restricted to Flanders and southern parts of the Netherlands. However, the Flemish speaker I consulted could not use it as a postposition at all and thus behaved like the other Dutch speakers.

- (13) a. Het vliegtuig **vloog tot onder** de brug. (goal)
 the plane flew until under the bridge
 ‘The plane flew to/until under the bridge.’
- b. Hij **schopte** de bal **onder** de tafel. (locative / goal)
 he kicked the ball under the table
 ‘He kicked the ball under the table.’

2.3. Data summary

The empirical findings are summarised in (14).

- | | | |
|------------------|---|------------------|
| (14) a. English: | <i>swim</i> -verbs + <i>in</i> / <i>on</i> | locative |
| | <i>swim</i> -verbs + <i>under</i> / <i>behind</i> | locative / route |
| | <i>put</i> -verbs + <i>in</i> / <i>on</i> / <i>under</i> / <i>behind</i> | locative / goal |
| b. Dutch: | <i>swim</i> -verbs + <i>in</i> / <i>op</i> / <i>onder</i> / <i>achter</i> | locative |
| | <i>put</i> -verbs + <i>in</i> / <i>op</i> / <i>onder</i> / <i>achter</i> | locative / goal |
| | <i>onder</i> / <i>achter</i> + postposition | route |
| c. German: | <i>in</i> / <i>auf</i> / <i>unter</i> / <i>hinter</i> + dative case | locative |
| | <i>in</i> / <i>auf</i> / <i>unter</i> / <i>hinter</i> + accusative case | goal |
| | <i>unter</i> / <i>hinter</i> + postposition | route |

In English and Dutch the availability of particular directional readings with locative prepositions depends on the verb class. Unless used with *put*-verbs, none of the English and Dutch locative prepositions can get a directional-goal reading. With *swim*-verbs the Dutch prepositions *onder* ‘under’, *achter* ‘behind’, *in* ‘in’, and *op* ‘on’ can only be interpreted locatively and any directional reading needs extra marking. This is done either by an additional postpositional route element to mark a route reading with *onder* and *achter* or using *in* and *op* in postposition to derive a goal reading. With English *in* and *on* in combination with *swim*-verbs, the addition of the directional preposition *to* is needed to express a directional-goal meaning. English *under* and *behind*, on the other hand, are ambiguous between a route and a locative reading with *swim*-verbs. German marks the distinction between goal and locative readings of PPs involving *in*, *on*, *under* and *behind* by accusative and dative case on the DP inside the PP irrespective of the verb class. A route reading with *under* and *behind* comes about with dative case and an additional postposition with a route meaning.

Hence, it seems that Dutch only has prepositions that are either locative or directional so that none of the prepositions discussed here are (lexically) ambiguous between a locative and a directional reading. English, on the other hand, seems to have prepositions that are ambiguous between a directional and a locative reading, namely *under* and *behind*. Crucially, though, the directional reading does not involve a goal a route reading.⁶ The fact that the availability of a directional reading for *in* and *on/op* depends on the class of verbs is often not accounted for in the literature, where these prepositions are usually treated as ambiguous between a locative and a directional reading (e.g. Koopman 1997; Huybregts & van Riemsdijk 2002; den Dikken 2003). I will come back to this point in the next section.

⁶ As will be discussed in more detail in subsequent sections, goals always need some extra marking either by some explicit goal element like a directional goal PP (involving for example *to*) or by “resultative” verbs that already integrate a goal (in the broad sense).

In addition, Talmy's typology of verb-framed vs. satellite-framed languages is not as clear-cut as sometimes suggested in the sense that there are genuinely Germanic verbs that seem to conflate motion and path, namely *put*-verbs. Even if this is still different from the motion and path conflation we find with verbs like *enter*, there is still some sense of directionality in these verbs. If there were no directional path-like component in these verbs, they could not be part of a directed motion event with purely locative PPs and no other satellite to express this path. That Talmy's typology is 'leaking' has also been noted by e.g. Stringer (2002) for French and Japanese, Beavers (2003) for Japanese, or Folli & Ramchand (2005) for Italian and English. For example, the latter argue that Italian prepositions are locative only. In that sense it could be that the main difference between Italian and English lies in the inventory of prepositions available: only English has directional PPs based on *to*. Folli & Ramchand furthermore show that Italian locative prepositions can be part of a directed motion event with certain verbs, which is reminiscent of the behaviour of *put*-verbs outlined in this section.

In the remaining part of this paper, I will address the following issues raised by the data discussed in this section. Section 3 investigates syntactic ways of deriving directional readings with *in* and *on/op* in English and Dutch as well as the case marking differences within German PPs. Section 4 will account for the difference between *put*-verbs and *swim*-verbs in terms of the event structure associated with these kinds of verbs. Finally, in section 5, I will assume that the difference between the English locative prepositions *under* and *behind*, on the one hand, and *in* and *on*, on the other, where only the former are able to licence a directional (route) reading with *swim*-verbs, is due to the (un)availability of contextual or reference axes with these prepositions.

3. The internal structure of PPs

This section addresses the cases in which a locative preposition can obtain a directional meaning due to additional elements or operations. In English, a directional P element like *to* can be added to a locative PP headed by *in* or *on*, in Dutch the corresponding locative prepositions can appear in postposition licensing a path reading, and in German a directional reading with all four locative prepositions *in* 'in', *auf* 'on', *unter* 'under', and *hinter* 'behind' arises if the DP inside the PP bears accusative case. I subsume all these cases under PP-internal syntax to set them apart from the PP-external syntax to be discussed in the next section.

