Spatio-temporal modification and the determination of aspect: a phase-theoretical account

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Introduction[*]

This paper examines how directional prepositional phrases, in conjunction with adverbials of temporal measurement, determine the aspectual type of sentences with verbs of dynamic localization in German, i. e., with the German equivalents of verbs such as *run*, *push*, *throw*, and *put*. In order to represent the aspectual properties of lexical items and phrases, the concept of a phase array (PA) is introduced, which receives its theoretical fundament in phase-theoretical semantics as established in Löbner (1988) and refined in subsequent work. PAs are characteristic arrangements of phases of states and can, for different types of predicates, be grounded in different conceptual domains, such as space and time. In the approach presented here, the aspectual type of a sentence is determined by its PA, which in turn is composed of the PAs of its constituents. A crucial feature of this account is the notion of aspectual underspecification. For both verbs and PPs, as well as for combinations thereof, aspectual properties may remain undetermined between the basic dichotomy 'bounded' and 'unbounded.' Various elements of the context may contribute to determining the aspect of simple and complex expressions whose semantics is underspecified in this regard.

1   Scope and orientation of the study

This paper examines how directional prepositional phrases, in conjunction with different types of temporal modifiers, determine the aspectual type of sentences

Doris Gerland, Christian Horn, Anja Latrouite & Albert Ortmann (eds.).
2014. *Meaning and Grammar of Nouns and Verbs*. Düsseldorf: dup.

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which contain verbs of dynamic localization. I will use examples from German, i. e., the German equivalents of verbs such as *run, push, throw* and *put,* and prepositions such as *into, out of, through, along,* and *around.* The verbs under consideration describe a change of position of the referents of their theme arguments on a path whose properties are further specified by the directional PPs.[1] The temporal modifiers under consideration are different types of measurement phrases which indicate the temporal extent of the represented situations. The objective is to describe the semantic properties of verbs, prepositions and temporal measurement phrases which account for the differences in constructions like the following:[2]

(1)   *Er schob sein Rad*

    a.   * *zwei Minuten lang/in zwei Minuten in die Wechselzone.*

    b.   *zwei Minuten lang/in zwei Minuten durch die Wechselzone.*

    c.   *zwei Minuten lang/*in zwei Minuten längs der Wechselzone.*

    'He pushed his bike for/in two minutes into/through/along(side) the transition area.'

In (1), I use the classic diagnostics for aspectual type, namely the combination with time-span adverbials (TSA) such as *in 2 Minuten* '(with)in 2 minutes' and with adverbials of duration (TDA) such as *2 Minuten lang* 'for 2 minutes' (literally '2 minutes long').[3] Applying these two basic types of temporal measurement phrases as criterial contexts reveals that a sentence with a transitive/causative motion verb and a directional PP receives a bounded (or more specifically: a telic) interpretation if the PP is headed by *in* 'into' and an unbounded (or atelic) interpretation if the PP is headed by *längs* 'along(side)'. The preposition *durch* 'through' licenses both a bounded and an unbounded interpretation and lets the temporal measurement adverbial set the aspectual type of the sentence.

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[1]   Note that I focus exclusively on direction-related uses of these prepositions. More generalized uses as discussed in the literature are left out of consideration.

[2]   Expressions which are semantically ill-formed are marked by '*'. Expressions which deviate from basic semantic assumptions but can be used under specific conditions that involve a semantic adjustment (which I call a 'reinterpretation'; see also Egg 2002) of some of their components are marked by '+.' This flag complements the prevalent '?,' which has a strong bias towards marking an expression as questionable, rather than as an expression whose interpretation involves some additional semantic adjustment, i. e., a reinterpretation, as assumed in the account on hand.

[3]   It is crucial to note that the German TDA *zwei Minuten lang* (literally: 'two minutes long') differs in some important respects from the English *for two minutes.* I will therefore include the literal translations whenever I want to make sure that semantic judgments of the German examples will not be based on the English renderings of the TDA in terms of a *for*-adverbial alone.

The classification of verbs of dynamic localization in (2), which I will take as a basis in the following, stays close to the classification in Kaufmann (1995), a comprehensive and in-depth study of German spatial verbs and prepositions:[4]

(2) Classes of dynamic localization verbs

   1. Intransitive verbs of motion (IMV) such as *gehen* 'go', *laufen* 'walk', *kommen* 'come', *schwimmen* 'swim'

   2. Transitive/causative verbs of motion (CMV) describing

      (a) causation of a motion by a continuous impulse (CMVC): *schieben* 'push', *ziehen* 'pull', ...

      (b) causation of a motion by an instantaneous impulse (CMVI): *werfen* 'throw', *schießen* 'shoot', ...

   3. Transitive/causative verbs of positioning (CPV) describing

      (a) causation of a change of position: *stellen, setzen, legen* 'put'/'lay'

For directional spatial prepositions I will use the traditional classification in (3) as a starting point:

(3) German directional prepositions:

   1. Source: *aus* 'out of', *von* 'from'
   2. Goal: *in* 'into', *auf* 'onto', *an* 'on(to)', *vor* 'in front of', *hinter* 'behind', *neben* 'beside', *unter* 'under';[5] *zu* 'to'
   3. Route/path: *um* 'around', *längs/entlang* 'along(side)'; *durch* 'through', *über* 'over/across'

Note, however, that this classification is partly pre-theoretical and mainly used for ease of reference. We will see later that in particular the prepositions in the

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[4] Note that Kaufmann (1995) gives a more fine-grained classification of both verbs and prepositions which distinguishes several semantic sub-classes of the general classes listed here. I use (translations of) Kaufmann's terminology in the present paper by virtue of its systematic perspicuity. There are of course other notable and influential nomenclatures: Rappaport Hovav & Levin (1998) use 'verbs of change of location' for the entire class of verbs under consideration here. Gropen et al. (1989) introduced 'verbs of continuous causation of accompanied motion in some manner' for *push, pull, ...* (cf. class CMVC above) and 'verbs of instantaneous causation of ballistic motion' for *throw, kick, ...* (cf. class CMVI). Levin (1993) calls the former class 'verbs of exerting force' and refers to the Gropen et al. term for the latter in the comments to her class 'verbs of throwing,' subclass 'throw verbs,' which Rappaport Hovav (2008) briefly calls 'verbs of ballistic motion.'

[5] These prepositions all come with a static/local variant with an NP complement in dative case and a directional variant with an NP complement in accusative case.

third category form quite heterogeneous classes with regard to their aspectual properties.

The theoretical framework for this study is the phase-theoretical semantics of tense, aspect and temporal modification which was established in Löbner (1988, 1989) and expanded in Herweg (1990, 1991b,c,a), Egg (1994, 1995), Egg & Herweg (1994), among others.[6] In this approach, various semantic properties of expressions of different categories[7] are described in terms of characteristic arrangements of phases and operations on these. Phases in this sense are segments of a scale, i. e., convex partitions of any set with a linear ordering, which are characterized by the fact that a certain predicate holds for them. As an illustration, take the role of the goal PP *in die Wechselzone* 'into the transition area' in (1.a): the PP states that there is a transition from a time when the bike is not located in a specific region to a time when the bike is in fact located in this region. The underlying scalar structure to which the localization predicate in question is applied in this case is a set of times.

I consider phases to be static (or 'frozen') perspectives on potentially complex abstract structures which themselves may be inherently dynamic. The underlying structures can originate from a manifold of conceptual domains, such as times, paths, events and other scales of different provenance, as well as the theoretically preeminent complex "Krifka-style" constructs which integrate structures from different conceptual domains by a bundle of mappings between them.[8] I see one of the representational and conceptual benefits of phase theory in the fact that it makes it possible to abstract away from different underlying structures;

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[6] The first application of phase-theoretical semantics to spatial prepositions that I am aware of was Kaufmann (1989), who focused on the opposition between *in* 'in'/'into' and *außerhalb/aus* 'outside'/'out of'. Kaufmann (1995) incorporates phase-theoretical considerations quite frequently. Egg (1994) gives a detailed analysis of *in* and Egg (1995) examines *through*. The phase-theoretical idea was revived more recently by Zwarts (2008), who repeatedly points to a kinship of elements of his approach with phase theory but only touches upon details of semantic composition.

[7] In addition to the references cited above, see Löbner (2011) for an overview of linguistic phenomena to which he applies his phase-theoretical notion of 'phase quantification.'

[8] Relevant ontologies of times are set out in van Benthem (1983). Paths, modeled as sequences of regions, are described, among others, in Wunderlich & Herweg (1991). Habel (1989) defines richer spatial structures, including abstractions of paths such as traces (Habel 1989). For vector spaces as alternative spatial ontologies see Zwarts & Winter (2000). An elaborate theory of event structures has been developed in Krifka (1989b) and subsequent work; see also Rothstein (2004). Scales are used as a fundamental semantic concept, *inter alia*, by Rappaport Hovav (2008), Beavers (2008) and Filip (2008). A source for what I call complex "Krifka-style" structures is Krifka (1998). Elements of Krifka's theory are, in different degrees, employed in most of the more recent approaches listed above.

a phase-theoretical construct can by design be simultaneously instantiated by structures that represent diverse conceptual domains, yielding a unified perspective on them.

A crucial feature of my phase-theoretical account is the notion of aspectual underspecification. For both verbs of dynamic localization and their directional PP modifiers, as well as for combinations thereof, I will allow that their aspectual properties remain undetermined between bounded and unbounded. This serves to account for the difference between (1.b) above, on the one hand, and (1.a) and (1.c), on the other hand. In (1.b) the combination of verb and PP alone is open with regard to a bounded or unbounded meaning; it is rather the temporal measurement phrase which pushes the interpretation in one direction or the other.

