On the Semantics of Locatives

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1 Introduction

Space is a very tangible notion. Any animal, even when unable to speak can at least reason spatially, and usually very skillfully so. Even when dealing with abstract notions, we prefer to reason with spatial terms, because this is what we understand best. This is the reason why language is deeply entrenched with spatial metaphors, and we use spatial concepts unknowingly all the time. Yet, the notion of space has not stirred the intellect of linguists and logicians to any degree comparable to time, aspect, plurality or presupposition. And this is not because spatial notions are used metaphorically more than truly spatially. Also the genuine use of spatial expressions to refer to concrete locations has been treated with considerable neglect. Although there is already a sizeable literature on this subject (for example Bierwisch [3], Wunderlich and Herweg [30] and references therein, Nam [25] and Fong [14] to name a few) our knowledge of the use of space in language seems somehow limited. The only area in which the research is flourishing

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is in cognitive linguistics, where one is mainly interested in the conceptualization of spatial relations. However, apart from questions such as what it means to be in front of a building or near it, there are syntactic questions relating to locative expressions as well. For example, there is a solid intuition that in sentence (1.1) it is the box and not John that ends up outside of the car. This has nothing to do with the fact that the box is a transitive object. For example, (1.2) is simply ungrammatical.

(1.1) John pushed the box out of the car.
(1.2) *John watched his neighbour into the shop.

These facts are not so easily explained [1] and they require deep analysis. Moreover, it needs to be seen just what is required for (1.1) to be true. Does the box have to have been fully inside the car before? And in what ways does it have to be moved by John? And so on. Further questions concern the status of locatives: are they adjuncts or arguments, and where can they appear in the syntax.

While the questions we have just raised apply to all languages, further questions appear in connection with locative cases. Particularly interesting facts come from languages which have a rich system of locative cases. In fact, when languages have a rich case system it is usually because they have a lot of locative cases. Their number can go beyond twenty in some cases. Languages with elaborate locative case systems are mainly found in the Uralic languages, northern Caucasian languages and — to a lesser degree — the Australic languages (see [5]). In all these languages, we find that locative cases are systematically organized along two orthogonal lines: one specifying the location and the other specifying the change.

In this paper we will elaborate the syntax and semantics of locative cases of various languages by studying the syntax and semantics of locative expressions in general. We shall argue that locative expressions universally consist of two layers, one for the configuration and one for the mode. The *configuration* describes the way in which several objects are positioned with respect to each other. Configurations can be brought into correspondence with prepositions which do not indicate change of location. Examples are: *at*, *in*, *on*, *between*, *in front of* etc. The *mode* describes the way in which an object moves with respect to the named configuration. While there is no plausible

[1] In fact, this question is hardly adressed in the literature. A notable exception is Nam [25].

bound on the number of configurations that a language distinguishes, the number of modes seems to be limited: there is evidence for the stative, the cofinal, the coinitial, the transitory and the approximative mode. The mode is *stative* if the object remains in that configuration during event time (e. g. Finnish Inessive talossa, in the house); the mode is cofinal if the object moves into the configuration during event time (e. g. Finnish Illative taloon, into the house); the mode is *coinitial* if the object moves from the configuration during event time (e. g. Finnish Elative talosta, out of the house). The mode is *transitory* if the object moves in and again out of the configuration (e. g. through the tunnel). Finally, the approximative mode describes a movement approaching a configuration (e. g. towards the tunnel).

From a semantical and syntactical point of view a locative expression is therefore structured as follows.

$$M + (L + DP)\ ,$$

where M is a modalizer (specifying the mode), L a localizer (specifying the configuration) and DP a determiner phrase. However, we shall show that M and L typically form a unit. For a head initial language we therefore assume the following structure:

$$V \quad [M{+}L] \qquad DP$$

Morphologically, however, the segmentation may be different. We claim that the complex L alone cannot be a morpheme bound to DP. This would generate NPs denoting spatial regions. We shall argue that this is impossible generally. Hence, we either find that $M + L$ form a unit, which is either an apposition or a case. Inspection of case systems and historical evidence for this view will be given. It gives case theory an edge in those languages that have many local cases. A verb with a locative complement needs a location, not a thing. Therefore, it does not select both M and L, it selects only M. L remains free. So, locative complements are fixed in their mode. If the case ending encodes both mode and configuration, there is no unique case associable with the complement. Looking from the other side, the DP plays a considerable role in the choice of L over and above the purely spatial relationship involved.

2 Previous Work on Locatives

2.1 Some Preliminaries

There is a tradition to view all cases as locative expressions, and this has been advocated by Hjelmslev [17] and [18], by Anderson (see [1], [8]). Since we are concerned with the spatial meanings of local cases rather than their metaphorical meanings, this line of research is only of peripheral interest to us here. Within the transformational grammar tradition one major work on locatives is Bierwisch [4], and — in a completely different sense — Bouchard [6]. Wunderlich and Herweg [30] give a survey of the literature on locatives. More recent work on locatives is found in [25] and [14].

Before we begin with our discussion concerning the semantics of cases, we have to address some terminological and methodological questions. The locative case names are formed typically by a preposition plus the suffix -*essive* or the suffix -*lative* (see [5]). The suffix -*essive* is used exclusively for the stative mode, while the others must be expressed by the suffix -*lative*. All other information is provided by the preposition. To denote the configuration we use English prepositions (e. g. 'in', 'on', etc.). The case labels of Hungarian (the most elaborate system of case names we know of) is as follows.

	stative	cofinal	coinitial
in	inessive	elative	illative
at	adessive	ablative	allative
on	superessive	delative	sublative

There is a *perlative*, also called *prosecutive*, which denoes the transitory mode of the 'in' configuration. Of course, with the help of more prepositions more case names can be created. The case names of Finnish are the same with the exception of the last row (which does not exist). Typically, if only one series exists, people use the trichotomy ablative, allative, locative. However, 'locative' is too general a name to be useful in our setting. Since we use these labels as names for case functions rather than cases, some discrepancy with the existing terminology may arise.

Sometimes the labels given to cases are misleading and can cause confusion. For example, the Finnish *translative* is no more a locative case. Such terminology can arise since other case functions can also be expressed by locatives. [2] For example, possession can be marked by the adessive case (such is the case in Finnish), the goal (which we call destination to avoid a clash in terminology) can be marked by the allative (in Finnish, for example) and so on. We may therefore claim that the Finnish adessive is also a genitive, the allative also a dative. In this case we regard the use of the locative cases as expressing the idea of possession or giving by means of some spatial metaphor. Our working hypothesis is the following. If in a neutral verb like to walk a case can be used to express the idea of location, or change of location without some adposition then we call the case a locative case. If some adposition is needed, matters are more difficult. Usually, we observe that adpositions do not select a locative case (that would be a viable option!), but rather they select some very restricted set of cases. However, the same adposition can choose different cases (as in many Indo–European languages, but also for example in Finnish). The choice of cases may make a difference with respect to the meaning. A very clear–cut case is German, where many prepositions allow the choice between dative and accusative. Accusative is used for the cofinal meaning and dative for the stative meaning. In that case, we are inclined to say that it is the contrast that serves to differentiate the two meanings, but the cases themselves do not carry any locative meaning. Hence German has no locative cases but the cases may serve to differentiate between stative and cofinal mode.