3.1. Places and Paths in syntax and semantics

The literature on the syntax of PPs usually assumes these to be internally complex with at least two hierarchically ordered functional projections to account for locative and directional readings (Koopman 1997; Helmantel 2002; Huybregts & van Riemsdijk 2002; den Dikken 2003; Svenonius 2004; among others). There is thus a general consensus for the following structure (give or take functional structure):

$$(15) \quad [\text{PathP} [\text{PlaceP} [\text{DP}]]]$$

I do not commit myself to whether adpositions are lexical or functional in nature, since this is debated. For the sake of completeness, I will follow Huybregts & van Riemsdijk (2002) here

in assuming that Path and/or Place heads are functional projections in, for instance, the extended nominal projection, though nothing in this paper hinges on this issue. The structure in (15) also mirrors the conceptual structure of prepositional phrases as outlined in Jackendoff (1983) and subsequent work, which has formed the starting-point for many accounts of the semantics of spatial PPs.

Here, I follow the vector space semantic approach to prepositions outlined in Zwarts (1997, 2005a); Zwarts & Winter (2000)⁷ (similar points have been made by Fong 1997; Kracht 2005; among others). In a vector space semantic approach, a locative PP like, for instance, *behind the house* is associated with the set of vectors that go from the house to points behind it. Thereby a location function (of type $e(vt)$) derives sets of located vectors for locatives, mapping an e-type denotation of the reference object, the complement of P, which is the GROUND in Talmy's (1985) terms, to a vector that describes its location or dimension. Hence, PlaceP is semantically associated with a set of vectors.

The denotation of a directional PP, on the other hand, is treated as an algebraically structured set of paths (Zwarts 2005a):

- (16) A **path** is a function of type iv from the real interval $[0,1] \subset \mathbf{R}$ (type i) to vectors (type v).

Directional prepositions map the reference object to a set of sequences of vectors (paths), where each of these sequences determines a potential change in position of the located object (the FIGURE according to Talmy 1985). Thus, a PathP denotes a set of sequences of vectors which constitutes a path.

Jackendoff (1983) uses the term *route* to refer to those Path functions that describe a route or a trajectory but not an (initial or final) end-point of the path. Such Path functions are associated with directional prepositions like *across*, *around*, *over*, *through*, *past*, *via* or *along*. In contrast, sources and goals specify where the path starts and ends, respectively. For example, Zwarts defines *into* as a transition from one phase to another:

- (17) $[[\text{into the house}]]$ = { p : there is an interval $I \subset [0,1]$ that includes 1 and that consists of all the indices $i \in [0,1]$ for which $p(i)$ is inside the house }

To and *onto* are defined in a parallel fashion where the result is AT and ON (instead of INSIDE), respectively. The denotations of the source prepositions *out of*, *from* and *off* are the reverse of the goal ones. A full list of these definitions is given in (18):

⁷ For complete definitions, the reader is referred directly to Zwarts (2005:775f.) and Zwarts & Winter (2000:208ff.).

- (18) { **p**: there is an interval $I \subset [0,1]$ including...
 ... 0 and consisting of all the $i \in [0,1]$ for which **p**(i) is at x } = [[from x]]
 ... 0 and consisting of all the $i \in [0,1]$ for which **p**(i) is on x } = [[off x]]
 ... 0 and consisting of all the $i \in [0,1]$ for which **p**(i) is in x } = [[out of x]]
 ... 1 and consisting of all the $i \in [0,1]$ for which **p**(i) is at x } = [[to x]]
 ... 1 and consisting of all the $i \in [0,1]$ for which **p**(i) is on x } = [[onto x]]
 ... 1 and consisting of all the $i \in [0,1]$ for which **p**(i) is in x } = [[into x]]

All of these prepositions have in common that they involve a two-stage structure, a negative and a positive phase. They all have exactly one positive phase that overlaps either with the starting point (0) or the ending point (1) (see also Fong's 1997 analysis in terms of phase quantification). The definitions furthermore indicate that they all involve some final location such as *at*, *on*, *in* x . These final locations can be syntactically represented as PlacePs that are embedded under PathPs as in (15).

3.2. English and Dutch

Given the syntactic and semantic assumptions outlined in section 3.1, we can now turn to the internal syntax and semantics of the West Germanic data discussed in section 2. For example, the English preposition *to* heads a PathP because a *to*-phrase denotes a path ending at the point denoted by the reference object, the DP inside the PP, which is the GROUND in Talmy's terms. The heads *in* or *on* of PlacePs embedded under a PathP headed by *to* move and incorporate into this Path^o to form *into* and *onto* (cf. den Dikken 2003; Svenonius 2004):

- (19) [_{PathP} [_{Path'} *in_i-to* [_{PlaceP} [_{Place'} t_i [_{DP} *the room*]]]]]]]]

In doing so, these PlacePs denote a location which in turn is the result state or the end-point of the *to*-phrase. So semantically the *to*-phrase is a path which ends at the location denoted by the *in*-phrase (*in* DP).

In Dutch, on the other hand, the DP complements of PlacePs headed by *in*, *on* can move to Spec PathP (cf. den Dikken 2003), to identify or license the Path structure:

- (20) [_{PathP} *de kamer_i* [_{Path'} [_{PlaceP} [_{Place'} *in* [t_i]]]]]]]]

Helmantel (2002) argues that this also has a semantic effect in that a DP in Spec PathP (DIRP there) receives a one-dimensional interpretation (in the sense of Verkuyl & Zwarts 1992). Only if an object is one-dimensional it can be interpreted as a path. In this context she discusses minimal pairs of the following type:

- (21) a. De man is **opde ladder** geklommen. (Helmantel 2002:73)
 the man is on the ladder climbed
 'The man has climbed onto the ladder.'
 b. De man is **de ladder op** geklommen.
 the man is the ladder on climbed
 'The man has climbed up the ladder.'