An important point of reference for my analyses is Filip's (2008) claim that, in Germanic languages, all underived (i.e., stem) verbs and many VPs are inherently unmarked with respect to boundedness ('telicity/maximality' in Filip's theory) and obtain bounded interpretations only in specific linguistic contexts or through pragmatic inferences. I will review this claim in the domain of dynamic localization, looking not only at the relevant verbs but also at directional prepositions (which were of course not in the scope of Filip's study).

2 Theoretical foundations[9]

2.1 Bounded and unbounded predicates

I specify the distinction between bounded and unbounded predicates in terms of cumulativity (cf. Zwarts 2005, 2008, Csirmaz 2012). Unbounded predicates apply to the seamless concatenation – the sum – of any two entities in their extension. By contrast, bounded predicates are noncumulative. As regards the domain of situations, I subscribe to Egg's (1994, 1995) position that the property of boundedness does not coincide with the property of telicity; rather, the latter is a subcategory of the former, which in addition comprises nontelic but bounded predicates, the so-called intergressives such as *cough* and *play a sonata*.[10]

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[9] I can only give a short and high-level overview of the theoretical background in the present context, which focuses on a specific application of phase-theoretical semantics. For details of the framework itself the reader is referred to the phase-theoretical literature listed in § 1. I will also set aside any formal definitions of well-established logical properties as well as of specific (phase-)theoretical notions that have been introduced in previous work. Unless otherwise stated, the reader is referred to Herweg (1991c) for explicit formal definitions.

[10] The category of intergressive predicates was introduced in Löbner (1988) and characterized as interruptions of an unmarked state, i.e. preceding and subsequent state are identical. The category was

In the domain of situations, the distinction between bounded and unbounded predicates – which in this domain are composed of the semantics of verbs, their arguments and specific modifiers – corresponds to different perspectives on situations. A bounded predicate describes a situation as an event, i. e., as an abstract individual occurrence which takes place in time. Since this kind of predicate characterizes the types of the events in their extension, I call them 'event-type predicates.' An unbounded predicate characterizes a situation as a state or process – 'states of no change' vs. 'states of change' in Galton's (1984) terms – and is represented in the theory on hand as a predicate about times, *viz.* the times at which the state holds or the process takes place (see Löbner 1988). A state of no change involves no development of a parameter other than the progress of time. Being conceived of as a state of change, a process in addition involves the homogeneous development of a parameter on an underlying structure other than just time, such as on specific scales that model the advancement of creating (*build*), destroying (*dismantle*) or consuming (*eat*) an object, the progressing coverage of an object (*read*), or a motion (*walk*).[11]

2.2   Temporal measurement and count adverbials

The two types of adverbials of temporal measurement witnessed in (1) are sensitive to the bounded/unbounded distinction: a TSA like *(with)in two minutes* operates on bounded predicates only and sets an upper limit to the duration of the noninstantaneous event which the predicate describes; whereas a TDA like *for*

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elaborated in Herweg (1990, 1991b) and most notably in Egg (1994, 1995). A subset of intergressives are semelfactives, a category which usually (e. g., Comrie 1976, Smith 1991) is confined to predicates about instantaneous situations, like *cough*, as opposed to *say (something), greet* (Löbner's original examples, in addition to the classic semelfactives) and *play a sonata, run a mile* (Egg's examples).

[11] One reviewer demands a more elaborate classification of what I subsume under the category of state expressions. I wish to argue, however, that for the objectives of the present study it is sufficient to employ the general category of state expressions as introduced in this section, which comprises all unbounded predicates. I would nevertheless like to point out that the framework of phase-theoretical semantics allows the definition of much more fine-grained differentiations. For instance, Egg (1994, 1995) and Egg & Herweg (1994) show how process predicates – Galton's 'state of change' expressions - can be distinguished from state predicates in the narrow sense, i. e., Galton's 'state of no change' expressions. In addition, Egg & Herweg (1994) define eight linguistically significant subtypes of the latter. This classification goes beyond Carlson's (1977) influential twofold distinction between individual level and stage level predicates (ILP vs. SLP), which appear only as the terminal points in this more fine-grained classification. The eight subtypes are beneficial in order to account for a whole variety of linguistic phenomena over and above the ILP/SLP distinction, such as semantic compatibility of predicates and temporal connectives (*as soon as he was old/*young* vs. *as long as he was *old/young*), constraints on the progressive, specific effects of interpretation, etc.

two minutes operates on unbounded predicates only and specifies the minimum duration of a homogeneous state or process.

One note of caution is necessary when we use TSAs and TDAs as criterial contexts for determining the aspectual type of an expression. Quite often, semantically inconsistent combinations of event/state/process predicates and temporal measurement adverbials do not lead to strictly unacceptable constructions. Rather, they trigger a reinterpretation in order to accommodate the aspectual properties of the predicate to the requirements of the adverbial. The reinterpretation can be that of a 'state of iteration' for an event-type predicate, as in *cough for 10 minutes*; or it can lead to the result state of an event, like in *open the door for 10 minutes*; and it can also be one in which an instantaneous event is supplemented with a process that culminates in the event described by the overt predicate, like in *reach the finish line in 30 minutes*. Similarly, a state predicate can undergo an ingressive reinterpretation, as in *be in Düsseldorf in 30 minutes*, where the TSA is understood as indicating the temporal distance between a contextually given reference point and the onset of the state.[12]

In order to cope with these phenomena, the classic test for compatibility with TSAs and TDAs is often supplemented by a test that uses temporal count adverbials (TCA) such as *twice* (see Herweg 1991c and the references cited therein). Since they are noncumulative, bounded predicates treat their arguments as logical individuals, i. e., as entities which can be counted. By contrast, unbounded predicates, being cumulative, cannot provide a criterion of individuation and counting for the entities to which they are applied. These different logical properties are responsible for the fact that bounded predicates can be combined with TCAs without any restriction (*cough twice*), whereas unbounded predicates do not accept

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[12] One reviewer disputes my claim that *reach the finish line in 30 minutes* requires a reinterpretation and refers me to the classic insight that *reach* entails a preparatory phase which is followed by a point-like transition and which can be picked up by the progressive, by *for*-adverbials (TDA) and apparently by *in*-adverbials (TSA). I am familiar with this position and the cited phenomena but do not draw the same conclusions as the reviewer. Verbs like *reach* (achievement verbs, in the terms of Vendler 1957) differ from accomplishments in the extent to which the preparatory phase/process that leads to a transition/culmination is accessible to further linguistic qualification. As an example, the temporal adverbial in *He started to reach the finish line at 10 a.m.* cannot refer to the time of the onset of the (preparatory) process, in contrast to accomplishments such as *He started to run to the finish line at 10 a.m.* or *He started to write a letter at 10 a.m.* Differences like these lead me to assume for the contested class of examples a reinterpretation in which the full situation or time frame which the TSA picks up is not provided by the semantic representation of the verb per se but is rather inferred from conceptual knowledge about specific types of events such as 'reaching' events. Why this works better for TSAs (and I conjecture that the same holds for the progressive) than for verbs like *start* plus time specification must be left open in the present context.

TCAs or again call for an adequate reinterpretation, as in *be in Düsseldorf twice*, which typically receives a "chunking" reinterpretation in which we package temporally separate states into individual chunks which can be counted (cf. the 'PO' operator in Herweg 1991b,c). So, since more often than not we will be able to accommodate the aspectual interpretation of an expression to the demands of its context, we are well advised to always use a combination of all applicable tests in cases of doubt.

2.3 Periods, phases and paths

The basic temporal ontology which I subscribe to is a classical mereological period structure in the style of van Benthem (1983) with a precedence relation, a part-of relation, and a sum operator which forms a complex period out of two less complex periods that have no temporal gap between them. A period that is conceptualized as a point in time is one which we conceive of as not being further divided into proper subperiods. And finally, two periods are adjacent if they are separated at most by such a point-like period. For the domain of events, we also assume a mereological structure, plus an operator that maps events to their runtimes (cf. Krifka 1989b).

On the basis of mereological structures like the ones outlined here, the notions of bounded and unbounded predicates can be defined in the obvious way in terms of (non)cumulativity, as sketched in § 2.1. Since state and process predicates are treated as predicates over times, their aspectual property of unboundedness/cumulativity is defined in period structures, whereas the boundedness/noncumulativity of event-type predicates is defined in event structures (see § 2.1). Both domains are related by a set of operators (see Herweg 1991b for details). In order to (again informally) explicate the role of these operators, two features of state (including process) predicates are crucial:

First, a phase of a state S is a period of time for which the state predicate S continuously holds. Second, states come in pairs of positive and negative instantiations, i. e., for every state predicate S there is a contrary counterpart ~S which has the same formal properties, especially the property of unboundedness, as its positive counterpart. Since '~' transforms a predicate S into its contrary predicate (not into its logical, i. e., contradictory, complement), we only require that there are no times for which both S and ~S hold (principle of contrarity). This does allow, however, for times in which neither S nor ~S apply.

Based on this notion of phases of a state and its contrary, we can now define fundamental subclasses of event-type predicates such as ingressive, egressive and intergressive predicates (whose logico-semantic properties, including their boundedness, are technically represented by operators on state predicates, as mentioned above; see Herweg 1991b). Ingressive and egressive predicates describe events which mark single changes of state, modeled as instantaneous (i. e., point-like) transitions from a phase to its adjacent contrary: Ingressive event-type predicates like *switch on the light* and *enter the room* mark the transition from a phase of a negative state ~S to an adjacent phase of its positive counterpart S; egressive event-type predicates such as *turn off the light* and *leave the room* mark the reverse transition from a phase of S to an adjacent phase of ~S. Finally, intergressive event-type predicates like *flash*, *cough,* etc. involve a dual transition from phases of a negative state ~S to its positive counterpart S and back to ~S.