A next issue concerns the two main uses of locative PPs, namely adjectival uses and adverbial ones. Consider the following examples:

(2.1a) I read the sentence [on the blackboard].
(2.1b) The sentence is written [on the blackboard].
(2.2a) Now arrives the train [to Helsinki].
(2.2b) This train goes [to Helsinki].
(2.3a) We are planning a trip [through the Scottish Highlands].
(2.3b) We are travelling [through the Scottish Highlands].

The (a) examples present an adjectival use of a PP and the (b) examples an adverbial use of the PP. The mechanics of the adjectival use can be derived more or less from the adverbial use. We can, for example, consider the adjectival use as elliptical. So, we may analyse the PPs of the (a)–cases as

[2] In this way, a non–locational use of an otherwise locative case can take over and the case may cease to be a local case. However, its name may persist despite the local function now being obsolete. The converse process is also conceivable though less frequently attested, when a case which is not locative turning into a locative case.

follows.

(2.1c)	on the blackboard	< which is on the blackboard
(2.2c)	to Helsinki	< which goes to Helsinki
(2.3c)	trip through the Scottish Highlands	<
	which goes through the Scottish Highlands	

Similarly, the adjectival use could be derived from the adjectival use. This approach however has several deficiencies. We will see that one of the main questions to be solved is which of the complements of the verb is moving in the specified direction. If we nominalize the verb, the subject disappears and we have trouble explaining the different behaviour without resorting to the verb and the underlying adverbial use of the locative PP. In (2.4a), the subject's location is modified, in (2.5a) the object's movement.

(2.4a) I took my breakfast in the living room.
(2.4b) The taking of the breakfast in the living room.
(2.5a) I threw the ball into the net.
(2.5b) The throwing of the ball into the net.

We conclude therefore that it is more profitable to develop a semantics for the adverbial use and derive the adjectival use from the former.

2.2 Bierwisch (1988)

Bierwisch's article [4] provides a very detailed analysis of local expressions in German. Bierwisch observes that the claims usually hold mutatis mutandis for other languages. This suggests that the regularities found are either universal or in fact not syntactic but semantic in nature. Bierwisch argues in line with Chomsky that prepositions form a major lexical class. Prepositions carry a feature $\pm$ DIR to specify whether or not they are directional. This is a syntactic feature. They project a phrase as follows. They form a P′ together with their internal argument. Van Riemsdijk [28] has argued that PPs have a specifier, and it can be of the following type (ignoring a fourth type). [3]

[3]We use Sans Serife font when the sentence is used as an example. Glosses are in Roman font with small caps. Translations are put in italics. If the translation serves also as an example, it is put into Sans Serife.

(2.6)	NP	vier Meter hinter der Tür four meters behind the door
(2.7)	AP	sehr weit vor der Tür very far before the door
(2.8)	PP	hoch oben über der Tür *high above the door*

Bierwisch argues against that on the grounds that the prepositions do select these putative specifiers. Instead, he claims that P$'$ is in fact the maximal projection. We basically agree with these intuitions.

Locatives can be predicates, arguments and adjuncts. This is exemplified in (2.9) – (2.11):

(2.9)	Alfred ist in der Schule. Alfred is at school.
(2.10)	Der Brief liegt auf dem Tisch. The letter is on the table.
(2.11)	Ich kaufe das Buch in Berlin. I buy the book in Berlin.

Bierwisch then goes on to sketch a semantic representation for locatives using the so–called semantic form language. It is at this point that we start our investigation. Using the somewhat more familiar typed λ–calculus we sketch a semantics for the typical locative expressions. In content it differs from that of Bierwisch in some aspects. First, our approach is model–theoretic and not conceptual. We are asking what it takes in the physical sense to make a statement true, without assuming anything about internal representations. Hence we do not assume an elaborate structure of space: for us, space is simply the euclidean three dimensional space. Objects occupy some path–connected subset of this space. Second, rather than proposing only a two way distinction between directional and nondirectional PPs, we propose a four way distinction. It is only one of the directional PPs (the transitory ones) which make reference to the path of an object, while the others make reference only to the place of the object at some points of the interval We also spell out in detail how the directional PPs are derived from their nondirectional counterpart. We will show that locatives have the structure $M+L+DP$, where $L+DP$ is a location. This location can be defined without reference to the path of motion. The semantics of the full locative PP is then defined by means of the semantics for the different modes, i. e. the different instantiations of M.

Furthermore, we are interested in the question of selection and modification. While Bierwisch argues that directionality is a syntactic feature and therefore eligible for selection, we will see in Section 6 that the facts are more complex. First, selection of a locative by the verb is possible. However, this happens only when the complement is not used in its original spatial meaning. When the spatial meaning is present, the verb can only select the mode of the PP. However, it can select specifically a particular mode rather than just selecting the value of the feature DIR. There is only one hard restriction as for the cooccurrence of verbs and PPs. If the event is static no directional PP may be used. Directional verbs do allow nondirectional PPs (contrary to claims of Bierwisch and others).

(2.12) Er rannte auf der Straße bis zur Ampel.
He ran on the road up to the street lights.

The reason is that a nondirectional PP simply says that the object remains in the location throughout event time. This is perfectly compatible with an activity, where the object is in motion. However, if the object is not in motion, a directional PP cannot be added, unless of course a different interpretation is chosen. There are some canonical examples where this is so (see also [14]).

(2.13) a trip from München to Rome through the Alps
(2.14) a bridge from Buda to Pest
(2.15) Alfred called Holger from London.

Here, as in many other cases, an object can be measured by means of a path (namely, we think of moving along the object from one end to the other). This is the case in (2.14). In (2.13), the denotation of the DP itself implies that there is some path involved. In the case of (2.15) we may think of an unspecified object (e. g. information, sound waves) as travelling from one end of the line to the other. Alfred, who initiates the call, is the origin of the path, and Holger the destination. Alternatively, if we think rather in terms of destination and origin one can understand the role of the PP quite naturally as specifying the location of the destination. However, since we would rather say that Holger is called *in* London, this interpretation is not without problems.

2.3 Nam (1995)

[25] presents a detailed study of the meaning of English locatives. His theoretical framework is that of Keenan and Faltz ([21]), who in their book outline the basics of a boolean semantics of static locatives. In their view, a static locative is an intersective modifier. This explains why the following inferences are valid:

(2.16) John is walking in the garden.
$\therefore$ John is walking.; John is in the garden.

Furthermore, Keenan and Faltz already observed that such modifiers show what they call *orientation*. They are modifiers of the predicate, yet they talk about the location of the subject. This is not necessarily so. In the following example, the modifier in the garden is talking about the location of the subject but alternatively about te location of the object:

(2.17) John sees Mary in the garden.
$\therefore$ John sees Mary.
(2.18) $\therefore$ Mary is in the garden.
(2.19) $\therefore$ John is in the garden.