Helmantel notes that the prepositional phrase *op de ladder* denotes a “location, namely the endpoint of the climbing”, whereas the DP *de ladder* in the postpositional phrase *de ladder op* is “not a location but rather functions as a path along which the climbing takes place” due to its being in the specifier of a directional phrase. She furthermore claims that any element in the specifier of a directional phrase has to be interpreted as a one-dimensional entity, a path, so that elements that cannot be construed as one-dimensional are banned from this position:

- (22) a. Jan stapt **op de kiezelsteen**. (Helmantel 2002:77)
 Jan steps on the pebble
 ‘Jan steps on the pebble.’
 b. #Jan stapt de kiezelsteen op.
 Jan steps the pebble on

With respect to the empirical discussion in section 2, then, Dutch *klimmen* ‘to climb’ and *stappen* ‘to step’ seem to be *put*-verbs since the whole sentence with a locative prepositional phrase involving *op* ‘on’ can still be interpreted directionally.

It is not clear, however, that all objects in postpositional phrases receive a path interpretation given the following case:

- (23) De man is **het dak op** geklommen.
 the man is the roof on climbed
 ‘The man has climbed onto the roof.’

This sentence is still acceptable if the roof is flat, but in that case *het dak* ‘the roof’ in the postpositional phrase is not really the path itself but the endpoint of the path. So the claim that any phrase in the specifier of a directional phrase has to receive a path interpretation is possibly too strong.

An open issue that arises in this context is why a similar incorporation of English *under* and *behind* into *to* to derive a goal interpretation is not possible. In this case, there could be some morphological or phonological constraints, given that *under* and *behind* are more complex or heavier than *in* and *on*, which could hinder their incorporating into *to*. Similarly, Dutch *onder* ‘under’ and *achter* ‘behind’ cannot appear in postposition to derive a directional goal reading.⁸ However, this cannot be due to a morphological constraint since here, the DPs move and the prepositions do not incorporate. This cannot be a semantic constraint, either, since the particular DPs are in principle interpretable as paths and therefore should be able to occupy the specifier position of a directional phrase, if we follow Helmantel (2002). Furthermore, a goal reading is possible with these prepositions in other languages like German. I will leave this issue for future research.

3.3. Case inside German PPs

We saw that German makes a distinction between a directional and a locative reading of PPs headed by the prepositions discussed in section 2 by case on the DP inside the PP, namely accusative case for directional readings and dative case for locative readings. However, not all

⁸ But see footnote 5.

directional PPs require accusative case. For example, the goal and source prepositions *zu* ‘to’, *von* ‘from’ and *aus* ‘out’ all take dative case only. (24) provides a revised generalisation of the data discussed in Zwarts (2005b)⁹:

(24)	locative Ps + DAT:	<i>bei</i> ‘at’; <i>an</i> ‘at, on’, <i>auf</i> ‘on’, <i>gegenüber</i> ‘across’, <i>hinter</i> ‘behind’, <i>in</i> ‘in’, <i>neben</i> ‘next to’, <i>über</i> ‘over’, <i>unter</i> ‘under’, <i>vor</i> ‘in front of’, <i>zwischen</i> ‘between’
	locative Ps + ACC:	---
	directional Ps + DAT:	source: <i>aus</i> ‘out’, <i>von</i> ‘from’ genuine goal: <i>nach</i> ‘to’, <i>zu</i> ‘to’
	directional Ps + ACC:	genuine route: <i>durch</i> ‘through’, <i>um</i> ‘around’ derived route: <i>über</i> ‘over’ derived goal: <i>an</i> , <i>auf</i> , <i>gegen(über)</i> , <i>hinter</i> , <i>in</i> , <i>neben</i> , <i>unter</i> , <i>vor</i> , <i>zwischen</i>

The generalisations that we can draw from this with respect to case marking inside German spatial PPs is that dative case appears with all locatives and all those prepositions that are unambiguously source and goal, hence with all the “basic” ones.¹⁰ Accusative case, on the other hand, appears with route prepositions and all directional PPs derived from locative ones; the only locative preposition that cannot appear with the accusative case and thus not derive directionality is *bei* ‘at’. I take this to be an idiosyncrasy though, since *an*, which also means ‘at’, behaves like all the other locatives in the ability to appear with the accusative to become directional. Almost all the derived meanings involve a goal reading with the sole exception of *über* ‘over’, which gets a route interpretation.¹¹

Since accusative case thus appears in all cases where some directional reading is derived for otherwise locative PPs, it is worthwhile exploring the idea that it is a structural rather than a lexical case under these circumstances.¹² Den Dikken (2003) assumes both German accusative and dative case to be assigned by the functional heads PathP and PlaceP,

⁹ Zwarts (2005b) wants to address only prepositions that (a) have a spatial meaning, and (b) govern either dative or accusative case. Hence, this should exclude prepositions that are not spatial, any non-spatial readings of particular prepositions, prepositions that govern the genitive case and finally (separable) prefixes. Therefore, I removed some items from his list. For example, *entgegen* + DAT ‘against’ is not a spatial preposition but means something like ‘in contrast to’, whereas the spatial ‘against’ is *gegen* + ACC. Whenever *entgegen* is spatial it is a separable prefix since a) under the spatial interpretation it cannot appear in preposition: **entgegen dem Feind kommen* ‘against the-enemy.DAT come’ and b) it cannot combine with just any verb: **Er stellte den Stuhl der Wand entgegen*. ‘He put the-chair.ACC the-wall.DAT against’ (rather: *Er stellte den Stuhl gegen die Wand*.) For a similar reason, I removed *außer* + DAT because it means ‘except for’ and not ‘outside’; the spatial meaning of ‘outside’ is rendered by *außerhalb* which governs the genitive and should therefore not be included at all. Finally, I left out *entlang*s because it governs both genitive and dative, where the genitive is a bit more archaic and the dative seems to take over due to the general loss of genitive in German. The leaving out of these three elements results in my own generalisations in (24).