Turning now to the spatial domain, a simple definition of a path will do for the purpose of this paper. I will thus use the definition in Zwarts (2008), who describes a path informally as a directed curve, corresponding to a sequence of positions in space. Formally, Zwarts defines a path in the proven way as a continuous function p from the real interval [0,1] to a domain of places. Within this framework, the starting point of a path can be indicated by p_0, the endpoint by p_1, and for any i such that $0 < i < 1$, p_i is an intermediary position on the path.

2.4   Phase arrays

In my subsequent analyses, I will use what I call *phase arrays* (PA) as the basic structure for aspectual composition. A PA is a sequence of adjacent phases of states (in the broad sense of § 2.1) S_1, S_2, ..., S_n, written as $\langle$ [S_1], [S_2], ..., [S_n] $\rangle$, where S_1, S_2, ..., S_n can be logically related in different ways. PAs are abstract constellations of phases defined over underlying ordered structures which can be grounded in different conceptual domains. The following examples shall serve as illustrations.

The aspectual properties of the different kinds of event-type predicates introduced above are represented by the following PAs:

(4)   Phase arrays for event-type predicates:

    a. ingressive (*switch on the light*): $\langle$ [~S], [S] $\rangle$

    b. egressive (*turn off the light*): $\langle$ [S], [~S] $\rangle$

    c. intergressive (*flash*): $\langle$ [~S], [S], [~S] $\rangle$

The associated PAs represent these event-type predicates as transitions between adjacent phases of opposite states of the theme argument of the action (leaving aside here any explicit representation of the agent's activity). The PA (4.a) should be read as a sequence of adjacent states of the light being off and the light being on. (4.b) shows the reverse sequence of states and (4.c) represents a dual transition from the light being off to the light being on and then back to the original state.

We can refrain from an explicit representation of events in PAs because these can be inferred from the specific constellation of phases by invoking the phase-theoretical definitions of the respective event-type predicates.[13] Note that the event-type predicates generated by the above PAs have the semantic property of boundedness.

(5) shows the PA for a state predicate:

(5)   Phase array for state predicates (e. g., *be in Düsseldorf*): $\langle$ [S] $\rangle$

The PA for a state predicate is monadic and specifies only the element S itself – in (5) the state of some object being located at a particular place – so the corresponding predicate is correctly represented as unbounded, since no state of change is expressed. The PA for a state predicate carries no reference whatsoever to what happens prior to or after a phase of the state.

One important enhancement of the PA representation, of which I will make ample use in subsequent paragraphs, is to enrich PAs with a notion of underspecification. To this end, I define an operator '|' on state predicates S, which serves as a compact representation of a set of semantic alternatives: |S indicates that it is left open, until further information becomes available, whether S is positive or negative. So, upon availability of additional information, in a PA like $\langle$[S], [|S]$\rangle$, |S will turn out to be either a seamless continuation of S (if |S is specified to S) or the contrary state adjacent to S (if |S is specified to ~S).

In the following discussion of how directional prepositions and different types of verbs of dynamic localization contribute to the composition of aspect, the representational device of PAs will play a crucial role. I will capitalize on the fact

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[13] Herweg (1990, 1991b) defines a system of axioms which make it possible to infer, given a particular constellation of phases, that there is an event with the appropriate temporal properties. So, from the PAs (4.a) and (4.b) it can be derived that there is an ingressive or egressive event of a particular type, resp., that separates the two contrasting phases, and from the PA (4.c) it can be derived that there is an intergressive event, again of a particular type, which temporally coincides with the middle phase. We can thus omit the explicit representation of events here and rather keep our representations simple for the purpose of this specific study.

that PAs are inherently underspecified representations of aspectual properties which can be instantiated by linguistic items in several ways:

1. The aspectual type of a sentence is determined by its PA, which is composed of the PAs of its constituents.
2. The verb introduces a basic PA which may or may not already predefine parts of the final PA; parts of the verb's PA may be left underspecified by the verb itself.
3. Arguments and modifiers of the verb contribute to the specification of the PA on all projection levels of the verb; however, these elements themselves can also preserve some level of underspecification.

In order to link verbs of dynamic localization and directional PPs into the shared format of PAs, I make the following assumptions:

-   The relevant verbs carry a motion component in their semantics that links the changing positions of their theme argument to positions on an abstract path which they introduce into the semantic representation. Information about the motion of the theme is thus represented as sequences of states of localization which are related to the segments of a path.
-   Directional PPs specify positions of what I call the localized object (LO) – which is the external argument of the preposition and the theme argument of the verb – on the path provided by the verb. They do this in the form of a sequence of states of localization of the LO/theme. The positions of the LO on the path are determined by the semantics of the preposition as specific regions – such as the interior in the case of *in* – relative to what I call the reference object (RO), which is the internal argument of the preposition (cf. Herweg 1989).
-   The basic elements of a path – its initial, intermediary and final segments p_0, p_i and p_1 – are linked to a basic tripartite PA as in (6); this holds both for the verbs and the prepositions under consideration here:

(6) $\langle\, [_{p0}\, S_1]\, , [_{pi}\, S_2]\, , [_{p1}\, S_3]\, \rangle$

This PA expresses that the states S_1 and S_3 hold at the marginal path segments p_0 and p_1, resp., and that the state S_2 holds at the intermediate path segments p_i. Different types of verbs and prepositions link their PA information to specific elements of this structure. The verbs under consideration here relate the motion of their theme arguments – which is represented in terms of the changing positions that the objects in question assume over the course of the described situations –

to segments of the abstract path that the verbs introduce. A directional PP adds more specific information about the positions of the theme in regard to this path: it contributes through its associated series of state predicates particular spatial properties of the theme/LO, namely that it is – or is not, in the case of negative state predicates – located in a region defined relative to some RO.

Note that the PAs for verbs employed here provide information about motion of their theme arguments only in terms of sequences of states of localization. Information about specific manners of motion (*walk, run*), as well as specific activities of the initiator of a motion (*push, throw*), for example, would have to be reflected in additional elements of the semantic representations of the verbs in question; these are, however, not relevant in the present context.

While for nonmotion verbs like those in (4) and (5) I assume just one underlying conceptual structure to which the elements of their PAs apply, namely periods of time (there may be more, but these would be out of the scope of the present considerations), I assume that the PAs of verbs of dynamic localization are related to two underlying structures, namely periods of time and paths. A simple way to link times and paths would be to make times the indices of the path function p. This would yield temporally parameterized paths in the sense of Habel (1989) and Wunderlich & Herweg (1991). I prefer, however, to keep the two structures independent from each other on principle – cf. Habel's generalized path concept which abstracts away from time (but retains orientation) – and stipulate a separate mapping between periods of time and segments of paths which is employed when necessary. This makes it possible to clearly differentiate between verbal and prepositional predicates. The former relate to times and – in the case of verbs of dynamic localization – to paths, whereas the latter relate to paths only. This distinction takes into account the fact that PP predicates cannot be temporally modified independently from their host verbs. Therefore, a construct like *He walked out of his house at 6:30 into the village at 7:30* is excluded. The state of affairs in question would need to be described by a coordination structure like *He walked out of his house at 6:30 and into the village at 7:30*, which provides two instantiations of the verbal predicate and thus two anchor points for the different temporal modifiers. The PP predicates will, of course, be integrated through semantic composition into the semantic representation induced by the verb and will thereby eventually receive a temporal interpretation. They will, however, do so only mediated by the semantics of the verb which they accompany.

For ease of exposition, the temporal dimension of PAs will not be represented explicitly in what follows but can be derived, if necessary, from the sequence of states associated with verbal predicates. I will rather focus in my representations on how verbal and prepositional PAs relate to the paths which are provided by the semantics of the verbs and to which the PP predicates refer.

With this basic inventory we can now turn to the different types of directional prepositions. I will use as evidence mostly combinations of directional PPs with simple and quite general intransitive verbs of motion such as *gehen* 'go/walk' and *laufen* 'walk/run'. As a working hypothesis I will assume that these verbs do not introduce any constraints on the aspect of their projections on their own but that specifications of aspect come from the PPs they combine with. That is, I assume that these intransitive motion verbs are underspecified with regard to the bounded/unbounded contrast and thus carry a PA of the form $\langle$ [$_{p0}$ |S], [$_{pi}$ S], [$_{p1}$ |S] $\rangle$. I will revisit this hypothesis in § 4.

3   Aspectual properties of directional prepositions

3.1   Ingressive and egressive prepositions: *in, aus* etc.

Source and goal prepositions introduce single changes of states in two variants:

- Source prepositions introduce a transition from the LO being located in a particular region at the initial segment of a path (p_0) to the LO no longer being located in this region at the middle section of the path (p_i).
- Goal prepositions introduce, for the middle and final segment of a path, the reverse transition: the LO is initially, at p_i, not located in the specific region where it is located later, at p_1.

The PAs for PPs involving these prepositions thus follow the egressive and ingressive scheme, resp.:

(7)   a.   *aus dem Park* 'out of the park' $\langle$ [$_{p0}$ IN(x, p)] , [$_{pi}$ ~IN(x, p)] $\rangle$

b.   *in den Park* 'into the park' $\langle$ [$_{pi}$ ~IN(x, p)] , [$_{p1}$ IN(x, p)] $\rangle$

In these simplified representations, x is a variable for the LO and p represents the denotation of the NP complement of the preposition (i. e., the RO). IN is a relation of localization which places its LO in a specific region that it assigns to the RO (simplified: the interior space of the park in question). The path indices show in which segment of the PA of a dynamic verb the PAs of the directional PPs fit.