It is however not possible to have it both ways. Either we construe the modifier with the subject or with the object. Nam basically agrees with these intuitions, but takes the analysis further. First, he shows that the analysis also holds for directional locatives. They are intersective modifiers, which show orientation. The kind of orientation that verbs show is constrained by the type of verb in question. The results found by Nam, buidling on [23], are shown in Table tab:orientation. ($O + S$ means that the locative is construed either with the subject or with the object; $O \times S$ means that it is simultaneously construed with both the subject and the object.) We shall return to this problem area in Section 7. In order to be able to extend the analysis of Keenan and Faltz to directionals, the ontology must be enriched. It is not enough to have just time points, we also must have paths. Nam takes paths to be (finite) sequences of locations. In contrast to Keenan and Faltz, Nam assumes that locative prepositions can also be predicate extensors. This is to say, they can raise the arity of the verb by one. Examples are found in prepositional passives and in languages which incorporate locatives into the verb. The first kind of examples are

(2.20) The bed was bounced on till it broke.
(2.21) This road has been marched along thousands of times.

Table 1: Orientation of Locatives

	Static	Directional	Symmetric	Source
Motion-Causative Verbs, Verbs of 'Sending/Carrying'				
drag, push, run; send, take				
	O	O	O	O
Verbs of Placement, Verbs of 'Hunting'				
place, set, put; watch, hunt				
	O	O	O	⋆
Verbs of 'Combining/Attaching', Verbs of 'Housing'				
mix, tape (music); contain, store, dienen (zu etw.)				
	O	O	⋆	⋆
Vebrs of 'Perception', Vebrs of 'Communication', Verbs of 'Contact'				
find, see; call, cable, touch				
	O	⋆	zugleich S,O	S, O
Verbs of 'Co-movement'				
escort, accompany, chase, drive, follow				
	S, O	S, O	S, O	S, O
Verbs of 'Social Interaction'				
meet, embrace, marry, fight, visit				
	S, O	⋆	⋆	⋆
Verbs of 'Judgement', Psych-Verbs, Intensional Verbs				
criticize, honor; adore; seek, mention				
	S	⋆	⋆	⋆

In (2.20), the preposition on combines with the verb (to) bounce to form a verb (to) bounce on, which is then passivized. While in English the preposition continues to be a separate word, in many other languages it is incorporated into the verb. In Bantu languages this is widespread. Nam cites the following from Chichewa ((2.22) and (2.23)) and Kinyarwanda ((2.24) and (2.25)):

(2.22)	Mbidzi	zi-na-perek-a	msampha	kwa	nkhandwe
	zebra	SP-PAST-hand-ASP	trap	to	fox
	The zebras handed the trap to the fox.				
(2.23)	Mbidzi	zi-na-perek-er-a		nkhandwe	msampha
	zebra	SP-ASP-hand-APPL-ASP	fox	trap	
	The zebras handed the fox the trap.				
(2.24)	Umwaana	y-a-taa-ye	igitabo	mu	maazi
	child	SP-PAST-throw-ASP	book	in	water
	The child has thrown the book into the water.				
(2.24)	Umwaana	y-a-taa-ye-mo		ammazi	igitabo
	child	SP-PAST-throw-ASP-in	water	book	
	The child has thrown the book into the water.				

It is noted that the incorporated preposition promotes the locative PP into a direct object. Such verbal particles are also found in German (for example be-, unter-) and Hungarian. We shall discuss them in Section 6.

2.4 Fong (1997)

This dissertation provides a detailed study of directional locatives of Finnish, with some comparisons with French, Mandarin Chinese and English. The basic results of this thesis are as follows. First, directional locatives (DLs) have a more abstract meaning than is generally assumed. That is to say, they do not refer necessarily to paths. However, English and Finnish differ in that Finnish DLs can operate on the apectual (or temporal) structures of the verb, while English DLs cannot. DLs interact with the verb and its aspect in quite subtle ways. The spatial meaning is recovered by mapping the abstract structures into the more concrete, spatial domain. Also, Fong observes that the analysis obtained for DLs does extend to static locatives in Finnish.

Fong uses phase quantifiers introduced by Löbner in the analysis of DLs in general. The idea of a phase quantifier is fairly simple. The truth of propositions is time dependent, so we may view them as functions from the time line to the set of truth values, here $\{0, 1\}$. Given a proposition p, we say an interval I is *admissible* for p if the truth value changes in I and (the restriction of p to the interval I) is a monotonic function from I to $\{0, 1\}$. So, I is the disjoint union of two nonempty intervals J_0 and J_1 such that J_0 is entirely before J_1, and p is false in J_0 and true in J_1. Now, a directional locative like into takes a DP and returns a set of admissible intervals. The sentence containing the PP is therefore true, if the event time in such an interval. Take for example (2.25). The preposition into, for example, denotes the function from propositions (here Jack is in the house) to sets of time intervals. Given p, $\mathsf{to}'(p)$ is the set of all intervals admissible for p. So, (2.25) is true iff the proposition Jack is in the house is admissible for the interval specified by the event Jack went.

(2.25) Jack went into the house.

It is probably fair to say that what is studied in [14] is not the locatives, but the modes. The cofinal mode corresponds to the phase quantifier for the proposition that the object which is in motion is in the location given by the PP. The coinitial mode corresponds to the phase quantifier for negation of that proposition. Fong considers phase quantification as abstract. It can apply to any linear order. This allows to treat also the essive and the the translative of Finnish, which are not local cases, but talk about an object having or becoming a property (see Section 5 for these cases). This suggests that the modes which we find in locatives are of much wider significance. Fong claims that this is not an artefact of the separation between mode and location. Rather, she points out several reasons why DLs are not restricted to spatial movement. First, NPs can also freely be modified by DLs, even though there is nothing in motion, such as (2.27).

(2.27) a bridge from Buda to Pest

Second, many verbs in Finnish demand a DL even though nothing is moving. Verbs of this kind are unohtaa (*to forget*) and löytää (*to find*). They must be construed with DLs, while in English a static loctive is mandatory. Notice that in Finnish you forget into the location, but you find out of it.

(2.28) Tuovi unoht-i kirja-n auto-on/*auto-ssa.
Tuovi forget-PAST-3SG book-ACC car-ILL/*car-INESS
*Tuovi forgot the/a book *into/in the/a car*

(2.29) Tuovi löys-i kirja-n auto-sta/*auto-ssa.
Tuovi find-PAST-3SG book-ACC car-ELA/*car-INESS
*Tuovi found the/a book *out of/in the/a car*

We shall deal with these verbs in Section 6. There are several drawbacks with Fong's proposal. The notion of a phase quantifier seems to be too rigorous a notion to begin with. The phase quantifiers match only the cofinal and coinitial mode. But there are other directional locatives (those in transitory or in approximative mode) which cannot be analysed by means of phase quantifiers at all. But even the analysis of the coinitial mode as given by Fong seems questionable. She connects out of with the location in, rather than the location out. However, as we shall note, it is not the same to be not in a location as to be out of it. Consider by way of example (2.30). It would be true under the proposal if there was an event of Jacks going, where initially he was in the house and at the end he was not. (For the proposition Jack is in the house must change exactly once in truth value, from 1 to 0).

(2.30) Jack went out of the house.

But this is not what this sentence is saying: it says that the proposition Jack is out of the house changes from false to true. This means that from the logic of phase quantification, the elative is a cofinal mode, not coinitial. But this is just contrary to what we must expect.