¹⁰ One could also think of treating goals and sources as points rather than paths. However, as argued for in Verkuyl & Zwarts (1992) and Zwarts (2005a), then goals and their source counterpart would have the same denotation in cases the ending and the starting points are the same (as in e.g. *to the house* and *from the house*), although they clearly denote different paths. Hence, if we treated goals and sources as mere points we would not include the directionality involved in these PPs (by an ordered set of indices or the like) and lose this distinction.

¹¹ See footnote 4 for why *über* ‘over’ is also different in other respects. It is interesting to note that Dutch *over* ‘over’ can appear in postposition, in contrast to *onder* ‘under’ or *achter* ‘behind’, and that in this position it gets a route but not a goal reading.

¹² The fact that accusative case also appears on all genuine route prepositions could indicate that these might be more complex as well.

respectively. For instance, the DP inside German PPs that involve *zu* ‘to’ bears dative case because the Place head, which is embedded under the PathP, is the closest to assign case to the DP. In directional contexts that trigger accusative case, on the other hand, as it is the case with the route prepositions and all those cases that involve what I have called derived directional meanings, he argues that there is no PlaceP available and that the DP complement of the PP is assigned accusative case by Path^o.

However, at least from a semantic point of view this cannot be right. Especially the derived directional PPs (with the sole exception of PPs involving *über* ‘over’) clearly embed some kind of place since they denote the goal of some path which is a location. In general, it is not clear why the PlaceP would be lacking with some (directional) prepositions but not with others. Den Dikken’s account does not provide a theoretical explanation since it is not more than restating the facts in syntactic trees without giving any further motivation why the facts are the way they are.

I will put forward a different idea about accusative case inside German PPs, thereby drawing direct parallels to accusative case on objects. I take accusative case inside German PPs to be structural as well but do not make any claims about dative case.¹³ According to Burzio’s generalization, there is a correlation according to which verbs without a specifier position are unable to assign structural case, or to put it in his terms:

- (25) a. A verb which lacks an external argument fails to assign accusative case.
 b. A verb which fails to assign accusative case fails to Θ -mark an external argument.
 (Burzio 1986:178f./184)

This has been captured by employing a functional head *v* above VP which is responsible for both the accusative case on the internal argument and the introduction of some agent or causer in its specifier position.

Zwart (2005a,b) assumes that accusative case on objects signals the presence of a subject and a dependency between the subject and the predicate rather than between the predicate and its object:

- (26) The accusative marks dependency w.r.t. the subject, not w.r.t. the verb.
 (Zwart 2005a)

He argues that the opposition between the structural cases nominative and accusative in morphology matches the syntactic difference between subjects and objects, in the sense that objects are hierarchically subordinated to subjects both in syntax and morphology and that also the predicate as a whole is dependent on the subject.

If we generalise Zwart’s (2005a,b) idea to accusative case inside German derived directional PPs the following picture emerges. Directional PPs can be seen as secondary, non-verbal predicates predicated over the Theme argument (e.g. Hoekstra 1984; Neeleman 1994). Under the circumstance that this secondary predication is accompanied by accusative case, then, we could assume that this case signals a dependency between the subject of the non-verbal predicate, which is in turn the internal argument of the VP, and this secondary predicate. Hence, this runs parallel to the relation between nominative subjects and verbal predicates containing a DP bearing accusative case. Accusative case is a structural case, then,

¹³ Dative case inside German PPs might be just some kind of default case that shows up in cases where a DP needs case.

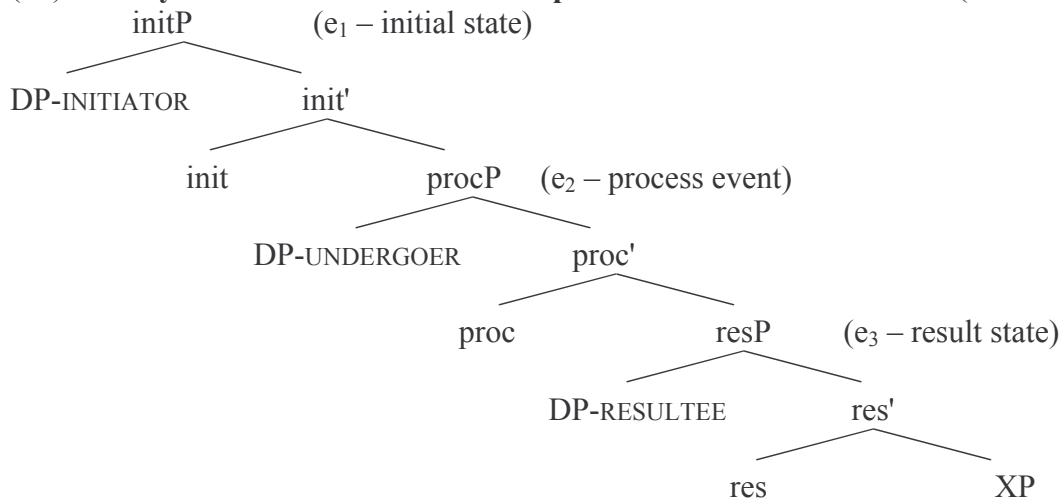
that appears on the internal argument within a predicate to signal the structural relationship between the external argument (the subject) and the predicate itself.

