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On directional readings of locative prepositions

1   INTRODUCTION

Talmy (1985): **verb-framed vs. satellite-framed languages**
- verb-framed languages (e.g. Romance, Japanese): verbs conflate motion and path semantics
- satellite-framed languages (e.g. Germanic): verbs conflate manner and motion but do not encode path

⇨ **Can Germanic verbs never encode path?**

distinction between locative and directional PPs in semantics and syntax (Zwarts 1997, Fong 1997, Zwarts & Winter 2000, Zwarts 2005a, Kracht 2005, Koopman 1997, den Dikken 2003, Svenonius 2004, among others)
- locative PPs: denote sets of locations (places) (semantics), functional place structure (syntax)
- directional PPs: denote sets of paths made up of locations (semantics), functional path structure embedding place structure (syntax)

⇨ **Can prepositions be ambiguous between a directional and a locative reading?**

2   LOCATIVE PPS IN (WEST) GERMANIC

English *in*, *on*

- directional only with non-iterative *jump*, *throw*, *put*, *fall*, etc., henceforth *put*-verbs (cf. Thomas 2001, 2003, Folli & Ramchand to appear)
- only locative with manner of motion verbs (Levin 1993) like *crawl*, *walk*, *swim*, henceforth *swim*-verbs

(1) a. *Oscar jumped **in** the lake.*   (locative / directional-goal)
     b. *Oscar swam **in** the lake.*   (locative / *directional)

Dutch *in*, *op* 'on'
the same (contra Koopman 1997)

(2) a. *Oskar sprong **in** het meer.*   (locative / directional-goal)
     b. *Oskar zwom **in** het meer.*   (locative / *directional)

English and Dutch *in*, *on* / *op* directionally
English complex prepositions *into*, *onto*, Dutch *in*, *op* in postposition[1] (cf. Koopman 1997, den Dikken 2003):

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

German in, auf 'on'
dative vs. accusative case on the DP inside the PP, irrespective of verb

(4) a. *Oskar **schwamm im** See.*   (locative / *directional)
         Oskar.NOM swim.PST in-the.DAT lake
     b. *Oskar **sprang im** See.*
         Oskar.NOM jump.PST in-the.DAT lake

(5) a. *Oskar **schwamm in den** See.*   (*locative / directional-goal)
         Oskar.NOM swim.PST in the.ACC lake
     b. *Oskar **sprang in den** See.*
         Oskar.NOM jump.PST in the.ACC lake

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

English *under* and *behind*

- with *swim*-verbs: locative or directional-trajectory
- with *put*-verbs: locative or directional-goal

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

German *unter* 'under' and *hinter* 'behind'[2]

(7) a. *Das Boot **trieb unter der** Brücke.*   (locative / *directional)
      the-boat.NOM float.PST under the-bridge.DAT
    b. *Das Boot **trieb unter die** Brücke.*   (*locative / goal / *trajectory)
      the-boat.NOM float.PST under the-bridge.ACC
    c. *Das Boot **trieb unter der** Brücke **durch**.*   (*locative / *goal / trajectory)
      the-boat.NOM float.PST under the-bridge.DAT through

Dutch *onder* 'under' and *achter* 'behind'

(8) a. *Het vliegtuig **vloog onder** de brug.*   (locative / *directional)
      the plane fly.PST under the bridge
    b. *Het vliegtuig **vloog onder** de brug **door**.*   (*locative / *goal / trajectory)
      the plane fly.PST under the bridge through
    c. **Het vliegtuig **vloog** de brug **onder**.*   (*goal)
      the plane fly.PST the bridge under
    d. *Het vliegtuig **vloog tot onder** de brug.*   (goal)
      the plane fly.PST until under the bridge

(9) *Hij **schopt** de bal **onder** de tafel.*   (locative / goal)
   he kick.PST the ball under the table

German: goal vs. locative ~ accusative vs. dative case irrespective of verb class;
        trajectory reading with DAT and additional postposition

difference in verb classes in **English** and **Dutch**: *put*-verbs vs. *swim*-verbs

English *under*, *behind* trajectory or locative / *in*, *on* locative only (unless with *put*-verbs)