Fong is right in pointing out that DLs do not need something being moved, but it does not seem to be a fact of Finnish alone. Many languages use DLs as complements of verbs, and there is nothing being moved. For example, in Hungarian félni (*to fear*) is construed with the ablative. What this suggests is not that the ablative of Hungarian can have non–spatial meaning, but rather that it can be idiosyncratically selected. We shall argue that not only cases but also modes are open to idiosyncratic selection, and this will generate the facts for the Finnish verbs without any additional assumptions. Fong's own analysis is that the Finnish verbs have a diphasic structure, and this is what makes the DL felicitous. We are not told however exactly what this diphasic structure consists in and how the DL can interact with it.

3 Ontological Assumptions

Before we will lay down the formal approach it is worthwile to outline our ontological assumptions. This might clarify some peculiarities of the present approach. First, we assume an ontology with things, events and groups thereof. Events are particular things, and they are denotations of — among other — verbs. (See [26] for a defense of the use of events.) On an event there are certain partial functions defined corresponding to the θ–roles. Consider for example

(3.1) Harry is painting a picture for Mary.

This sentence says that there is an event e in which there is an agent called Harry, a beneficiary called Mary and some theme, which is a picture. So, the functions agent', $\mathsf{beneficiary}'$ and theme' are defined on this particular event e and yield Harry, Mary and the picture, respectively. If I say only

(3.2) Harry painted a picture.

then the function $\mathsf{beneficiary}'$ is not necessarily defined (though it may be). However, for an event of painting it is constitutive that there is an agent, so the function agent' is always defined. We shall in subsequent parts often refer to something constituting some event. This is an important notion. It may often be hard to say what it is that constitutes a certain type of event, but it is just as hard to say what makes a thing a certain type of object, eg when is something a democracy. For Harry painting it is constitutive that he takes some paint and by some means puts it onto a surface. So, we need as requisites some paint, Harry, a surface, and some thing with which the paint is spread onto the surface. For Harry to paint a picture it is further required that what he paints is a picture. And so on. We shall see that while certain type of *DPs* can be added rather freely (for example beneficiaries), other are less free. It depends on the event in question. If the event is the event of Harry's writing then it is hard to see what Harry's writing a windmill should be. Windmills aren't the type of things that you can write. Similarly with directional PPs. Their compatibility with an event depends on there being something that constitutes the event by moving. This is because the directional PP can only describe the path of that object rather than any other.

We shall assume that verbs typically denote sets (!) of events and nouns sets of things [4] Most syntactic arguments are treated as semantic adjuncts. This makes the semantics easier to handle. The argument/adjunct distinction is therefore in this system an artefact of the syntax. [5] The event variable is bound by the tense operator. We shall assume that modifiers denote the same type of sets as the modifiees. Now, if M is a modifier and E a modifiee, then we have as interpretations in our model $\mathfrak{M}$ two sets, namely $[\![M]\!]^{\mathfrak{M}}$ and $[\![E]\!]^{\mathfrak{M}}$. The constituent $[ME]$ is then interpreted by $[\![M]\!]^{\mathfrak{M}} \cap [\![E]\!]^{\mathfrak{M}}$.

An event usually has a time and a place associated with it. That is to say, there are functions time' and loc', which return for each event e its time and its location. We have already said that these functions may not be defined in all cases, but we are interested in this paper mainly in those events where they are. The event time is always an interval; we allow no scattering of an event in time. Similarly, we assume that the location of an event is path connected (though not necessarily convex). (See the Appendix for technical definitions concerning spatial and topological concepts.) There is a subtle but important difference to be made between the event location and the location of the participants. First, the event location contains all locations of the acting participants in the event. That this is not an innocent notion may be exemplified by the following examples. Consider first (3.1). If Harry is painting a picture for Mary, then we want to say that the event location must certainly include the location of Harry and that of the picture, but not necessarily that of Mary. Say therefore that an event participant is **active** if it must be contained in the event location. So, Mary is a **non–active participant**. Of course it needs to be clarified what non–active participants are. We leave that matter unresolved. It may suffice here to say that this notion seems to be connected with the type of θ–role assumed in the event. To take a different example look at

(3.3) Albert is moving with all his furniture to Tokyo.

It seems clear that both Albert and his furniture are active participants in the sense of the definition. Now consider Albert taking an airplane to Tokyo, while his furniture gets shipped. In what sense is Albert moving *with* his

[4] It has to be said though that for the theory to work in all cases we shall assume also that some nouns denote sets of events as well, such as trip and so on. However, we shall not bother to deal with that in detail.

[5] This is on our part not a theoretical commitment. We have chosen things this way just for simplicity. If the semantics is developed well enough, we believe, the argument/adjunct distinction might well have its roots in semantics.

furniture? We cannot say that there is one event of moving; that would contradict the connectedness requirement. If there are two, however, how can I say Albert moved *with* his furniture? I have no answer to this problem. I do want to uphold the connectedness requirement, but I acknowledge that it is not altogether unproblematic.

Now, given that we have the locations of the active participants, we want to argue that the location of the event is at least that of the active participants. Obviously, one needs to take some connected set of locations containing them. However, this is admittedly vague. If we are playing cards at a table, then the location of the playing is one which contains our locations as well as those of the cards. Presumably, we will be generous and take the table as a whole with it. If at some point I go out into the kitchen to get some food then we would on the other hand not say that the kitchen is part of the location of us playing cards. However, by force of definition it would be. The solution to this problem is to say that at certain moments of the interval I am actually *not* playing. That is to say, the partial function agent returns a group that contains myself at some moments during the event time, and not at others. We shall not say, however, that there is a different event of us playing going on. Also this point is left unresolved. Let us stay however with the problem of location. We have already assumed that there is such a thing as the location of a participant. Hence, we assume that there is a function loc, which for a given moment of time and some object, returns the location occupied by that object at that moment of time. All locations must be path–connected. (So, Saturnus and its ring are two objects, not one.) We might ponder to assimilate events to objects by saying that their location is something that changes over time. However, I think that events have a location in a sense that individuals do not. Consider Harry. There is nothing about Harry that would force him to occupy one place rather than another; indeed, we would not like to speak of Harry's location simpliciter. This is different with events. We wish to contend that events have a location. This is simply the union of all locations occupied by the active participants during that event (plus something more).

If I have to be more precise at this point I should say that what distinguishes events from individuals is — among other things — their relatively short lifespan. This in turn makes it feasible to speak of their location as something absolute, and not something that changes through time. When we ask of an event, where it happened, we get an answer like: 'in Manchester', 'under the tree', 'on the grass' and the like. And we do not get answers like:

'from Berlin to Hamburg', 'into the railway station'. So, we refer to a location of an event as an absolutum, a property of the event itself. [6] Naturally, an event may consist in something moving around. In that case the location of the thing that is moving is of course changing through time, but not that of the event. The very moment that a thing remains in constant enough a location throughout its lifespan we can refer to its location as an absolutum. We ask of the location of a city, a mountain, or things like that; but not of a car or a lion, except perhaps when it is locked up in a cage. Thus, whether or not a location is a property of an individual qua individual is a question of its durability. Moreover, it is a gradual affair. We are not inclined to say that Hamburg is near Jonas, but we rather say that Jonas is near Hamburg. This is because the second element defines the location with respect to which the first is placed. We are less inclined to think of Jonas as having a location with respect to which we would place a city than we are to position Jonas with respect to the location of that city.