A problem that might arise in this context is that not all predications involve accusative case. For instance, *he is a teacher* is a predication but *a teacher* is not in the accusative case, at least not in languages that have morphological case as, for instance, in German, where this DP appears in the nominative case. However, it is not clear whether such examples really have a similar hierarchical structure as the kind of predicates discussed above. Furthermore, with the basic directional PPs involving *zu* ‘to’, *aus* ‘out’ and *von* ‘from’, the DP bears dative and not accusative case but these PPs are still secondary predicates over the internal argument of the VP. Hence, the proposal for accusative case inside PPs only goes in one direction in the sense that it accounts for the emergence of accusative case but not for its absence. The exact details of this analysis still need to be worked out.

4. Event structure and Ps

In this section, I will address the difference between *put*- and *swim*-verbs and propose an account for this difference in terms of the event structure associated with these kinds of verbs. Ramchand (2005) proposes to decompose events into maximally three subevents, namely a state (the initial state), a process (the dynamic part) and another state (the result state):

(27) The syntax / semantics of the first phase (Ramchand 2005)



All dynamic verbs identify at least *procP*, since this is the dynamic part of each event. The causing subevent (*initP*) and the result state subevent (*resP*), however, are optional and not all verbs have the ability to identify these independently.

DPs in the specifier positions of *initP*, *procP* and *resP* have the interpretation of INITIATOR, UNDERGOER and RESULTEE (holder of the result state), respectively, where one and the same DP can appear in several of these positions. This is so because a verbal lexical item can be associated with more than one position simultaneously thereby identifying various subeventive heads at the same time. Here, Ramchand follows Starke (2001) in assuming that lexical items do not necessarily insert under a single terminal node but rather that elements can merge and project and then remerge at a later stage of the derivation.

Subevents are linked to one another by the “leads-to” relation, where in the maximal structure a state leads to a process which in turn leads to a state again. Following the notation of Hale & Keyser (1993), this relation is defined as follows:

- (28) **Principle of Event Composition** (Ramchand 2004:327)
 If a head X which introduces an eventuality variable e_x , embeds a projection YP where Y introduces the eventuality variable e_y , then the structure is interpreted as $e_x \rightarrow e_y$ (e_x ‘leads to’ e_y).

Hence, the interpretation of states in the event structure as either initial or result state depends on their position in the hierarchical structure, i.e. embedded under a process they are resultative but embedding a process they compose the initial state, which is the causative part of the event.

For example, a sentence like *Roberta threw the dead rat out (the door)* will have the structure of *Roberta causes the dead rat by throwing to be outside (the door)*, with *Roberta*, the causer of the whole event, in spec initP and with *the dead rat* simultaneously in Spec procP and Spec resP, since it is both undergoer of the process of throwing and resultee in the sense that it ends up outside the door. With Ramchand & Svenonius (2002), English particles like *out* are treated as particle phrases (prtPs) in complement of a result phrase (RP there) and with the direct object as the specifier of prtP:

- (29) Throw the dead rat out
 a. [_{initP} INITR throw-*init* [_{procP} UNDRGR *t_V* [_{resP} RESTEE **out-res** [_{prtP} **the rat** [_{prt} *t_{prt}*]]]]]]
 b. [_{initP} INITR throw-*init* [_{procP} UNDRGR *t_V* [_{resP} **the rat res** [_{prtP} *t_{DP}* [_{prt} **out**]]]]]]

In order to identify the result phrase, it is assumed for English that either the particle moves and incorporates into the head of this phrase (a.) or the object moves into its specifier, which then leads to particle shift word order (b.).

Different elements can supply a result state subevent. First, there are verbs that can identify resP in and by themselves such as *find*, semelfactive *jump*, among others. In addition, verbal particles in English (30) and certain (resultative) adjectives (31) can also provide the result state:

- (30) He ate **up** the chocolate.

- (31) He hammered the metal **flat**.

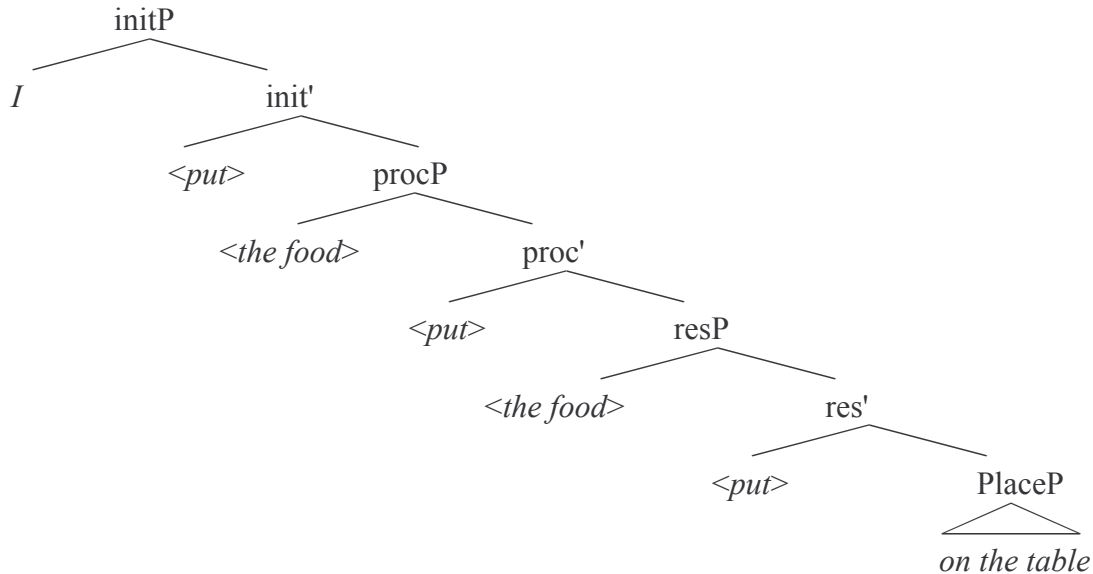
In cases where the event structure contains a result phrase, the event is telic, since resultativity entails telicity.¹⁴