Dutch *under*, *behind*, *in*, *on* locative (unless with *put*-verbs);
        trajectory *under*, *behind* with additional postpositions

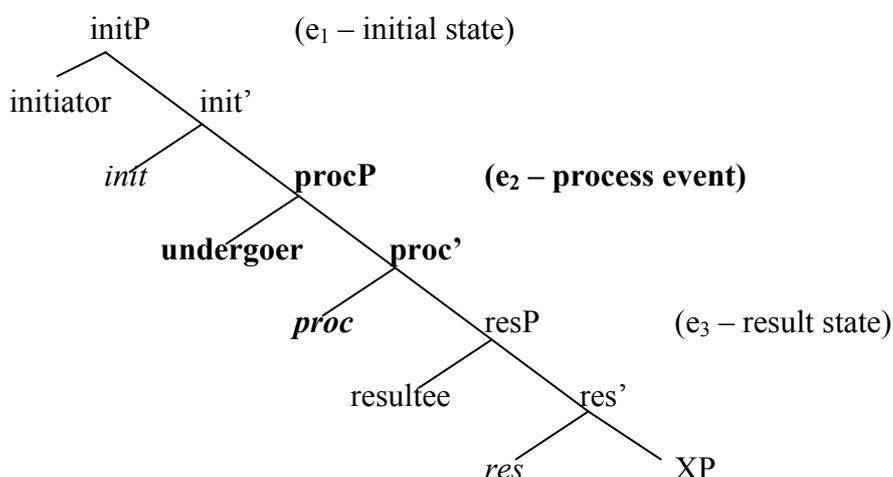⇨ Talmy's typology needs revision: genuine Germanic verbs with path elements (*put*-verbs)

⇨ Only English has prepositions that are ambiguous between directional and locative (*under*, *behind*)

What makes *put*-verbs different from *swim*-verbs?

Why are *under* and *behind* different from *in* and *on*?

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[2] Out of some reason *über* 'over' is different from *unter* 'under' in that it only gets a trajectory reading even with the accusative, and that furthermore a postpositional trajectory element can also be used with an accusative DP for many speakers, although the dative is definitely preferred (see also den Dikken 2003 and Zwarts 2005b).

3   EVENT STRUCTURE AND Ps

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

initP   (e_1 – initial state)

initiator   init'

init   **procP**   **(e_2 – process event)**

undergoer   proc'

proc   resP   (e_3 – result state)

resultee   res'

res   XP

all dynamic verbs identify at least a procP, the dynamic part of every event

causing subevent (initP) and result state subevent (resP) are optional – not all verbs can identify these

Starke (2001): lexical items do not necessarily insert under a single terminal node; elements can merge and project and then remerge at a later stage of the derivation.

(11)   **Event Composition Rule** (Ramchand 2005, p. 37)
    $e = e_1 \rightarrow e_2$: e consists of two subevents, e_1, e_2 such that e_1 causally implicates e_2.

state embedded under a process: result state

State embedding a process: initial state

Ramchand & Svenonius (2002): English particles as particle phrases (PrtPs) in complement to resP [RP there]

(12)   *throw the dead rat out*
    a. [initP INITIATOR throw-*init* [procP UNDERGOER t_V [resP RESULTEE **out-*res*** [PrtP **the rat** [Prt t_{Prt}]]]]]
    b. [initP INITIATOR throw-*init* [procP UNDERGOER t_V [resP **the rat** *res* [PrtP t_{DP} [Prt **out**]]]]]

this framework applied to the Germanic data

> *put*-verbs: come with a result state subevent; locative Ps can modify this result state
> *swim*-verbs cannot identify resP; locative PPs with *in, on* modify the whole event denoted by the VP

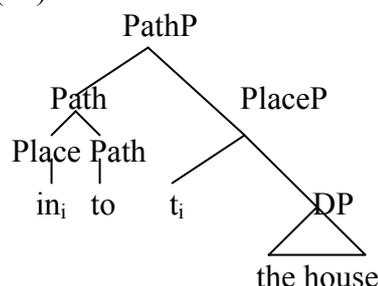**three ways in which VP-internal P elements can be related to the event structure:**