Now we come to another rather crucial observation concerning things and events. We assume that agents, beneficiaries and so on not not only be individuals but also groups. We take groups to be sets of individuals, not conglomerates. This allows us to iterate the construction of group formation. We will not go into the ramifications of this. In general, if α is a type, then $\alpha^\bullet$ denotes the type of groups of type α. A thing is of type $\alpha^\bullet$ if it is a set of things of type α. So, there will be groups of individuals, of locations, of time points and even groups of events. [7] We shall also assume that there is a notion of an *individual.* We shall say here that an individual is nothing but an *urelement.* Here, an *urelement* is anything that is not a set. Examples of urelements are Harry, Mary, the picture, the event of us playing cards, the city of Tokyo and the like.

It is clear that certain verbs can take only groups as agents, others only

[6] One might object that this is just so because we asked with the help of where, which requires a location. But note that in order to ask for the destination of an event (if that were to exist) we would have to use the question *Wereto did it happen?, which is ungrammatical. Therefore, events have a location simpliciter, it does not change over time. They have no origin and no destination.

[7] For those who find the uncritical use of sets worrying we say that we do not consider pairs of individuals to be groups. So, the pair $\langle x, y\rangle$ is not identical to any set formed with the help of x and y, in particular the set $\{x, \{x, y\}\}$. We consider the pair an entity in its own right. It follows that functions and relations and other formal creatures cannot be groups. (Though there might of course be groups of functions — but that is another matter.)

individuals. What is however also important is that we allow for groups of events. A verb does not simply denote an event; it may possible denote a group of events. Consider for example the following sentence:

(3.4) In several cities there were demonstrations against the government.

We may consider this as saying that there was an event of demonstrating in several cities. However, we want to argue on conceptual grounds that this is wrong. An event is something that takes place in some interval of time and which has a location that is connected. So, if we have demonstrations at various disconnected places then we must assume that these are several events, each constituting a separate event of demonstrating against the government. Now, we may either take the sentence to denote a group of events with each having its own location, or we may in fact associate with the whole group of events a location. What can that be? The first solution is to take the union of these locations. The other would be to take the group of locations. We shall see later that both are correct on different occasions. In general, given a function f of type $\alpha \to \beta$, we can associate a function $f^\bullet : \alpha^\bullet \to \beta^\bullet$ defined as follows:

$$f^\bullet(X) := \{f(x) : x \in X\}$$

This is the **group function** associated with f. If $\beta = \gamma^\bullet$, we may on the basis of the group function define the **cumulative function**

$$f^\circ(X) := \bigcup f^\bullet(X) = \bigcup \{f(x) : x \in X\}$$

This is the same as with agents. A group of events can have as agent the group consisting of those groups partaking in the individual events; or it can have as agent the group of all those individuals that took part in one of the events. This difference appears in the following sentences.

(3.5) The Smiths and the Toalsters met.

We may read this as saying that the Smiths met and that the Tolasters met. Under this reading, there are two events of meeting, one for each family. The agent is the group of the agents of the different events. We may however also have a reading in which, although there is a group of events, the agent is simply the entire group of the Toalsters and the Smiths.

Finally, we should say something about the nature of space in language. We shall assume that there is a type of entity called *point* and an entity called *region*, which we consider to be a certain set (= group) of points. Although in the natural sciences such a notion is very common, the need for such a category must be argued for. After all, we rarely speak of regions in an absolute way; we always define them by means of an object that occupies them. Of course, an absolute notion of space makes spatial reasoning much simpler than if we were to construe the space by means of the objects inhabiting it. However, there are also linguistic facts that show the existence of locations (regions) as independent entities. Consider first the word where. We can ask for locations using the word where, but we cannot ask for groups or sets of individuals. Otherwise, it would be interchangeable with what. Hence, the kinds of objects that the word where asks for are regions. Further, the word there denotes a region. This explains the following contrast. [8]

(3.6a) Dort, wo das Gras noch grün ist, ...
(3.6b) There, where the grass is still green, ...
(3.7a) *Das Buch, wo wir gelesen haben, ...
(3.7b) ? The book, where we have read, ...
(3.8a) *Dort, worin das Gras noch grün ist, ...
(3.8b) *There, in which the grass is still green, ...
(3.9a) Das Buch, worin wir gelesen haben, ...
(3.9b) The book, in which we have read, ...

What this data shows is that relative clauses involving German wo (like English where) can be used to define a modifier for regions, but not for things. On the other hand, German worin (like English in which) returns a modifier for things, but not for regions. The same holds for other languages that we have been looking at. Interesting supporting evidence for a distinct semantic type of location comes from Australian languages. [9] Although the facts are the same in many Australian languages (see [10] for example), we shall exemplify them with Martuthunira (see [11]). Like many Australian languages is allows case markers to be stacked. The ablative case denotes a temporal relationship ('after') or a locational one ('away from'). When it is used in the latter meaning, it needs a location as a complement. Here is an example. The word for person is kanyara. If we want to say *away from the person* we must use the ablative stacked on top of the locative:

[8] In these and all following examples, the (b) sentences are English translations of the (a) sentences. They appear in Sans Serife font since they are also used as examples.

[9] These facts have been brought to my attention by Alan Dench.

(3.10) kanyara-li-nguru
person-LOC-ABL
away from the person

The use of the ablative alone has a different effect:

(3.11) Nhartu-ma-rnu-lwa-rru ngula kanyara-nguru waarruwa-nguru?
what-CAUS-PASSP-ID-NOW IGNOR person-ABL devil-ABL?
What became of them after the time they were people, devils?

So, the ablative can be attached to them stem directly or following the locative. Only in the latter construction does it have a locative meaning (in fact, it then turns into a modalizer signalling coinitial mode). However, it would be a mistake to attribute this to the presence of the locative case. In [11] it is explicitly stated that if a noun is inherently locational, the ablative signals coinitial mode when attached directly to the stem. Consequently, we find

(3.12) Wanthala-nguru-lu?
where-ABL-EFF?
where from?

(This is example (4.65). The additional case marker EFF is of no significance here. It can be dropped.) These facts are naturally explained if we assume that certain nominals denote locations, while most nominals denote things.

Next consider adjectives like blue, hot and so on. I will argue that these are functions from space points and time points to truth values. We say for example:

(3.13a) Diese Kachel ist oben blau und unten weiß.
(3.13b) This tile is blue above and white below.
(3.14a) Es ist heiß in Miami aber kalt in Berlin.
(3.14b) It is hot in Miami but cold in Berlin.

If blueness was a property of objects it would not be clear how to deal with the phrases oben (above) and unten (below). Moreover, one can demonstrate that it is precisely locational PPs that can be put in place of oben and unten. We conclude therefore that they denote regions and not things. Likewise in the other example. We will claim that hotness is not a property of an object as such, but rather an object is hot somewhere at some point of time. An object is blue or hot simpliciter if it is blue or hot on all its relevant parts. So, we may rightfully say,

(3.15a) Diese Kachel ist blau.
(3.15b) This tile is blue.
(3.16a) Miami ist heiß.
(3.16b) Miami is hot.