Applying this framework to the Germanic data discussed in section 2, we get a natural explanation for the difference between *swim*-verbs and *put*-verbs. If *put*-verbs come with a

¹⁴ There are other ways for a predicate to be telic in the sense that not all telic predicates contain a resP. Krifka (1989, 1998) argues for a homomorphic mapping between the domain of objects and the domain of events enabled by a certain kind of thematic relation (only with affected arguments) to derive inner aspectual properties of the event as a whole (similar also Verkuyl 1972, 1993). This idea can be generalised to other domains beside the nominal one so that there is a general homomorphic mapping between the event and any projected scale, along which some change takes place as it is the case in (33) (cf. Verkuyl & Zwarts 1992; Krifka 1998; Hay et al. 1999; Beavers forth.; Zwarts 2006). (see Gehrke forth. for discussion)

result state subevent, locative PPs (PlacePs) can modify this result state despite their lack of Path structure:

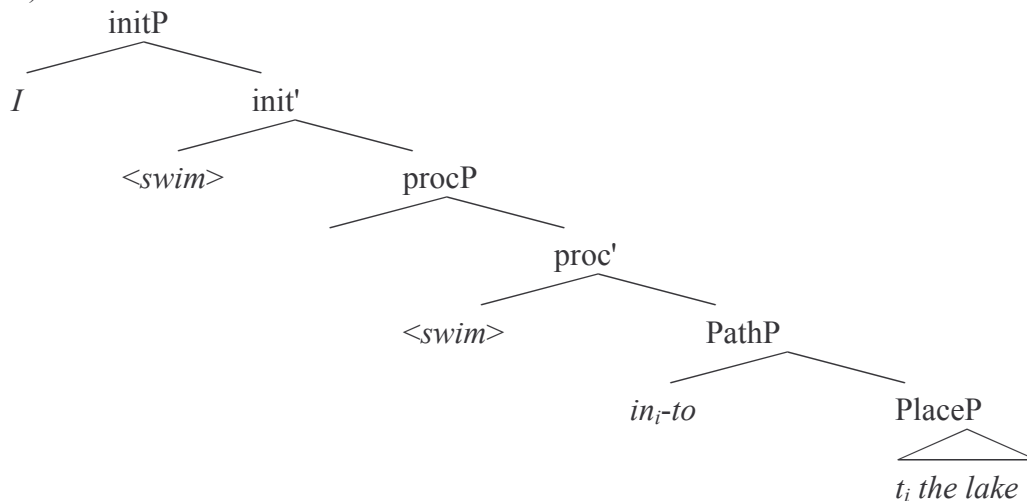
(32) *I put the food on the table.*



The meaning of directionality here is not associated with the PP itself but rather part of the verbal denotation.

Swim-verbs, on the other hand, cannot identify *resP*. In such cases, locative PPs (PlacePs) can only modify the whole event denoted by the VP unless some Path structure is licensed by other means as described in the previous section. For example, if a *swim*-verb is combined with an *into*-phrase, the composition results in a process denoted by *swim* which leads on path to a place inside the reference object:

(33) *I swam into the lake.*



This event is telic as well, but telicity here is not due the event structure containing a result phrase but to the process being bounded by the bounded directional path it combines with.

So the main claim here is, that the prepositions *in* and *on* – at least in the languages discussed in this paper – are not lexically ambiguous between a directional and a locative

reading. Rather, they are locative only, in the sense that any meaning of directionality is due to additional elements or operations. This goes directly against certain claims found in the literature. Huybregts & van Riemsdijk (2002), for example, argue that an English PP containing *on* is always ambiguous between a purely locative and a directional meaning. They support this claim by the fact that such a PP can also receive a directional reading in PP-with-NP constructions of the following type, without any additional element like e.g. a verb providing the meaning of directionality¹⁵:

(34) On the table with those plates! (Huybregts & van Riemsdijk 2002:13)

I do not think this is a valid argument. If PPs headed by *on* and the like were ambiguous between a directional and a locative reading they should be ambiguous in all contexts, irrespective of the environment they appear in. I showed in section 2, though, that these PPs in combination with *swim*-verbs can only denote Places in both Dutch and English. I can think of no reason why a motion verb should block a directional reading that should be freely available with these prepositions if they were lexically ambiguous. This in turn means that cases like (34) might involve some kind of verb ellipsis or some empty light verb of the *put*-type that enables the path reading. I will leave this for future research.

In sum, there are three ways in which VP-internal P elements can be related to the event structure. First, P elements can be particles identifying a result state subevent as in (29). Second, with motion events where the verb cannot identify a resultative subevent by itself, namely with *swim*-verbs, a directional PP can denote a path providing a scale along which the event is “measured out”.¹⁶ Finally, with verbs that identify a resP subevent, namely *put*-verbs, a locative PP can further modify the result state VP-internally or more precisely, resP-internally. However, with motion verbs that do not come with a resP, i.e. *swim*-verbs, locative PPs headed by *in* and *on* cannot constitute a part of a directed motion event, since this reading only arises with locative PPs in case there is already a result state in the structure. Rather, these PPs are not VP-internal but modify the whole event denoted by the VP (see also Maienborn 2003 for a distinction between VP-internal and -external locatives).