Applying the standard test criteria to combinations of motion verbs with source/goal prepositions yields the following results:

(8)   a.   [+] *Er ging zwei Minuten lang in das Haus/aus dem Haus.*
          'He went into/out of the house for two minutes (two minutes long).'

      b.   [+] *Er ging in zwei Minuten in das Haus/aus dem Haus.*
          'He went into/out of the house in two minutes.'

      c.   *Er ging zwei Mal in das Haus/aus dem Haus.*
          'He went into/out of the house twice.'

The combination with a TDA as in (8.a) triggers a mandatory reinterpretation in German: the adverbial cannot measure the duration of the situation of walking into or out of the house – which confirms that we are indeed dealing with descriptions of events and not processes or states – but rather gives the duration of the result states of the events, *viz* the states of being located inside or outside of the house. We may marginally also obtain an iterative reinterpretation in the sense that the subject repeatedly entered the house over a period of 2 minutes. Note that these reinterpretations are actually blocked if we replace *zwei Minuten lang* with another kind of duration adverbial, such as *seit zwei Minuten* (literally: 'since two minutes'): **Er ging seit zwei Minuten in das Haus/aus dem Haus* (literally: 'he went since two minutes into/out of the house').

TSAs as in (8.b) are difficult to combine with the prepositions in question because the change of state is preferably understood as instantaneous. TSAs require, however, events with a real (non-point-like) duration. As a consequence, the adverbial in (8.b) is preferably understood as measuring the time span from a contextually given point in time to the time of the change of state ('he set out for the house/to leave the house within the next 2 minutes'); i. e., they obtain what we can call a distance reading. I will come back to this type of construction below.

TCAs as in (8.c) yield the clear-cut result that we are indeed dealing with bounded expressions; there is no need at all for any kind of reinterpretation in order to accommodate the combined verbal and prepositional predicate to the aspectual requirements of the adverbial.

Coming back to examples like (8.b), we can observe that combinations of TSAs with egressive and ingressive prepositions become much better, and do not call for any kind of reinterpretation, if the motion or the path are either explicitly accentuated by linguistic means such as more specific verbs of motion (9.a), additional adverbs of manner (9.b) or additional directional PPs (9.c), or if extra-

linguistic knowledge leads us to assume an extended motion on an elongated path; see the contrast between (10.a) and (10.b).

(9)   a.   *Er kroch in zwei Minuten in das Kellerverlies.*
          'He crawled into the dungeon in two minutes.'

       b.   *Er ging zielstrebig/hastig/langsam in fünf Minuten ins Dorf.*
          'He went determinedly/hastily/slowly into the village in five minutes.'

       c.   *Er ging in einer Minute vom Haus über den Hof in die Garage.*
          'He went in 1 minute from the house over/across the yard into the garage.'

(10)   a.   [+] *Er lief in zwei Sekunden (aus dem Wohnzimmer) in den Flur.*
          'He walked (out of the living room) into the corridor in two seconds.'

       b.   *Er lief in zwei Tagen (vom Schwarzwald) in die Vogesen.*
          'He walked (from the Black Forest) into the Vosges Mountains in two days.'

We can conclude that, even if the path is further qualified only by an ingressive PP, which by itself introduces an instantaneous transition from one state to the opposite state, the motion that leads to this change of state is, in principle, nevertheless accessible to temporal measurement by a TSA. Acceptability of TSAs in conjunction with egressive/ingressive prepositions is very much a question of the extent to which the motion and its manner are explicitly described or what world knowledge tells us.

Other source and goal prepositions, such as *von* 'from' and *auf* 'onto' and the dimensional prepositions *hinter* 'behind', *unter* 'under', ..., exhibit the same aspectual behaviour as the ones explicitly discussed in this paragraph. However, *zu* 'to' is sometimes claimed to differ from the other goal prepositions in important respects. According to Kaufmann (1995), *zu* often only indicates the orientation of a motion. As evidence, Kaufmann cites examples of the sort (11.b), where the motion can be called off before the goal area has been reached, although (11.a) shows that *zu* is nevertheless a bounded preposition:

(11)   a.   *Er lief in einer Stunde/*stundenlang zum Bahnhof.*
          'He walked in one hour/for hours (literally: hours long) to the train station.'

       b.   *Er lief heute früh wie immer zum Bahnhof, kam aber nie dort an.*

'He walked this morning as always to the train station but never got there.'

In her analysis of *zu*, in which she employs the notion of a supremum of a path, Kaufmann models the default interpretation, according to which the path ends in the vicinity of the RO, in terms of the supremum being part of both the path and the proximal region of the RO. If, however, the context endorses the interpretation that the path ended before the goal area was reached, the supremum is still within the proximal region of the RO but external to the path under consideration. In this vein Kaufmann captures the idea that with *zu* the path can be understood as the intended path, rather than the real path, without giving in the assumption that *zu* is in fact bounded.

Looking this proposal over we observe that we can find examples of the sort (11.b) for other goal (i. e., bounded) prepositions as well, if we choose an appropriate context of interpretation:

(12)   *Er wanderte heute früh auf den Feldberg/in die Vogesen, als er wegen des aufkommenden Unwetters beschloss umzukehren.*
       'He hiked onto the Feldberg mountain/into the Vosges Mountains this morning, when he decided to return because of the upcoming thunderstorm.'

Thus, rather than hardwire observations like in (11.b) into the semantics of *zu*, as opposed to other goal prepositions, I'd rather confer their explanation – in contrast to Kaufmann's account – upon a general (albeit yet to be elaborated) account of 'intentional dilution' – or the 'imperfective paradox', to use the classic notion (Dowty 1979) – of telic constructions.

One final remark: We must concede that, more often than not, *zu* appears to be more open to 'intentionally diluted' readings than the other goal prepositions. This may be due to the fact that German does not have a simple counterpart of *towards* which would supplement the *to*-like semantics of *zu*. German actually has a PP which can function like a P that expresses orientation only, namely *in Richtung* 'in direction'. This P in the guise of a PP forms expressions of unbounded aspect:

(13)   *Er ging stundenlang in Richtung Colmar.*
       'He walked for hours (literally: hours long) in the direction of Colmar.'

We might hypothesize that *zu* is quite open to the sort of 'intentional dilution' outlined above because by this *zu* partly fills a gap in the German prepositional

system (cf. French *vers*, Italian *verso*), at least in quite specific contexts, however, without adopting an unbounded reading.

3.2 The intergressive preposition *um*

Um 'around' is traditionally often classified as a route PP, together with *längs/ entlang* 'alongside/along'. We will see shortly, however, that *um* and *längs/entlang* differ considerably in their aspectual properties.

The combination with the standard test contexts reveals that PPs headed by *um* are bounded predicates:

(14) a. *Er lief in einer Stunde um den See.*
          'He ran around the lake in one hour.'

  b. $^+$ *Er lief eine Stunde lang um den See.*
          'He ran around the lake for one hour.'

  c. *Er lief drei Mal um den See.*
          'He ran three times around the lake.'

TSAs and TCAs combine well with *um*-PPs without triggering any reinterpretation. By contrast, the TDA in (14.b) triggers an iterative reinterpretation: the TDA measures the time it takes to circle around the lake an indefinite number of times. Zwarts (2005, 2008) calls this a plural reading, which he models with an explicit plural operator on a basically bounded PP.

I represent the aspectual properties of *um*, as it is used in examples like (14), by an intergressive PA which reflects the fact that in PPs like *um den See* the initial position is reestablished when the LO has completed a round of running around the RO:

(15) Phase array for *um + NP*: $\langle\ [_{p0}\ S\ ],\ [_{pi}\ {\sim}S\ ],\ [_{p1}\ S\ ]\ \rangle$

Intergressive predicates lend themselves perfectly to iterative uses in unbounded contexts, as combinations of semelfactives with TDAs show: *cough/blink/knock for hours*. This is due to the fact that, since the state that holds before the event is the same as the state that holds after the event (cf. Egg 1995), the event can easily be started over and over again. This is different for egressive and ingressive predicates, for which iterative readings require much more interpretational effort (compare (14.b) above with (8a.); see also *switch on/turn off the light for hours* vs. *flash for hours*). These characteristics of intergressive predicates account for the

ease with which *um* can be used with an iterative reinterpretation in unbounded contexts (see (14.b)).

The above representation is likely to be somewhat simplistic in that it does not palpably capture the full bandwidth of usage of this preposition. As an example (there are many more; see, e. g., Wunderlich & Herweg 1991), consider the use of *um/around* as in *Er lief um die Ecke* and *He ran around the corner*, where the start and end positions of the motion are different. There is clearly a need for a more detailed analysis of the characteristics of the path associated with this preposition (see, e. g., Zwarts 2005 and 2008). We could accommodate PPs like the above in our PA-based approach by way of relaxing the condition on the phases that surround the middle phase, demanding only that this phase is surrounded by contrasting phases which may or may not be locally identical. The PA (15) would then be a special instantiation of this more general PA. Note that this would not alter the aspectual properties which we ascribe to this preposition. A more comprehensive account of *um* has, however, to be deferred to subsequent research.[14]

3.3 Process-like pre-/postpositions: *längs, entlang*

The second type of what is traditionally classified as route prepositions is *längs* 'alongside', together with the postposition *entlang* 'along'. As Klein (1991) points out, these pre-/postpositions are not full synonyms: *längs der Straße* means 'roughly in parallel alongside the road', whereas *die Straße entlang* allows the LO to move alongside (like *längs*) or on the road.

Based on the observations about the behaviour of the preposition in the well-known test contexts in (16), I assign to *längs* the unbounded monadic PA of a state/process predicate, as in (17):

(16) a. * *Er lief in einer Stunde längs der Straße.*
          'He walked alongside the street in one hour.'

     b. *Er lief eine Stunde lang längs der Straße.*
          'He walked alongside the street for one hour.'

     c. * *Er lief drei Mal längs der Straße.*
          'He walked alongside the street three times.'