However, blue and hot differ from adjectives like wise and caring in that they are defined primarily on locations and only in a derived sense on objects. Consequently, the following sentences do not make sense:

(3.17a) *Dieser Mensch ist oben weise.
(3.17b) *This man is wise above.

4 Semantical Analysis

4.1 Localisers

Our basic ontology consists of time points (i), which are real numbers, spatial points (p), which are triples of reals, objects (e), events (v) and truth–values (t, which is identical to the set $\{0, 1\}$). (For technical background on spatial and topological concepts see also the Appendix.) A proposition is an entity of type $i \to t$. Our fragment is purely extensional. An interval can be construed as a set of type $j := i^\bullet$, a region as a set of type $r := p^\bullet$. We require in both cases that the sets are path–connected. A **parametrized region** is a function from time to regions; it is an object of type $i \to r$. A **neighbourhood** is a set of regions, hence an object of type $r^\bullet = p^{\bullet\bullet}$. A **parametrized neighbourhood** is a function from time points to neighbourhoods and so of type $i \to r^\bullet$. [10] We assume that there is a function loc' of type $e \to (i \to r)$. It returns for any given object a function from time points to regions; this region is the location of the object at the given time.

We will motivate the basic idea with a simple example.

(4.1) The cat emerged from under the table.

The preposition consists of two parts, namely from and under. The structure is

[10] There is a popular theory of the plural due to Link in which groups are construed as conglomerates, and not as sets. For this theory, $r^\bullet$ must be the same as r, since a conglomerate of conglomerates is simply a conglomerate. For us it is important though that we have sets and not just conglomerates.

(4.2) [from [under [the table]]]

The PP under the table defines some location by means of a noun phrase (the table) and a preposition. We call such a preposition a *localiser*, because it serves to define a spatial region by means of a noun phrase. The phrase (4.1) however says that there is some movement with respect to the location during the event time, which can be characterized as follows. At the beginning of the event time, the object is fully contained in the location and at the end of the event time it is fully outside the location. Moreover, the movement proceeds more or less directly. That means, in (4.2) the cat moves from the location under the table to a location not under the table, but not back — at least during event time. We call the preposition from a *modaliser* because it serves to define the mode of the movement.

First we turn to the localisers. Examples of localisers are in, at, on, between, under. Non–examples are because (since it does not denote any spatial relationship) and out and into (because there is some change of location involved). Moreover, we do not consider any temporal prepositions (to keep matters simple). Naively, we would think of a localiser as a relation between regions, where a region is a subset of the three–dimensional space (or some other suitable space). So, if R is the set of regions, a localiser denotes a subset of $R \times R$. From a syntactic point of view, however, $P + DP$ is already a saturated expression, namely a PP. It can function as a complement as well as an adjunct, depending on circumstances. So, we replace the binary relation by a different construct. There is a natural adjunction [11] between subsets of $R \times R$ and functions from R to subsets of R. Namely, if $H \subseteq R \times R$, then let $H^{\spadesuit}$ be defined by

$$H^{\spadesuit}(x) := \{y : H(x, y)\}$$

The map from H to $H^{\spadesuit}$ is bijective. So, we can alternatively take as the meaning of a localiser a function from regions and to set of regions, that is, neighbourhoods. There is an additional complication arising from the fact that the localiser does not take regions but DPs as complements. The object denoted by a DP can be moving in space (eg a car). Now given a function N from regions to neighbourhoods, we define the corresponding localiser $N^{\heartsuit}$

[11] Here, the word 'adjunction' is used in its meaning in category theory. For readers unacquainted with it it is actually enough in this contex to understand that an adjunction is — among other things — a bijection.

as follows.

$$N^{\heartsuit} := \lambda x.\lambda t.N(\mathsf{loc}'(x)(t))$$

This is an object of type $e \to (i \to r^{\bullet})$. Applied to an object it yields a parametrized neighbourhood. This means that we will construe the localiser as a function from individuals to neighbourhoods which are changing through time, called parametrized neighbourhood. Hence a localiser is an adposition which defines a parametrized neighbourhood from a *DP*.

Here is an example. Let r be a region. Denote by $\iota(r)$ the convex hull of r minus the region r itself. So, if r is the location of a box, $\iota(r)$ is what we call the *inner* or *interior* of that box. Then, let $i(r, s)$ iff $s \subseteq \iota(r)$. The function $i^{\spadesuit}$ acts as follows. Given a set r, it returns all sets s such that $i(r, s)$, that is, all s such that $s \subseteq \iota(r)$:

$$i^{\spadesuit}(r) = \{s : s \subseteq \iota(r)\}$$

Using this function, the semantics of in becomes

$$\begin{array}{rcl} \mathsf{in}' & = & i^{\spadesuit\heartsuit} \\ & = & \lambda x.\lambda t.i^{\spadesuit}(\mathsf{loc}'(x)(t)) \\ & = & \lambda x.\lambda t.\{r : i(\mathsf{loc}(x)(t), r)\} \\ & = & \lambda x.\lambda t.\{r : r \subseteq \iota(\mathsf{loc}'(x)(t))\} \end{array}$$

It is easy to see that this is a function of type $e \to (i \to r^{\bullet})$. So, in' is a function from objects to parametrized neighbourhoods. [12] In a similar vein, we can now analyse a lot of other spatial concepts, like at, on, under. What we need in addition to the usual set theoretic notions is a metric, and an orientation. The metric is needed to define the meaning of on. Let $d(\vec{x}, \vec{y}) : \mathbb{R}^3 \times \mathbb{R}^3 \to \mathbb{R}$ be the usual distance metric (see Appendix). Then

[12] This applies only for singular DPs. For plural DPs we assume that the semantics of in is a function of type $e^{\bullet} \to (i \to r^{\bullet\bullet})$, taking groups of objects to parametrized groups of neighbourhoods. The semantics can be standardly generated as follows. If f is of type $e \to (i \to r^{\bullet})$, the corresponding plural, $P(f)$, is of type $e^{\bullet} \to (i \to r^{\bullet\bullet})$, where

$$P(f) := \lambda x^{\bullet}.\lambda t.\{f(x)(t) : x \in x^{\bullet}\}$$

Now, there are prepositions that take groups only, for example between and among. For them we must assume that the semantics is of type $e^{\bullet} \to (i \to r^{\bullet})$. Namely, they are functions from groups of objects to parametrized neighbourhoods. We will not go into the details here.

for subsets $r, s \subseteq \mathbb{R}^3$ put [13]

$$d(r,s) := inf\{d(\vec{x},\vec{y}) : \vec{x} \in r, \vec{y} \in s\}$$

Furthermore, the **diameter** of r is

$$\delta(r) := sup\{d(\vec{x},\vec{y}) : \vec{x},\vec{y} \in r\}$$

For example, r **touches** s if $r \cap s = \varnothing$ and $d(r,s) = 0$. r is **near** s if $d(r,s)$ is small in comparison to $\delta(r)$ and $\delta(s)$. [14] The vertical orientation is given by the vector $\vec{e}_3 := \langle 0,0,1\rangle$, which is orthogonal to the plane $x_3 = 0$. Now, we say that $\vec{x}$ is **above** $\vec{y}$ if the difference $\vec{x} - \vec{y}$ is a positive multiple of $\vec{e}_3$. So, $\vec{x} = \langle x_1, x_2, x_3\rangle$ is above $\vec{y} = \langle y_1, y_2, y_3\rangle$ if $x_1 = y_2$, $x_2 = y_2$ and $x_3 > y_3$. Further, we write $a(s,r)$ if for every $\vec{y} \in s$ there exists an $\vec{x} \in r$ such that $\vec{y}$ is above $\vec{x}$. We write $u(s,r)$ if for every $\vec{y} \in s$ there exists an $\vec{x} \in r$ such that $\vec{y}$ is under $\vec{x}$. The rest is analogous to the case of in. Namely, we put

$$\begin{array}{rcl} \mathsf{above}' & := & a^{\spadesuit\heartsuit} \\ \mathsf{under}' & := & u^{\spadesuit\heartsuit} \end{array}$$