5. Projective vs. non-projective locative prepositions

One remaining puzzle concerns the difference between English *under* and *behind*, on the one hand, and *in* and *on*, on the other. As was shown in section 2, *in* and *on* are not able to get a directional reading in isolation and this meaning has to be triggered either by a *put*-verb or by an additional directional element like *to*. *Under* and *behind*, on the other hand, can be ambiguous between a locative and a directional reading even with *swim*-verbs, in which case the directionality involves a route (but not a goal) reading. I will tentatively propose a

¹⁵ Dutch seems to behave similarly and can use *in* (*on*) either in preposition or in postposition in such cases: *De gevangenis in met die crimineel!* (Helmantel 2002:35) and *In de gevangenis met die crimineel!* (Mirjam Rigterink p.c.), both meaning ‘In the prison with that criminal!’. Apparently, with the preposition one stresses the P and with the postposition one stresses *gevangenis*. For a possible semantic difference between such minimal pairs, see Helmantel (2002:72f.). In German, the DP inside the PP in these cases always bears accusative case, hence is marked for directionality.

¹⁶ In the sense of Tenny (1994). If this scale is bounded, the event is telic; if it is unbounded, the event is atelic (see Hay et al. 1999; among others).

semantic account for these facts, again employing the vector space semantic approach of Zwarts (1997, 2005a) and Zwarts & Winter (2000).

Zwarts & Winter (2000) follow Jackendoff (1983) and others in differentiating between projective locative prepositions like *under* or *behind* and non-projective ones like *in*, *on* or *at*. Whereas a non-projective preposition requires only spatial knowledge about the location of FIGURE and GROUND (in the sense of Talmy 1985) with respect to one other, a projective locative preposition requires further information about directions from the reference object. The denotation of non-projective Ps is defined as a boundary vector on a set of points:

- (35) a. $\mathbf{in}' = \lambda A. \lambda \mathbf{v}. \text{int}(\mathbf{v}, A)$ (Zwarts & Winter 2000:4)
 b. $\mathbf{at}' = \mathbf{on}' = \lambda A. \lambda \mathbf{v}. \text{ext}(\mathbf{v}, A) \wedge |\mathbf{v}| < r_0$
 (with $r_0 \approx 0$, A as a set of points, and \mathbf{v} as a boundary vector of A)

The definition of projective modifiers, on the other hand, additionally involves a certain axis modelled along the lines of three orthogonal unit vectors in the vector space V for *up*, *right* and *front*. The denotations of *under* and *behind* are as follows:

- (36) a. $\mathbf{under}' = \lambda A. \lambda \mathbf{v}. \text{ext}(\mathbf{v}, A) \wedge c(-\text{up}, \mathbf{v}) > |\mathbf{v}_{\perp-\text{up}}|$ (Zwarts & Winter 2000:4)
 b. $\mathbf{behind}' = \lambda A. \lambda \mathbf{v}. \text{ext}(\mathbf{v}, A) \wedge c(-\text{front}, \mathbf{v}) > |\mathbf{v}_{\perp-\text{front}}|$

It is possible that this additional axis element in the definition of projective modifiers enables directional (route) readings with English *under* and *behind*. In these cases, the whole location under the bridge actually gets a one-dimensional path reading similar to the extent readings discussed in Gawron (2005) (see below). Non-projective prepositions, on the other hand, need additional structure to license a directional reading.

Contextual axes also play a role in other areas apart from projective prepositions. Gawron (2005), for example, convincingly argues for the need of a '*spatial axis*, an ordered set of collinear points that can serve as an *axis of change*' (Gawron 2005:5f.) to account for the difference between eventive and extent readings of extent verbs and degree achievements. This is demonstrated in the following examples:

- (37) a. The fog extended from London toward Paris. (ambiguous)
 b. Fog gradually covered the city. (event reading only)
 c. Fog covered the city for three hours. (extent reading only)
 (Gawron 2005:1)

Example (37a) is ambiguous between a situation where fog literally moves from London into the direction of Paris and thus progresses in time (event reading), and a situation where the fog simultaneously covers the whole area between London and close to Paris irrespective of time (extent reading). Examples (37b) and (37c) are used to show that adverbials can disambiguate between these two readings. Thus, the extent reading does not involve any movement but there is still the need for some axis to describe change that is 'independent of time' as in the following example:

- (38) The boiling point of water drops 3 degrees Fahrenheit between sea level and 4000 feet. (Gawron 2005:6)

This example shows that there is a “functional dependence between altitude and boiling point” in the sense that the boiling point falls, as the altitude increases. Change with respect to time, then, is just a special case of functional change, ‘the existence of some correlation between two ordered domains’ (Gawron 2005:6).

Similarly, Fong (1997) uses some kind of perspectival or referential axis to account for the following set of data:

- (39) a. a bridge **into** San Francisco (Fong 1997:32f.)
 b. a bridge **out of** San Francisco

In principle, these two PPs can be used to describe the same bridge, only that the perspective is switched since in the second case the axis points away from San Francisco. Hence, the existence of contextually provided spatial axes that, according to Gawron (2005), can function as an axis of change, is well motivated and could account for the fact that the English projective locative prepositions *under* and *behind* can have a directional reading.