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[14] Note that German *um* does not have the 'crisscross' reading of English *around* (cf. Zwarts 2005) as in *He drove around the city center for hours*. In German this needs to be expressed by the adverbial *umher* in conjunction with a static local PP like *im Stadtzentrum* 'in the city center'.

(17)   Phase array for *längs + NP*: $\langle\,[_{pi}\ S\ ]\,\rangle$

In contrast to the other prepositions which we have examined so far, *längs* quite strongly defies any aspectual reinterpretation. If at all, the typical reinterpretations of state expressions described in § 2.2 – ingressive and "chunking" – may be marginally possible. This would, however, not impact the above aspectual classification, which assigns to a PP like *längs der Straße* a state of localization on a path that extends in its middle segment (p_i) alongside the street and whose initial and final course are blanked out in terms of localizing the LO. This PA does not at all refer to what happens with regard to S at the left and right context of the path segment which it singles out. Any bounding of the path and the associated state of localization needs to come from other PPs, like in *Er lief von der U-Bahn-Station längs des Botanischen Gartens zum Heinrich-Heine-Saal* 'He walked from the metro station alongside the Botanic Garden to the Heinrich Heine Hall'.

    Although *längs* und *entlang* are nearly synonyms, the subtle difference between them that Klein points out may not be the only one. Substituting *entlang* for *längs* in our test contexts shows a much less pronounced concord with the stative constellation for *entlang* than for *längs*:

(18)   a. ⁺ *Er lief in einer Stunde die Straße entlang.*
            'He walked along the street in one hour.'

        b. *Er lief eine Stunde lang die Straße entlang.*
            'He walked along the street for one hour.'

        c. ⁺ *Er lief drei Mal die Straße entlang.*
            'He walked three times along the street.'

I see two courses of explanation for this difference in aspectual behaviour. First, we can speculate from Klein's observation that, with *längs*, the RO (in the present case, a street) provides little more than a general orientation for the motion of the LO/theme, whereas with *entlang*, the LO/theme can enter into a much more direct, functional relationship with the RO (if this is of an adequate sort). This may allow one to figure a situation in which the LO/theme paces out or perambulates the street in its entirety, for some surmised purpose. And this kind of adaptive conceptual reasoning might in turn make it much easier to accommodate the basically unbounded predicate to a bounded context than in the case of *längs*.

    A second line of explanation – and I'd rather leave the decision open here – would be to clearly contrast the aspectual properties of *entlang* with those of

längs and abandon for the former the claim that this preposition unequivocally heads unbounded PPs (*pace* Kaufmann 1995: 75). This would mean moving *entlang* into the class of prepositions which I am going to discuss in the next section, namely those prepositions which are semantically underspecified with regard to the property of boundedness vs. unboundedness.

3.4 Aspectually underspecified prepositions: *durch, über*

The semantics of *durch* 'through' and *über* 'over/across' is quite intricate and has, particularly in the case of *durch* and its English equivalent *through*, been subject to a number of deep and insightful studies.[15] I take it that *durch* and *through* are selected as a path preposition when the RO is conceptualized as a three-dimensional object, like in *durch den Tunnel* 'through the tunnel'. In contrast, *über*, which overlaps with English *across* and *over*, is typically selected as a path preposition with ROs that are conceptualized as two-dimensional surfaces, as in *über den Platz* 'across the square'.

As regards their aspectual properties, these prepositions are usually considered to have a basic bounded meaning. This position is based on the assumption that the middle segment of the path to which the prepositions relate usually completely traverses the interior (for *durch/through*) or the surface (for *über/*across) of the RO, and that the path both starts and ends outside of the RO. This would indeed yield a twofold change of state, which of course would render the respective PPs bounded.

In this vein, Zwarts (2005) posits a primary bounded meaning for *through* and *across* on the basis of examples of the kind shown in (19.a). Unbounded uses of these prepositions are derived by the operations of grinding and pluralization on the basic bounded meaning. Prepositional grinding, in analogy to cases such as *There is apple in the salad* in the nominal domain, effectively blanks out all parts of a path that are outside the relevant region of the RO. Grinding thus yields the unbounded readings of sentences like (19.b), in their non-goal-directed 'seesaw' sense which gives the impression that someone is strolling around in the park or on the green. Pluralization (which accords with my notion of iteration; see § 3.2) would be used to derive the unbounded readings of sentences like (19.c), in their 'back and forth' sense:

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[15] Kaufmann (1993) is the most detailed study of this preposition that I am aware of. See also Zwarts (2005) and Krifka (2012) for many interesting considerations about possible path shapes for *through*. As regards *über*, note that I'm dealing with motion-related uses of this preposition only.

(19)   a. *He walked through the tunnel/across the bridge in two minutes.*

   b. *He walked through the park/across the green for one hour.*

   c. *He walked through the tunnel/across the bridge for hours.*

Similarly, Kaufmann (1993, 1995) assumes the bounded uses as basic and derives unbounded uses by way of conceptually suppressing any borders that the RO may in fact have. Egg (1995) treats *through* as the main exemplar of an intergressive (i. e., bounded) predicate in the spatial domain. However, Csirmaz (2012) argues just the other way around: The unbounded meaning of *through* is basic; bounded readings arise because a change-of-state interpretation is imposed upon the basic meaning.

   My position is that neither the bounded nor the unbounded meanings can be taken as basic without reservation (at least for the German versions, although I conjecture the same for English). Rather, both prepositions are underspecified with regard to their aspectual properties. This means that their PA looks like (20) and that aspectual properties of the sentences they appear in are determined not by the prepositions themselves but by other elements in their context.

(20)   Phase array for *durch/über + NP*: $\langle\ [_{p0} |S\ ],\ [_{pi} S\ ],\ [_{p1} |S\ ]\ \rangle$

This position is based on two major observations: First, as we already saw in (19), and as is also demonstrated by (21), more often than not *durch* and *über* are equally fine in both bounded and unbounded contexts, with no traceable demand for reinterpretation.

(21)   *Er lief in einer Stunde/eine Stunde lang/drei Mal durch den Park/über die Wiese.*
   'He walked through the park/over|across the lawn in one hour/for one hour/three times.'

Secondly, and in disagreement with the claims cited above, in many cases no complete traversal of the relevant regions of the RO is required for *durch/through* or *über/across*. What is more, a complete traversal can even be explicitly excluded. Take the examples in (22). Here, the moving object does not leave the respective region of the internal arguments of *durch* and *über* (the office and the pitch, resp.) at all; the full path, including start and end, stays within these regions (at least on standard interpretations):

(22)   a. *Er ging vom Schreibtisch durch sein Arbeitszimmer zum Regal.*
      'He walked from his desk through his office to the bookshelf.'

b. *Er lief von seinem Tor über das Spielfeld zum gegnerischen Strafraum.*
'He ran from his goal across the pitch to the opposing penalty area.'

I conclude from examples like these that the meanings of the prepositions on their own do not imply any demarcation of the path, especially not in terms of the borders of the RO. The task of delimiting the motion and its path is rather delegated to other elements in the sentence. In (22), this task is performed by the accompanying egressive (source) and ingressive (goal) PPs. In (19.a) and (21) the bounded reading is imposed upon the sentence by the TSA or TCA. In cases like *Er kam durch den Park/über die Wiese* 'he came through the park/across the lawn' it is the meaning of the verb that determines a bounded reading (more on *kommen/come* below, § 4.2). In other cases, it may even be conceptual knowledge or assumptions about functional properties and shape of objects which decide on preferred interpretations. So, barring contradicting evidence from other elements in the sentence, unbounded interpretations are most likely preferred – albeit by no means mandatory – for objects such as cities, forests, parks in the case of *durch/through*, and places, squares, fields, etc. in the case of *über/over/across*, where motion can easily be taken as being not primarily goal-directed. However, if properties of the RO suggest a goal-directed path function (tunnels, passages, etc. for *durch*; bridges, streets, etc. for *über*), the preference for a bounded interpretation clearly increases. And the extreme cases are doors, windows, etc. in combination with *durch*, and lines, borders, etc. in combination with *über*, i. e., ROs for which one factual dimension is conceptually downgraded. In these cases, bounded interpretations are vastly preferred and unbounded interpretations can almost exclusively be obtained only via iterative reinterpretations (⁺*He walked through the door/over the border for hours*).

I'd like to stress at this point that the impact of conceptual knowledge about object shape and function on semantic interpretation and compatibility is not specific for the prepositions under consideration here, but is a pervasive phenomenon especially in the spatial domain. It is conceptual knowledge about object shape that distinguishes the way in which dimensional adjectives can be applied to objects of similar orientation, as in *high/⁺long tower* vs. ⁺*high/long pole*; or that makes the depth of a room a different dimension of the object than the depth of a hole – in the former case, the depth is a horizontal dimension, whereas in the latter case it is a vertical dimension. What is more, conceptual knowledge about typical functions of objects, such as their use as means of public transportation, may account for distinctions such as *bus/taxi/riksha into town* vs. *+car/+bicycle*

into town. In our present area of interest, we can point to examples like *Ich bin eine Stunde zum Schwimmbad/zu Ikea gegangen* 'I went to the swimming pool/to Ikea for one hour (literally: one hour)'. Only the latter object licenses the interpretation that the speaker's stay in the goal region lasted one hour (for swimming pools this interpretation is only available in combination with the preposition *in(s)*).[16]

As an alternative to the present approach, we could assume an intergressive PA $\langle$ $[_{p0}$ ~S $]$, $[_{pi}$ S $]$, $[_{p1}$ ~S $]$ $\rangle$ as representation of the basic aspectual meaning of *durch* and *über* and allow particular RO properties (the ones that parks and lawns exhibit, as opposed to tunnels and bridges or even doors and borders) to "despecify" this PA to the underspecified representation $\langle$ $[_{p0}$ |S $]$, $[_{pi}$ S $]$, $[_{p1}$ |S $]$ $\rangle$. This "despecification" would still be different from Zwart's grinding approach or any other "unbounding" mechanism in that it would allow the aspect of expressions like *He walked through the park/over the green* to go either way (see (19) and (21)). However, in the light of the examples plus the observations in (22), I prefer to assign to these prepositions an underspecified PA which can be made more specific by a plethora of contextual features, which comprise not only explicit linguistic indicators such as other spatial and temporal modifiers but also typical object properties. I thus assume that conceptual knowledge about objects such as doors and borders can narrow down the space of interpretation of an aspectually underspecified preposition like *durch* and *über* to eventually one preferred specific aspect.