- (Germanic) particles identifying a result state subevent (12)
- with *swim*-verbs: a directional PP can denote a path
- with *put*-verbs: locative PPs can further modify the result state

locative PPs with *swim*-verbs: modify the whole event (VP-external modifier, cf. Maienborn 2003)

4   THE INTERNAL STRUCTURE OF PPs

in, *on*: English *to* licenses a pathP, place heads *in* and *on* move and incorporate into path° to form *into* and *onto* (cf. den Dikken 2003, Svenonius 2004):

(13)

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              PathP                           (Svenonius 2004)
             /    \
          Path    PlaceP
          /  \    /    \
      Place Path t_i    DP
        |    |          /\
       in_i  to        /  \
                    the house
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Dutch: DP complements of PlacePs headed by *in*, *on* move to spec PathP (cf. den Dikken 2003)

open issues: **Why can Dutch *onder* and *achter* not appear as postpositions?**
                   Why is incorporation of English *under* and *behind* into *to* not possible?

<u>**Case inside German PPs**</u>

potential problem: not all directional PPs take accusative case
revised generalisation of Zwarts (2005b):

(14)   locative Ps + DAT: *bei* 'at'; *an* 'at, on', *auf* 'on', *gegenüber* 'across', *hinter* 'behind', *in* 'in', *neben*
                            'next to', *über* 'over', *unter* 'under', *vor* 'in front of', *zwischen* 'between'

       locative Ps + ACC: none

       directional Ps + DAT: source: *aus* 'out', *von* 'from'
                               genuine goal: *nach* 'to', *zu* 'to'

       directional Ps + ACC: genuine route: *durch* 'through', *um* 'around'
                               derived route: *über* 'over'
                               derived goal: *an, auf, gegen(über), hinter, in, neben, über, unter, vor, zwischen*

DAT **with locatives and unambiguous source and goal (with all the 'basic' ones)**

ACC **with route and derived directionals**

den Dikken (2003)
German accusative and dative case are assigned by the functional heads pathP and placeP, respectively.
In directional contexts that trigger accusative case there is no placeP available and the DP complement of PP is assigned accusative case by path°.
contra: semantically there should be some place embedded under path

Zwart (2005a,b)
Accusative case on objects signals the presence of a subject and a dependency between subject and predicate rather than between predicate and object, as is traditionally assumed.

generalizing Zwart (2005a,b) to accusative case inside German directional PPs:
directional PPs are secondary, non-verbal predicates (e.g. Neeleman 1994)
subject of the non-verbal predicate: internal argument of the VP

> **Accusative case on the DP within the PP signals a subject-predicate dependency in analogue to the relation between nominative subjects and verbal predicates containing accusative DPs.**

5 VECTOR SPACE SEMANTICS: PROJECTIVE VS. NON-PROJECTIVE LOCATIVE PREPOSITIONS

- Zwarts (2005a): locative (stative) vs. directional (dynamic) prepositions
- Zwarts & Winter (2000): semantics of locative prepositions

example: locative PP *behind the house*

set of vectors that go from the house to points behind it
location function assigns any physical entity in D its location in space – to derive sets of located vectors, mapping an e-type denotation of the reference object to a vector that describes its location or dimension

⇨ **non-projective locative Ps**: *in, on, at*
require only spatial knowledge about the location of figure and ground with respect to one another; defined as boundary vectors on sets of points:

(15) a. **in′** $= \lambda A.\lambda \mathbf{v}.int(\mathbf{v},A)$ (Zwarts & Winter 2000, p. 4)
   b. **at′ = on′** $= \lambda A.\lambda \mathbf{v}.ext(\mathbf{v},A) \wedge |\mathbf{v}| < r_o$
   (with $r_o \approx 0$, A as a set of points, $\mathbf{v}$ as a boundary vector of A)

⇨ **projective locative Ps**: *over, under, behind*
involve an axis modelled along three orthogonal unit vectors in the vector space V for *up, right, front*