One open issue remains though. Why can only English *under* and *behind* but not their Dutch counterparts obtain a directional (route) reading? Presumably, there is a division of labour in Dutch between the preposition *onder* ‘under (location)’ and the circumposition *onder ... door* ‘under (route)’ where English only has one element available, namely *under*.¹⁷ A more syntactic approach would be that English can make use of silent elements similar to the Dutch postpositions *door* ‘through’ or *langs* ‘along’, whereas in Dutch these elements always have to be overtly expressed. Svenonius (2004), for example, argues for the existence of silent Path heads in cases where locative PPs can be directional as the following:

- (40) The boat **drifted beyond** the city limits. (Svenonius 2004:19)

He furthermore assumes that in such cases verbs of motion can license a null variant of *to* so that we obtain the following structure:

- (41) [_{PathP} TO [_{PlaceP} *beyond* [_{KP} K [_{DP} *the city limits*]]]]

He also talks about cases where this empty head is associated with VIA as in *over the palace*:

- (42) [_{PathP} VIA [_{PlaceP} *over* [_{KP} K [_{DP} *the palace*]]]] (Svenonius 2004:15)

So even though he offers these two possibilities of empty Path heads that are presumably licensed by “verbs expressing some kind of motion” he does not really make a general distinction between the kinds of verbs of motion that actually trigger a directional reading and those that do not. In addition, it is far from clear which type of empty head is actually involved in which case and how the licensing of empty Path heads is constrained in this system. As shown in section 2, not all verbs that express some kind of motion, can then license empty path heads but only *put*-verbs can (in contrast to *swim*-verbs). I furthermore

¹⁷ A similar difference is discussed in Zwarts (2003), where English has only one preposition for different meanings of *around* whereas Dutch has the two prepositions *om* and *rond*.

argued in this section, that something similar to Svenonius' VIA head can be licensed by English projective prepositions even in the context of *swim*-verbs, so that the path element in these cases actually does not come from the verb but from the preposition itself.

Another problem with Svenonius' account is that a TO head should only be available in the context of *put*-verbs. However, the verb in (40) is quite similar to *float* which has been argued to be of the *swim*-type (recall (10)). Hence, the empty head here might be VIA rather than TO and this empty head is then licensed by the projective preposition *beyond*. This is supported by the following example:

- (43) The clouds **raced beyond** the city limits. (Svenonius 2004:20)

According to Svenonius, this sentence involves an empty TO head licensed by the verb of motion *to race*. According to my informants, however, this sentence involves a route rather than a goal reading in which case *to race* should be of the *swim*-type and the empty head is licensed by the projective preposition *beyond*. This cannot be the whole story, though, if we turn to the following example:

- (44) The race car **raced beyond** the finish line.

According to my informants, this sentence has a goal reading although the same verb and the same preposition are used.

So obviously, it is not always the case that only the verb class and the kind of preposition determine the availability of a particular empty path head, in contrast to what I have been arguing for throughout this whole paper. Properties of the DP denoting the FIGURE or the GROUND or even the general context might play a role as well. There also seems to be considerable speaker variation as to which verbs actually license which Path heads as speakers like Svenonius (American) seem to be much more permissive than my British informants. That something like this is going on is also evident when one compares the results of Nikitina (2006) who looked at American English to those of Thomas (2001, 2003) who investigated British English. What exactly is the difference here has to await further research.

6. Summary and outlook

This paper discussed the conditions, under which locative prepositional phrases headed by *in*, *on*, *under* or *behind* can be understood directionally in English, German and Dutch. It was shown that with these prepositions alone only *put*-verbs but not *swim*-verbs can license a directional reading. This has been accounted for in terms of the event structure associated with these verbs: *put*-verbs identify result phrases that can be modified by locative PPs, whereas *swim*-verbs do not, and locative PPs can only modify the entire event. In order to derive a goal reading with locative prepositions and *swim*-verbs, extra elements or operations are needed, such as additional goal phrases or certain kinds of movement to license a path structure. The combination of such process verbs with a Path then can lead to a telic event interpretation if the Path is bounded. In German, a directional reading arises with these PPs if the DP inside them bears accusative case. It was argued that accusative case on the DP within the PP signals a subject-predicate dependency in analogy to the relation between nominative subjects and verbal predicates containing accusative DPs. Finally, it was shown that English *under* and *behind* differ from *in* and *on* since they can be interpreted directionally also with

swim-verbs. To account for this, I proposed that the additional axis element in the definition of projective locatives like *under* or *behind* enables directional (route) readings in English. With non-projective Ps like *in* or *on*, however, directional readings have to be licensed by other means.

Hence, the questions addressed in the introduction have been answered in the following way. There are genuinely Germanic verbs that conflate path and motion. Second, the prepositions under discussion are not ambiguous between a directional and a locative reading. Rather there are purely locative prepositions or purely directional prepositions. In cases where PlacePs can be associated with directionality and thus with some path, this additional Path structure has to be licensed by movement, case, additional lexical items or the like. However, projective locative Ps in English seem to be able to license some path since their lexical semantics involves an additional axis that can serve as an axis of change.

Some open issues remained. For example, why can Dutch *onder* and *achter* not appear as postpositions? Why can English but not Dutch *under*- and *behind*-phrases obtain a directional reading? Is there a silent *through* with English *under/behind*? Do we want to make use of silent elements at all and if we do, what are the constraints on the availability of silent elements? What kind of verb is *race*, and is *beyond* different from *under/behind*? What is the role of the context in licensing directional readings, in other words, can other elements apart from the verb or the preposition enable a directional reading and thus license a path? These and other issues need to be addressed in future work.

Acknowledgements

I would like to thank my English and Dutch informants Anna Asbury, Bert Le Bruyn, Rick Nouwen, Mirjam Rigterink, Sharon Unsworth, and Willemijn Vermaat for providing the relevant data. Furthermore, I am grateful to Boban Arsenijević, Jakub Dotlačil, Nino Grillo, Gillian Ramchand, Tanya Reinhart, Henriëtte de Swart, Kriszta Szendrői, Joost Zwarts, and Eytan Zweig for discussing ideas presented in this paper, and the Utrecht scale structure reading group for general fruitful discussions in, on, over, about and around related topics. Finally, I want to thank the audience of ConSOLE XIV in Vitoria for questions, comments and suggestions.

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