It then follows that

$$\begin{array}{rcl} \mathsf{above}' & = & \lambda x.\lambda t.\{r : a(r, \mathsf{loc}'(x)(t))\} \\ \mathsf{under}' & = & \lambda x.\lambda t.\{r : u(r, \mathsf{loc}'(x)(t))\} \end{array}$$

Notice that given these definitions, it is not the same to say that x is above y and that y is under x. For example, in Figure 1, in A, we say that (4.3) is true while (4.4) is false. The situation is the converse in B. Here, (4.5) is true while (4.6) is false.

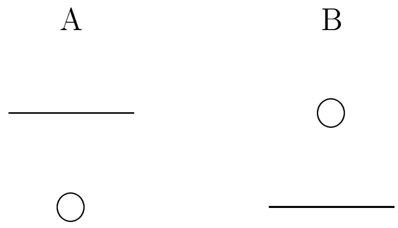
(4.3) The circle is under the line.
(4.4) The line is above the circle.
(4.5) The circle is above the line.
(4.6) The line is under the circle.

In the above examples it was not apparent that we needed the notion of a neighbourhood rather than that of a region. However, let's look at the

[13] Notice that vector arrows are used to denote space points, while ordinary variables denote objects.

[14] This needs to be made precise, though. We shall not an attempt to do that, since we are only peripherally interested in identifying the meaning of individual localisers,

Figure 1: Under and Above



preposition on. Clearly, an object is *on* another object if it is above it and the two touch. The question is whether we can reduce this to a function from the location of the second object to a region such that x is on y at t iff $x \in O(\mathsf{loc}'(y)(t))$. This is not possible. Let us take an example. The box is on the table if it is above the table and it touches the table. Let r_1 be the region occupied by some box b_1. Let b_2 be a box inside b_1, and r_2 its region. Where do we have to find r_2 inside r_1 in order for b_2 to touch the table? Obviously, one cannot answer this. So, knowing the region r_1 is not enough. Hence, there is no region specifiable independently of the object in question in which that object must be contained in order to touch the table. So, we must say that

$$\mathsf{on}' := \lambda x.\lambda t.\{r : r \in \mathsf{above}'(x)(t) \text{ and } d(r, \mathsf{loc}'(x)(t)) = 0\}$$

We can continue with more localisers in a similar fashion. Notice that in some cases the mere shape of the object is not sufficient to establish the spatial relation. A case in point is in front of. If one would know only the abstract shape of a building one would not be able in general to know whether one is in front of the building, since it requires that one faces the entrance (or so it does in many cases).

4.2 Modalisers

Now we turn to the mode. We shall classify the modes according to the sets in which a certain proposition is true. To that end, take a set $J \subseteq I$. We say that J **begins** I, in symbols $\mathsf{beg}'(J, I)$, if for all $s \in I$ there is a $t \in J$ such that $t \leq s$. We say that J **ends** I, in symbols $\mathsf{end}'(J, I)$, if for all $s \in I$ there is a $t \in J$ such that $s \leq t$. This is defined for all sets of reals. If J and I are intervals, then this captures the usual intuitions: J begins I if J is an initial part of I, J ends I if it is a final part of I. Notice that the definitions do not specify whether J or I are open intervals. There is moreover an extreme case to be noted. If $I = [s,t]$ then the one point interval $[s]$ begins I, and the one point interval $[t]$ ends it.

Now, let x be an object, I an intervals and L a parametrized neighbourhoods. Then put

$$A(x, L, I) := \{t \in I : \mathsf{loc}'(x)(t) \in L(t)\}$$

This is the set of intervals such that x is contained in the some region of L. We say that x is **statically in** L **during** I if $A(x, L, I) = I$. x is **coinitially in** L **during** I if $A(x, L, I)$ begins I. x is **cofinally in** L **during** I if $A(x, L, I)$ ends I. This allows us to define the basic four modes.

$$\begin{array}{ll}
\mathsf{st}^*(x, L, I) \text{ iff} & A(x, L, I) = I \\
\mathsf{cf}^*(x, L, I) \text{ iff} & A(x, L, I) \neq I \wedge \mathrm{end}'(A(x, L, I), I) \\
\mathsf{ci}^*(x, L, I) \text{ iff} & A(x, L, I) \neq I \wedge \mathrm{beg}'(A(x, L, I), I) \\
\mathsf{tr}^*(x, L, I) \text{ iff} & \neg\mathrm{st}(x, L, I) \wedge \neg\mathrm{cf}(x, L, I) \wedge \neg\mathrm{ci}(x, L, I)
\end{array}$$

Using the metric, we can als define the approximative mode in the following way:

$$\mathrm{ap}^*(x, L, I) \text{ iff } (\forall s, t \in I)(s \leq t \rightarrow d(\mathsf{loc}'(x)(s), L(s)) \geq d(\mathsf{loc}'(x)(t), L(t))$$

Here, we put $d(X, L(t)) := \mathit{inf}\{d(X, Y) : Y \in L(t)\}$. Now let us take a locative expression. We shall assume that the interval I is the event time. We shall assume that there is a function $\mathsf{time}' : v \rightarrow i^\bullet$, which returns for each event its time. (Again, notice that we are assuming events to take place not at any old set of reals, but rather an interval.) We assume that there is a specific object, called the **mover** is the only thing about which the event predicates that it moves. We will be concerned later with the identification of the mover. We shall assume here that there is a function $\mu : v \rightarrow e$ that returns for an event the mover. (It will be necessary to lift that function to be of type $v \rightarrow e^\bullet$.) Now, with these things defined we can write down the final definitions.

$$\begin{array}{lll}
\mathsf{st}' & := & \lambda L.\{\mathcal{E} : \mathsf{st}^*(\mu(\mathcal{E}), L, \mathsf{time}'(\mathcal{E}))\} \\
\mathsf{ci}' & := & \lambda L.\{\mathcal{E} : \mathsf{ci}^*(\mu(\mathcal{E}), L, \mathsf{time}'(\mathcal{E}))\} \\
\mathsf{cf}' & := & \lambda L.\{\mathcal{E} : \mathsf{cf}^*(\mu(\mathcal{E}), L, \mathsf{time}'(\mathcal{E}))\} \\
\mathsf{tr}' & := & \lambda L.\{\mathcal{E} : \mathsf{tr}^*(\mu(\mathcal{E}), L, \mathsf{time}'(\mathcal{E}))\}
\end{array}$$

Here, $\mathcal{E}$ is an event variable and L a variable for parametrized neighbourhoods. Notice that we have defined the modes in such a way that they take a parametrized neighbourhood and return a set of events. Technically, we have made the directional PPs into (semantic) adjuncts. There are of course other solutions. So, consider the example (4.1). The expression from under the table is now rendered as follows. The parametrized neighbourhood, L, is in this case the set of all regions which are contained in the region which is under the table. The event is the event of the cat emerging, and the mover is the cat. We have coinitial mode, so the proposition the cat is under table is true for some initial segment of the interval, and the proposition no part of the cat is under the table is true at some point t during event time. This means that at some point the cat was with all of its parts not under the table.

