**Revisiting route prepositions: NON-INITIAL, NON-FINAL paths at the interfaces**

*Boris Haselbach – Institute for Natural Language Processing, University of Stuttgart*

**Introduction.** In general, we find two algebraic approaches to spatial paths (SPs). Axiomatic approaches take SPs as primitives (Piñón 1993, Krifka 1998, Beavers 2012), while constructed approaches take SPs as constructed objects, e.g. as functions from an ordered domain to locations (Nam 1995, Zwarts 2005). This paper puts forth an axiomatic yet geometrically expressive approach to SPs denoted by spatial prepositions. Applying a vector space model, Zwarts (2005: 748) argues that constructive approaches can make spatial relations maximally explicit. However, we think that constructive approaches are ‘too explicit’ as they basically allow natural language descriptions to express SPs with shapes of any kind. Consider (1).

(1)  
*John ran over the street.*

Under an off-the-shelf constructed approach without further geometric rectilinearity constraints on SPs (e.g. Zwarts 2005), the semantic representation of (1) does not exclude the interpretation that John does not cross the street. Within axiomatic approaches this problem need not arise because SPs are typically represented as rectilinear line segments that function as minimal models of SPs as they are typically represented by underived motion verbs combining with PPs. Such descriptions minimally commit to rectilinear line segments or at most to orthogonally related ones. Advocating a constructive approach to SPs, Zwarts (2005) spells out the geometric and algebraic properties of goal (and source) prepositions like *into* as well as route prepositions like *through*. So far, axiomatic approaches account only for ‘geometrically poor’ goal and source prepositions such as *to* and *from* (e.g. Krifka 1998, Beavers 2012). Further, they lack a proper algebraic and geometric treatment of route prepositions. With this paper we aim at filling these gaps of axiomatic approaches. Focusing on German, we spell out the syntax-semantics and syntax-morphology interfaces of the topological goal prepositions *in* (*into*), *an* (*onto*), *auf* (up onto), and the route prepositions *durch* (*through*), *um* (*around*), *über* (*over*). We claim that the three goal prepositions correspond to the three route prepositions (i.e. *in* ∼ *durch*, *an* ∼ *um*, *auf* ∼ *über*) insofar as each pair shares a common abstract topological feature.

**Properties of goal and route prepositions.** First, while goal prepositions have a repetitive and a restitutive reading with *wieder* (again), route prepositions have only a repetitive reading (Ramchand 2012).

(2)  
**a.**  
*Hans rannte wieder in den Park.*  
Hans ran again into the park  
→ repetitive and restitutive reading

**b.**  
*Hans rannte wieder durch den Park.*  
Hans ran again through the park  
→ repetitive reading only

Second, while goal prepositions are typically marked when serving as modifiers of underived nominals, route prepositions are often felicitous modifiers of underived nominals (3).

(3)  
*Die Mauer durch *'/" in den Park war bunt.*

The wall through /'in into the park was colorful

**The framework.** We adopt the Y-model of grammar (Chomsky 1995) where syntactic structures interface (i) with the articulatory-perceptual system (Phonological Form, PF) and (ii) with the conceptual-intentional system (Logical Form, LF). We model PF in terms of Distributed Morphology (Halle and Marantz 1993) and LF in terms of Discourse Representation Theory (Kamp and Reyle 1993). We assume unification-based semantic composition rules (cf. the over- and underlined discourse referents in the LF-representations in (7)). With regard to prepositional syntax, we assume Svenonius’ (2003) Split P Hypothesis stating that the cognitive relation between Figure and Ground (Talmy 1975, 2000) is reflected structurally insofar as the Ground is introduced as the complement of (big) P, while the Figure is introduced as the specifier of the higher light preposition little *p*. 

1
The proposal. We propose a symmetrical tripartite structure of route paths. In particular, we propose that route prepositions involve the predicate ninf (for non-initial non-final paths) that can be defined on an undirected path structure \( H \) (Krifka 1998: 203). To our knowledge, this algebraic structure has not received much attention yet, as opposed to directed path structures \( D \) (Krifka 1998: 205). Crucially, ninf can be defined without mapping to event structure, cf. (5) and (6). This is different from the goal predicate which necessarily involves \( \theta \)-mapping to event structure (Krifka 1998: 227–8, Beavers 2012: 30) such that a goal is that subregion \( r \) of a SP \( w \) that is \( \theta \)-related to a final subevent of \( e \), cf. (4). In the case of goal prepositions, the goal region \( r \) is subject to geometric predication, while, in the case of route prepositions, the ninf path \( v \) is subject to geometric predication. The tails are indistinguishable with regard to geometric predication, leading to a semelfactive-like interpretation of route prepositions.

\[
\text{goal}(r, w, e) \leftrightarrow \\
\text{ninf}(v, w) \leftrightarrow
\]

A ninf path \( v \) is a proper subpath of a SP \( w \) that excludes the smallest peripheral subparts of \( w \) (tails) that are geometrically indistinguishable.

Ninf’s independence of event structure straightforwardly explains why route PPs (i) have only a repetitive reading, cf. (2) – the undirected algebraic structure does not commit to any order of the tails and thus they are indifferent with regard to pre- or result states – and (ii) can felicitously serve as modifiers of underived nominals, cf. (3) – no event needs to be unified in context.

Derivations. We assume that goal Ps involve the syntactosemantic features [LOC] and [GOAL], while route Ps involve the syntactosemantic feature [NINF]. Little \( p \) of path prepositions involves the feature [FPR] giving rise to a Figure/Path Relation (Beavers 2012). The SP is the referential argument of \( pP \), the Figure is introduced in Spec-\( pP \), and the event is to be unified contextually, typically with a P-external motion predicate from \( V \). We further propose that abstract topological features can be hosted in \( P \). The ones pertinent to the prepositions under discussion are [INT], [CONT], and [VERT]. They lead to the LF-interpretations and PF-realizations in (8). The LF-predicates are subject to a model theory where minimal models for them are spelled out.

\[
\text{a. in den Park (into the park)} \quad \text{b. durch den Park (through the park)}
\]