(16) a. **under′** $= \lambda A.\lambda \mathbf{v}.ext(\mathbf{v},A) \wedge c(\textit{-up},\mathbf{v}) > |\mathbf{v}_{\perp\textit{-up}}|$
   b. **behind′** $= \lambda A.\lambda \mathbf{v}.ext(\mathbf{v},A) \wedge c(\textit{-front},\mathbf{v}) > |\mathbf{v}_{\perp\textit{-front}}|$

**additional axis element in the definition of projective modifiers enables directional (trajectory) reading
non-projective Ps need some additional structure to license a directional reading**

**other areas where axes play a role independently from projective prepositions:**

- eventive and extent readings of extent verbs, degree achievements etc. (Gawron 2005)
- Fong's (1997) diphasic locatives: *the road (in)to / out of Ukiah (widens / narrows 5 feet at the wall).*

open issue: **Why can only English but not Dutch *under*, *behind* obtain a directional (trajectory) reading?**

Presumably, English can make use of silent elements similar to the Dutch postposition *door* 'through' or *langs* 'along', whereas in Dutch these elements always have to be overtly expressed.

Svenonius (2004): **silent *to* in cases where locative PPs can be directional**

(17) *The clouds **raced beyond** the city limits.* (Svenonius 2004)
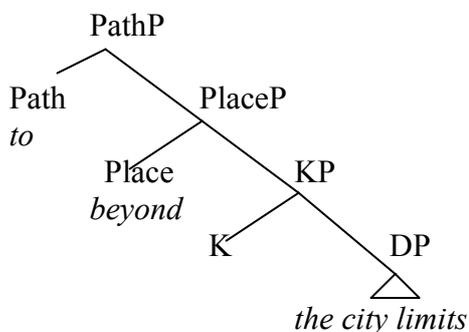
problem: is this really a goal reading (*to*)?

(18) *The race car **raced beyond** the finish line.* (goal)

6 SUMMARY AND OUTLOOK

- The difference between *swim*-verbs and *put*-verbs can be accounted for in terms of the event structure associated with them: *put*-verbs identify resPs, *swim*-verbs do not.

- In German, accusative case on the DP within the PP signals a subject-predicate dependency in analogue to the relation between nominative subjects and verbal predicates containing accusative DPs.

- An additional axis element in the definition of projective locatives like *under* or *behind* enables directional (trajectory) readings in English. With non-projective Ps, however, directional readings have to be licensed independently.

⇨ **Can Germanic verbs encode path?**

Yes. Talmy's (1985) typology needs to be revised: different types can be found in one and the same language (see also Beavers 2004 for Japanese).

⇨ **Can prepositions be ambiguous between a directional and a locative reading?**

(Probably) no. 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 etc.).

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 (see also Gawron 2005).

Some open issues

- Why can Dutch *onder* and *achter* not appear as postpositions? Why is incorporation of English *under* and *behind* into *to* not possible?

- Why can English but not Dutch *under-* and *behind*-phrases obtain a directional reading?

- What kind of verb is *race*? Is *beyond* different from *under* / *behind*? What is the role of the context?

- Is there a silent *through* with English *under* / *behind*?

- Do we want to make use of silent elements at all?

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8   **APPENDIX: PREPOSITIONAL ASPECT (ZWARTS 2005)**

directional Ps map the reference object to a set of sequences of vectors (paths), each of these sequences determines a potential change in position of the figure.

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

(20)   A PP is **bounded (telic)** iff it does not have cumulative reference

(21)   *A set of paths* **X** *is* **cumulative** *iff*
        (i)   *there are* **p** *and* **q** $\in$ **X** *such that* **p**+**q** *exists and*
        (ii)   *for all* **p**, **q** $\in$ **X***, if* **p**+**q** *exists, then* **p**+**q** $\in$ **X***.*

concatenation: partial operation subject to the condition that the second path starts where the first path ends

atelic PPs are closed under sums, telic PPs are not

(22)   a.   *bounded, telic*: to, into, onto, from, out of, off, away from, past, via
        b.   *unbounded, atelic*: towards, along
        c.   *(un)bounded, (a)telic*: across, around, down, over, through, up

goal and source prepositions: transitions from one phase to another (Zwarts 2005):

(23)   { **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]]