As a consequence, considering the shape of the paths which *durch* and *über* characterize, traversal of only a significant portion of the characteristic region of the RO is required, rather than a full traversal.

Are there aspectually underspecified directional pre-/postpositions other than *durch* and *über*? One candidate might be *entlang*, as discussed in §3.3. Other candidates are *hinauf* 'up(wards)' and *hinab* 'down(wards)':[17]

(23)   *Er lief in einer Stunde/eine Stunde lang/drei Mal den Berg hinauf/hinab.*
       'He walked up/down the mountain in one hour/for one hour/three times.'

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[16] I assume that many of the relevant parameters in the interpretation of *durch* and *über* could be explained in terms of Lang's (1989) theory of object schemata. I do, however, subscribe to Kaufmann's (1993) position that object schemata have to be enriched with functional information in order to account for the *bus/taxi/car/... into town* example.

[17] Zwarts (2005) treats the English prepositions *up* and *down* as ambiguous between an unbounded "comparative" and a bounded "superlative" reading.

The syntactic and semantic category of these words is not clear; they can be treated as postpositions or as directional adverbs (a category which Kaufmann 1995 also considers for *entlang* and even *längs*). Anyway, the examples in (23) show that in the present framework their aspectual contribution as directional postpositions would be captured by the underspecified PA scheme (20).

4 Aspectual properties of verbs of dynamic localization

4.1 Phase arrays for motion verbs

In the following paragraphs, I will discuss the aspectual properties of verbs of dynamic localization according to the classification set out in § 1. As for dynamic prepositions, I will represent the aspectual properties of these verbs in terms of the constraints they impose on the PA that is associated with the path they introduce into the semantic representation. These constraints are represented by predicates over the theme argument of the verb, i. e., the LO which is subject to the dynamic localization (see § 2.4). The predicates are again linked to the specific sections of the PA that we already used in order to represent the aspectual contributions of prepositions. The aspectual properties of V-PP combinations will thus be computed from the combined constraints which verbs and PPs impose on the different sections of the underlying PA, in the form of conjoined predications.

4.2 Intransitive verbs of motion (IMV)

The analysis of directional prepositions in combination with intransitive motion verbs showed that these verbs (disregarding *kommen* 'come' for the moment) indeed do not contribute any aspectual constraints on their own to semantic composition. In fact, they combine freely with all sorts of directional prepositions, which in turn determine the aspectual properties of the resulting phrases. We can thus gather from the discussion in § 3 that verbs like *laufen* 'walk', *gehen* 'go', *rennen* 'run', etc. are indeed underspecified with regard to aspect, as I hypothesized at the outset of the examination of prepositions. The PA for the verbs in question therefore looks as follows:

(24)   Phase array for IMVs *laufen, gehen, rennen,* etc.: $\langle$ [$_{p0}$ |S_V], [$_{pi}$ S_V], [$_{p1}$ |S_V] $\rangle$

The findings for *kommen* 'come' are different: (25.a) shows that the combination with an underspecified preposition leads to a bounded predicate. (25.b) shows that directional PPs in combination with *kommen* can refer to all segments of a

path. We can therefore posit the PA (26) for *kommen*, which factors in a change of state concerning the position of the LO (which is determined by the *origo*; see Kaufmann 1995) at the end of the path, and leaves all further details to the directional modifiers.

(25)   a. *Er kam *eine Stunde lang/in einer Stunde durch den Park.*
           'He came through the park for/in one hour.'

       b. *Er kam in einer Stunde aus der Stadt durch den Park in das Dorf.*
           'He came out of the town through the park into the village in one hour.'

(26)   Phase array for the bounded IMV *kommen*: $\langle$ [$_{pi}$ ~S_V], [$_{p1}$ S_V] $\rangle$

In order to illustrate how the PA of a complex predicate is composed of the constraints coming from the PAs of its components, let us look at two (simplified) examples with an aspectually underspecified verb of motion. (27) shows the composition of the PA of the bounded VP-predicate *aus dem Haus in das Dorf gehen* 'go/walk out of the house into the village'. I use S_{GO}, S_{IH} and S_{ID} as abbreviations for the predicates contributed by the verb and the two PPs; the subscripts of the PP-predicates indicate the states of being in the house and in the village, resp. (28) shows how the PA of the aspectually underspecified VP-predicate *durch den Park gehen* 'walk through the park' is composed. The meaning of *durch den Park* 'through the park' is represented in a rather simplistic form using the predicate of being located on a pathway in the park, S_{DP}, just for the purpose of illustration.

(27)   PAs for

       a. *gehen:* $\langle$ [$_{p0}$ |S_{GO}], [$_{pi}$ S_{GO}], [$_{p1}$ |S_{GO}] $\rangle$

       b. *aus dem Haus:* $\langle$ [$_{p0}$ S_{IH}], [$_{pi}$ ~S_{IH}] $\rangle$

       c. *in das Dorf:* $\langle$ [$_{pi}$ ~S_{ID}], [$_{p1}$ S_{ID}] $\rangle$

       d. *aus dem Haus in das Dorf gehen:* $\langle$ [$_{p0}$ |S_{GO} & S_{IH}], [$_{pi}$ S_{GO} & ~S_{IH} & ~S_{ID}], [$_{p1}$ |S_{GO} & S_{ID}] $\rangle$

(28)   PAs for

       a. *gehen:* $\langle$ [$_{p0}$ |S_{GO}], [$_{pi}$ S_{GO}], [$_{p1}$ |S_{GO}] $\rangle$

       b. *durch den Park:* $\langle$ [$_{p0}$ |S_{DP}], [$_{pi}$ S_{DP}], [$_{p1}$ |S_{DP}] $\rangle$

       c. *durch den Park gehen:* $\langle$ [$_{p0}$ |S_{GO} & |S_{DP}], [$_{pi}$ S_{GO} & S_{DP}], [$_{p1}$ |S_{GO} & |S_{DP}] $\rangle$

(27.d) is bounded, due to the involved changes of state, whereas (28.c) remains aspectually underspecified, as desired. It can easily be verified that adding the PA for an egressive or ingressive PP like (27.b) or (27.c) to (28.c) would render the predicates *aus dem Haus durch den Park gehen* and *durch den Park in das Dorf gehen* bounded. Adding an underspecified PA like (28.b) to a bounded PA like (27.d) would, of course, not change the aspect.

How can we account for the fact that VP predicates like *längs des Bachs laufen* 'walk alongside the brook' are unbounded? The PA for this predicate has to be computed from one underspecified PA for the verb – $\langle\, [_{p0}\,|S_V\,],\, [_{pi}\,S_V\,],\, [_{p1}\,|S_V\,]\,\rangle$ – and one decidedly unbounded PA for the PP: $\langle\, [_{pi}\,S_{AB}\,]\,\rangle$ (where S_{AB} is a simplified representation of being located on a pathway alongside the brook). We have to make sure on the one hand that, if no further information is added by a bounded PP, the resulting predicate (29.a) will be unbounded – cf. (29.b-c). On the other hand, the aspect must not be specified to 'unbounded' before all other constraints of the sentence have been evaluated, because additional PPs could indeed make the construction bounded, like in (29.d).

(29) a. *längs des Bachs laufen*
          'walk alongside the brook'

  b. *stundenlang längs des Bachs laufen*
          'walk alongside the brook for hours'

  c. * *in einer Stunde längs des Bachs laufen*
          'walk alongside the brook in one hour'

  d. *in einer Stunde längs des Bachs in das Dorf laufen*
          'walk alongside the brook into the village in one hour'

In (29.d), the constraints of the PA for the goal preposition are integrated with the PAs of the other elements in the normal way, which yields a bounded structure, due to the change of state with regard to the location of the LO in the final section of the path. In order to account for (29.a–c) I assume some principle of informational completeness. When all conditions are evaluated, the resulting combination of predicates is assumed to be complete for this discourse segment in focus. In the above example (29.a), there is just one single PP which blanks out what happens before and after the relevant phase. In this case, where no change-of-state information is provided, the stative PP determines the aspectual type of the sentence by way of concealing all phases other than its own. This is characteristic of the unbounded aspect, a fact that is indeed borne out by (29.b–c).

Now what happens if there is no directional PP modifier at all, i. e., if the path remains unspecified, like in (30)?

(30) a. *Er lief zwei Stunden lang im Park.*
          'He walked in the park for 2 hours.'

    b. */$^+$ *Er lief in zwei Stunden im Park.*
          'He walked in the park in 2 hours.'

(30.a) shows that *im Park laufen* 'walk/run in the park', where the PP *im Park* is locative, i. e., nondirectional, is unbounded. Combining this predicate with a TSA as in (30.b) yields deficient results or may, in a quite marginal reading, induce the ingressive reinterpretation typical for unbounded predicates. Here I assume that the path predicate is defaulted to the unbounded aspect whenever the path component is left unspecified. If there is no directional modifier at all, this triggers the impression of a non-goal-directed 'seesaw' or 'to-and-fro' motion, which we could capture by a nonovert but unbounded path specification of type $\langle\,[_{\mathrm{pi}}\,S_\varnothing]\,\rangle$. This presumed default specification equates to an existential closure on path arguments, assigning to *he was running* the reading *he was running some place*, just like we understand *he was sitting* as *he was sitting somewhere* and *he was eating* as *he was eating something*.

4.3   Transitive verbs of motion

As noted in § 1, transitive verbs of motion come in two variants: those that express a continuous impulse which the agent exerts on the theme/LO, such as *schieben* 'push' and *ziehen* 'pull' (CMVC), and those where the impulse is instantaneous or punctual, such as *werfen* 'throw' and *schießen* 'shoot' (CMVI).

The aspectual properties of verbs of type CMVC are underspecified, as the examples in (31) show: In combination with underspecified PPs they accept both bounded and unbounded contexts, as in (31.a), whereas decidedly bounded or unbounded contexts enforce the corresponding interpretation (see (31.b–c)):

(31) a. *Er zog den Schlitten eine Stunde lang/in einer Stunde/drei Mal über das Feld.*
          'He pulled the sleigh across/over the field for one hour/in one hour/ three times.'

    b. *Er zog den Schlitten *eine Stunde lang/in einer Stunde/drei Mal auf den Hügel.*

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'He pulled the sleigh onto the hill for one hour (one hour long)/in one hour/three times.'

c. *Er zog den Schlitten eine Stunde lang/*in einer Stunde/*drei Mal längs der Loipe.*
'He pulled the sleigh along the ski trail for one hour/in one hour/three times.'

We can thus conclude that the PA of a verb of type CMVC has the following aspectually underspecified structure:

(32)   Phase array for verbs of type CMVC: $\langle\ [_{p0}\ |S_V\ ],\ [_{pi}\ S_V\ ],\ [_{p1}\ |S_V\ ]\ \rangle$

By contrast, verbs of type CMVI are bounded, independently from the aspectual properties of their directional modifiers (more on the combination with TSAs below):

(33)   a. *Er warf den Ball *fünf Sekunden lang/$^?$in fünf Sekunden/drei Mal über das Spielfeld.*
'He threw the ball over/across the field/pitch for five seconds/in five seconds/three times.'

b. *Er warf den Ball *fünf Sekunden lang/$^?$in fünf Sekunden/drei Mal ins Tor.*
'He threw the ball into the goal for five seconds/in five seconds/three times.'

c. *Er warf den Ball *fünf Sekunden lang/$^?$in fünf Sekunden/drei Mal längs der Seitenlinie.*
'He threw the ball along(side) the touch line for five seconds/in five seconds/three times.'

Verbs of type CMVI express an instantaneous release of contact and/or control by the agent with regard to the theme (which is the LO). I represent their aspectual properties with the PA structure in (34):

(34)   Phase array for verbs of type CMVI: $\langle\ [_{p0}\ S_V\ ],\ [_{pi}\ {\sim}S_V\ ],\ [_{p1}\ \varnothing_V\ ]\ \rangle$

The change of state from S_V to ${\sim}S_V$ makes these verbs bounded. Their PA is similar to an egressive PA, but the tripartite structure shows that the described situation is more complex than a simple bipartite egressive constellation (cf. (4.b)). The third element of the PA, $\varnothing_V$, makes use of a notational device that serves to indicate that, although the situation is explicitly acknowledged to be more complex and, in fact, to involve a full path, the verb itself decidedly excludes any

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reference to the final section of the path. As an example, a verb like *werfen/throw* contributes to the temporal properties of the events in its denotation only the fact that there is an instantaneous change of state, determined by the release of an object, through which the object is set in motion. On its own, the verb does not aggregate the initial, middle and final part of the path into a cohesive and continuous unit by means of a predicate that expressly does or does not (S_V or ~S_V, or the underspecified |S_V) hold for all segments of the path.

This conception of their PA serves to account for the fact that quite often verbs of type CMVI do not go together easily with TSAs, as is typical for predicates which describe an instantaneous change of state (this is why I put a question mark on these adverbials in (33); cf. the discussion in § 2.2 and § 3.1).[18] We can observe, however, that acceptability of these constructions comes in degrees. If the PP only puts an additional constraint on the punctual state of change from $[_{p0} S_V]$ to $[_{pi}$ ~$S_V]$ and nothing is said about $[_{p1} \varnothing_V]$, the application of a TSA (as describing the duration of the theme's motion, not in a reinterpretation to something like *it took him two seconds to finally get the ball out of the restricted area*) is close to being impossible; see (35.a). Adding information on p_1 to $[_{p1} \varnothing_V]$, as the goal PP does in (35.b), improves the situation. And if we give a full-fledged description of all components of the motion and its path, as in (35.c), the result is quite impeccable. (36) sketches the PAs associated with the combinations of V and PP for (35) in a rather simplified form (S_V, S_{IZ}, S_{UF} and S_{IK} are the predicates associated with the verb, the source, the path and the goal PP, resp.).

(35)   a.   */⁺ *Er warf den Ball in zwei Sekunden aus der eigenen Zone.*
            'He threw the ball in two seconds out of his own restricted area.'

       b.   ? *Er warf den Ball in zwei Sekunden aus der eigenen Zone in den gegnerischen Korb.*

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[18] This observation is given quite some consideration in Kaufmann (1995) and Rappaport Hovav (2008). Kaufmann considers as one possible explanation that the verbs in question do not introduce any information about the motion of the object and its associated continuous path into the semantic representation (in terms of Kaufmann's decompositional approach: these verbs do not involve a MOVE component). She concedes, however, and rightly so I believe, that this assumption makes it hard to explain how route or path prepositions can at all be linked into the semantic representation. Rappaport Hovav, by contrast, claims that the two subevents involved in a throwing event, *viz* the instantaneous release of an object and its traversing a path, are both lexicalized in the verb. However, the times of the two subevents do not coincide and the second subevent – the traversal – does not structure the first subevent – the release – by way of imposing on it an incremental process. I consider my account to be closer to Rappaport Hovav's line of thought than to Kaufmann's (*nota bene* explicitly tentative) idea.

'He threw the ball in two seconds out of his own restricted area into the opponent team's basket.'

c. *Er warf den Ball in zwei Sekunden aus der eigenen Zone über das gesamte Spielfeld in den gegnerischen Korb.*
'He threw the ball in two seconds out of his own restricted area over/across the entire court into the opponent team's basket.'

(36) a. $\langle\ [_{p0}\ S_V\ \&\ S_{IZ}\ ],\ [_{pi}\ {\sim}S_V\ \&\ {\sim}S_{IZ}\ ],\ [_{p1}\ \varnothing_V\ ]\ \rangle$

  b. $\langle\ [_{p0}\ S_V\ \&\ S_{IZ}\ ],\ [_{pi}\ {\sim}S_V\ \&\ {\sim}S_{IZ}\ \&\ {\sim}S_{IK}\ ],\ [_{p1}\ \varnothing_V\ \&\ S_{IK}\ ]\ \rangle$

  c. $\langle\ [_{p0}\ S_V\ \&\ S_{IZ}\ \&\ |S_{UF}\ ],\ [_{pi}\ {\sim}S_V\ \&\ {\sim}S_{IZ}\ \&\ S_{UF}\ \&\ {\sim}S_{IK}\ ],$
    $[_{p1}\ \varnothing_V\ \&\ |S_{UF}\ \&\ S_{IK}\ ]\ \rangle$

To sum up, we can claim that verbs of type CMVI in fact do allow of temporal measurement via TSAs, though under specific conditions only. As a minimum, the final segment of the involved path, about which the verb itself does not say anything, needs some qualification by an appropriate PP. Providing even more information about the course of the path apparently accentuates the fact that there is indeed an event taking place that has some duration which can reasonably be measured. The structure of the PA assigned to the verbs in question gives at least some clue of what is happening here.

4.4 Transitive position verbs

Transitive/causative position verbs (CPV) exhibit the characteristics of single-change-of-state verbs. They combine well with TCAs and reject both TSAs and TDAs as direct specifications of the events they describe. If TSAs and TDAs are accepted at all, then only marginally so and only with the appropriate reinterpretations in terms of temporal distance or iteration, resp.:

(37) *Er stellte das Buch* [*/+]*in drei Sekunden/*[*/+]*drei Sekunden lang/drei Mal ins Regal.*
'He put the book onto the bookshelf in three seconds/for three seconds (three seconds long)/three times.'

This observation suggests representing their aspectual properties with the PA structure in (38), which is in line with Kaufmann's (1995) claim that causative position verbs do not introduce a full path but rather describe simple transitions into a specific state of localization of the LO.

(38)   Phase array for verbs of type CPV: $\langle\ [_{p0} \sim\!S_V\ ],\ [_{p1}\ S_V\ ]\ \rangle$

Simple egressive and ingressive PPs like in (39.a) combine with CPVs without any qualification.[19] Route/path PPs cannot be added because they do not find a landing point in the verb's PA, since there is no middle section $[_{p0}\ \_\ ]$ – see (39.b):

(39)   a.   *Er legte das Buch vom Regal auf den Schreibtisch.*
              (literally) 'He put the book from the bookshelf onto the desk.'

        b.   * *Er legte das Buch vom Regal durch sein Arbeitszimmer auf den*
              Schreibtisch.
              (literally) 'He put the book from the bookshelf through his office onto
              the desk.'

The PA in (38) will account for the vast majority of constructions with causative position verbs. Nevertheless there are some very special situations in which at least *legen* and *hängen*, and possibly also *stellen*, allow of prepositions which are applied to the middle segment of a path. As a consequence, temporal measurement in the form of TSAs is also accepted in these sentences:

(40)   a.   *Er legte (in einer Minute) das Kabel vom Flur durch das Wohnzimmer in*
              den Garten.
              'He laid the cable from the corridor through the living room into the
              garden (in one minute).'

        b.   *Er hängte (in einer Minute) die Leine vom Wohnzimmer über den Balkon*
              in den Garten.
              'He hung the rope from the living room over/across the balcony into
              the garden (in one minute).'

        c.   *Er stellte (in einer Stunde) die Verstärkeranlage über die Rampe auf die*
              Bühne.
              'He put the amplification system over/across the ramp onto the stage
              (in one hour).'

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[19] With their definitions in § 3.1 in terms of the PAs $\langle\ [_{p0}\ S\ ],\ [_{pi} \sim\!S\ ]\ \rangle$ for egressive PPs and $\langle\ [_{pi} \sim\!S],$ $[_{p1}\ S\ ]\ \rangle$ for ingressive PPs, which include reference to the middle section of a path (p_i), these PPs would not immediately fit into the PA for verbs of type CPV, which does not even include this section. We can, however, accommodate the PAs for these PPs if we align only the phase of their positive state (S) with a specific path segment (for egressive PPs: p_0; for ingressive PPs: p_1) and require that their negative state ($\sim\!S$) is linked to the subsequent (p_i or p_1 in the egressive case) or previous (p_i or p_0 in the ingressive case) PA segment, which varies depending on the type of verb (CPV vs. the other verb-classes).

These cases are very specific in that they all call for objects of a specific shape and constitution. Sentences like (40.a–c) would not work with a single book. In fact, adequate objects have to have a considerable length, since combinations like in (40) require objects whose position on a path can unfold over time. The status of these uses of causative position verbs is not fully clear. On the one hand, with the exception of (40.c), there is no real change of position of an object from a source location across a path to a goal location, but rather the unfolding of a wide-stretched location. On the other hand, even these sentences are not static, but describe extended events, as is shown by the fact that they accept TSAs (and refuse TDAs, barring reinterpretations).

Since the conditions for this use of causative position verbs are highly specific, it is not reasonable to reflect at the same time core uses, as in (37), and marginal uses, as in (40), in one underspecified representation. I'd rather assume that, under the specific circumstances sketched above, the ingressive PA for verbs of type CPV can be relaxed to something like $\langle\ [_{p0}\ \sim\!S_V\ ], [_{pi}\ \varnothing\ ]\ , [_{p1}\ S_V\ ]\ \rangle$, which acknowledges that there is a middle phase to which a PP can be applied, but on its own does not put any constraints on it. As a general representation of the aspectual properties of causative position verbs, this structure would, however, be much too loose.

4.5   The aspectual impact of the theme argument

In addition to their own PA and those of their directional PP modifiers, the aspectual properties of transitive motion and position verbs depend on (at least) one more dimension, namely the way in which the theme/LO of the dynamic localization is subject to the phasal development along a path. Just like in nonspatial domains (*eat an apple* vs. *eat apples/applesauce*), a complex predicate of a dynamic spatial localization can be applied in a holistic way to the denotations of bounded NPs, i.e., to individuals, or in a distributed way to the denotations of unbounded NPs, i.e., masses or plural objects.[20]

In the spatial domain, we can observe this phenomenon already with the aspectually underspecified causative motion verbs of type CMVC when these are combined with a bounded PP: Although the PP yields a bounded change-of-state predicate, the combination of the resulting V-PP predicate with the unbounded

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[20] Cf. the seminal work of Krifka (1989a,b,c). These studies put a particular emphasis on verbs of creation and consumption (*write, eat*) and on verbs with gradual patient arguments (*read*). Krifka (1998) shows how the approach can be expanded to selected spatial prepositions.

theme NP in (41.a) is unbounded. The same holds for similar constructions with causative motion verbs of type CMVP (41.b), for constructions with causative position verbs (41.c), as well as for *kommen* (41.d), which are all bounded from the outset, as we saw in the previous paragraphs:[21]

(41) a. *Er schob (eine Stunde lang/*in einer Stunde) Schnee vom Gehweg.*
          'He pushed snow from the sidewalk (for one hour/in one hour).'

  b. *Er warf (eine Stunde lang/*in einer Stunde) Schnee auf den LKW.*
          'He threw snow onto the truck (for one hour/in one hour).'

  c. *Er stellte (eine Stunde lang/* in einer Stunde) Bücher ins Regal.*
          'He put books into the bookshelf (for one hour/in one hour).'

  d. *(Eine Stunde lang/*in einer Stunden) kam (nur) schmutziges Wasser aus der Leitung.*
          '(For/in one hour) (only) muddy water came out of the tap.'

This means that when we embed our semantic analyses of the aspectual properties of verbs of dynamic localization and their directional modifiers into a full-fledged theory of grammar with an appropriate formalism, this would need to allow the representation and calculation of the aspectual type on the basis of information from all relevant sources, i. e., from the phasal characteristics of verbs and directional PPs, as well as from the referential properties of the verb's arguments. A suitable formalism would ideally supply a rich representational inventory from which the aspectually relevant properties of verbs and their arguments and modifiers could be directly calculated. This would require a means for representing the internal structure of events, processes and states with both their parts and participants, as well as properties of and a manifold of relations between these elements. In addition, fine-grained distinctions would be needed among types of actions that can be executed on objects with different effects (such as pushing, throwing, putting, etc., in the domain under investigation here). Furthermore, there is a need to represent the different ways in which entities of different types (like simple and complex individuals, plural entities and masses – cf. a ball, a

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[21] Looking beyond the theme argument, it is not surprising that for all of the transitive verbs of dynamic localization we also find examples where it is the referential properties of the subject or agent which determines the aspect, rather than the object or theme, similar to Dowty's (1979) famous example *Tourists discovered that quaint little village for years*. In the following examples, the object/theme NPs are all bounded, while the subject/agent NPs are unbounded and render the aspect of the entire construction unbounded: *Touristen trugen/warfen/stellten (jahrelang) den Maibaum auf den Dorfplatz* 'Tourists carried/threw/put (for years) the maypole onto the village square'.

team, soccer players and snow) can be subject to change in various dimensions. I have to leave it at this here and defer further considerations about a suitable grammar formalism to future investigation.

5 Summary

In order to describe and represent the aspectual properties of verbs of dynamic localization and their directional PP modifiers, I introduced the concept of a phase array (PA), which receives its theoretical fundament in a "Löbner-style" phase-theoretical semantics. In this approach, the aspectual type of a predicate is determined by its PA, which in turn is composed of the PAs of its constituents. The verbal head of a sentence introduces a basic PA which may or may not predefine parts of the final PA. The verbs under consideration include in their semantics a motion component which links the changing positions of their theme argument to positions on an abstract path which they introduce into the semantic representation. Directional PPs in turn specify positions of their localized object (LO) – which is the verb's theme argument – on the path provided by the verb. They do this in the form of a sequence of states of localization of the LO/theme which are defined in terms of specific regions in relation to the reference object (RO), i. e., the internal argument of the preposition. Like PAs for verbs, PAs for prepositions/PP can be of the type bounded, unbounded, or underspecified.

To conclude this study I would like to relate the results of the present study to Filip's (2008) claim that, in Germanic languages, all stem verbs and many VPs are inherently unmarked with respect to boundedness ('telicity/maximality' in Filip's theory) and obtain bounded interpretations only in specific linguistic contexts or through pragmatic inferences. The picture I obtained from my analyses is multifaceted: firstly, I found clear cases of decidedly unbounded expressions among both verbs and prepositions. State/process verbs like *schlafen* and *sitzen* and their English counterparts *sleep* and *sit*, as well as a state/process-like preposition like *längs* (and Engl. *towards*), can be accommodated to contexts which select bounded predicates only with some level of reinterpretation with varied degrees of intelligibility and acceptability. If we want to enforce a bounded reading of these verbs, we have to apply specific reinterpretations, which are felicitous only under rather specific circumstances.

Secondly, quite a few verbal and prepositional predicates fit without any restraint into both bounded and unbounded constellations. In the spatial domain,

these are intransitive motion verbs (except *kommen* 'come') and transitive motion verbs that express a continuous impact on the theme (*schieben* 'push' etc.), as well as the prepositions *durch* and *über*, plus *hinauf/hinab* and possibly even *entlang*. I consider the verbs in question (plus the prepositions, which were not in the scope of Filip's claim) to be the cases that most directly conform to Filip's notion about aspectual unmarkedness.

Thirdly, I found both verbs and prepositions with a strong bias towards the bounded aspect. Among them are causative position verbs (*stellen* 'put', *legen* 'lay'), causative motion verbs that express an instantaneous impact (*werfen* 'throw'), the intransitive motion verb *kommen* 'come', plus ingressive, egressive and intergressive prepositions. These verb classes seem to contradict Filip's strong claim about category V. However, although the verbs and prepositions in question form bounded predicates in V-PP combinations, they nevertheless all exhibit a systematic dependency on the referential properties of their theme arguments (*throw balls, push snow from the sidewalk*, and the German equivalents), just like verbs such as *read*, *write* and *eat* do. Thus, if we build the dependency on properties of the theme directly into the semantic representations of the dynamic spatial verbs in question, from which we compute their aspectual properties, we would retain in their semantics a strong element of underspecification of aspect.

To close, I would like to point out that, although aspectually underspecified verbs can equally well enter into bounded or unbounded constructions, we could nevertheless observe a certain primacy of the unbounded interpretation in the domain of dynamic spatial expressions. Whenever, in the case of aspectually underspecified verbs, there is no information, like that coming from a bounded directional PP, which moves the aspect in a definite direction, the aspect is always defaulted to unbounded; cf. *Lola rennt (im Park)* 'Lola runs (in the park)'. We observed no case where an underspecified aspect is specialized by default to bounded in an indeterminate context; bounding appears to always require a specific context.

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