Notice that we have defined the static mode, st', in the same way as all the directional modes. There are as we shall see many possibilities to construe a static PP with an object. They can however be defined in just the same way, exchanging $\mu(\mathcal{E})$ by a suitable (active) participant. We shall not work out the details here.

4.3 Discussion

The definitions set up in the previous parts have to justified and explained. By our definitions, (4.1) is true just in case there was an event e of emerging in the past such that (a) at some beginning of e, the cat was under the table, (b) the cat was not always under the table. Let us see what is right about this proposal and what possibly needs revision. First, it has in the literature not been recognized that the landmark may be moving in time. Therefore, it is not legitimate to speak of its location simpliciter. Consider by way of example the contrast between (4.7) and (4.8). [15]

(4.7) Throughout out the race, Schumacher was driving behind Häkkinen.
(4.8) At the beginning of the race, Schumacher was driving to behind Häkkinen.

What (4.7) means is that at all time points of the race, the location of Schumacher's car was behind the location of Häkkinen's car. Hence, the relationship between the cars remains constant throughout the interval. In (4.8) this is different. Here, the relation of behindness is reached only confinally in the

[15] (4.8) sounds stilted, one is inclined to omit to. In German the contrast is clear. One uses the preposition hinter with the dative in (4.7) and with the accusative in (4.8).

relevant interval. In both examples, the landmark is moving, and there is no relation constant over time according to which behindness is defined for Schumacher's car. Hence, it is clear that we must compute the relation at each moment.

What is not so clear, however, is at what intervals which relationship must hold. Our definition are only the weakest ones one can come up with. Namely, the set of points at which the cat is under the table is *any set beginning the interval* $\mathsf{time}'(e)$. One wishes to stengthen this to say that it is also an interval. This we claim depends on the telicity of the event in question. For a nontelic event we see no reason to strengthen our definition. Otherwise, (4.9) is ruled out as ungrammatical.

(4.9) The can ran out of the kitchen into the living room and back into the kitchen.

One may object to this and say that (4.9) speaks about two events, one spanning the cat's running from the kitchen into the living room, and the other spanning the cat's running from the living room into the kitchen. However, notice that we would not go as far as to say that there have been two events of running. So, if you have two contiguous intervals I and J of the cats running, there is only one process underlying it.

The last problem concerns the question whether it is enough just to require that the cat is not under the table rather than requiring that it must have completely been not under it at the end. Similarly, and perhaps more clearly, this would require us to say that if you are going into the house, you must have been outside of it before. Once again, we must reject such a proposal. Consider the sentences (4.10) – (4.13).

(4.10) Jack went away into the house.
(4.11) Jack came to me from inside the house.
(4.12) Jack went out of the house.
(4.13) Jack came to me from outside the house.

It is clearly not the same to say that you are in the house and that you are not outside of the house. You might just be standing in the door. Likewise, to be outside of the house is not the same as to be not inside the house. All four notions involved are clearly different. (4.10) can be true if Jack is standing in the entrance of the house, so initially he is neither in the house nor outside of it. Likewise, if I am standing in the door and Jack is approaching me from inside the house, (4.11) can be true even if Jack never leaves it.

Analogous arguments hold for (4.12) and (4.13).

A note of clarification is in order. No language that we have been looking at distinguishes the localiser L from the combination $M + L$, where M is in static mode. However, these two are clearly distinct. One reason is that modalisers do take expressions of the form $L + DP$ (eg under the table), so the latter must be of type $i \to r^{\bullet}$. We shall therefore assume that in languages the static mode is always expressed by $\varnothing$. Further, although $L + DP$ is a parametrized neighbourhood, it can nevertheless behave like an adjective. Hence, we shall assume that $NP\ L\ DP$ it is elliptical for

$$NP, \text{which is/was } L\ DP^{16}$$

We remark here that the semantics takes only a summary view of the movement. To walk out of the house can be done in many ways, fast, hesitatingly, or hovering back and forth until one finally steps outside of the door. All this is not reflected in the modes. Moreover, the modes distinguish only between the state of affairs in some cardinal points of the time interval (the end points, the interior). Arguably, there are instance in which one needs to make reference to the entire path. In English this would be the preposition along. [17]

(4.7) The tourist walked along the river.

Here, to walk along the river means to walk wherever the river is, throughout the interval. Moreover, by default one more or less walks in one direction. I have also found a language where this function is expressed by a case. Csúcs [9] reports that Votiac (a Finno–Ugric language; the modern official name is Udmurt) has a case called *transitive*. It expresses that the movement goes through or along an object. The examples he gives are

[16] Note that we have to fill in a time point here. We can not simply say that an object is located in a parametrized neighbourhood but rather that it is located in a parametrized neighbourhood at a given time point.

[17] I owe this point to Regine Eckardt.

(4.8) ul'čaj-eti avtobus koškiz.
street-TRANS bus went
The bus went along the road.

(4.9) so uknoj-eti učke val.
the window-TRANS he looked
He looked through the window.

(4.10) sur-eti
river-TRANS
along the river

Similarly with

(4.11a) The train went through the tunnel.
(4.11b) The train went in and out of the tunnel.

(4.11b) allows the train to exit the tunnel at the same side where it entered, while (4.11a) requires the train to pass through the tunnel and exit at the other side. Therefore, [5] speaks of the transitory mode as encoding the path, while the cofinal and the coinitial mode encode only the destination and the origin. But matters are more complex than that. I think that one can hardly say more than that the transitory mode encodes that the object has been in the configuration during some interval contained in the event interval. The additional meaning that the transitory mode may carry with it is much harder to pin down (if it exists). For example a police constable in search for a suspect can say

(4.12) I walked through the whole house but I could not find anyone.

Here through means something like: the path more or less covers the house, anything that was in the house could have seen from one point of the path. It does not mean: he left the house through a different door than the one through which he entered it.

We shall end with a remark on some further locative cases that do not fit into this schema. The first is the *approximative*. It is used to specify a direction. Like the transitive of Votiac it specifies a property of the path that an object takes. The following is from [9]:

(4.13) nil šur-lań bińiz
girl river-APPR ran
The girl ran in the direction of the river

A last example is the *terminative*. It specifies that the movement went really up to the destination. It is sometimes hard to distinguish it from the allative. We think that the difference is mostly aspectual. Here is an example from Votiac and Hungarian.

(4.14) arama-oź biźimi — Votiac
a liget-ig futottunk — Hungarian
meadow-TERM we ran
We ran up to the meadow.

5 Crosslinguistic Survey

In this section we will sketch the locative case systems of some languages, in particular Avar, Finnish, German, Hungarian and Tsez. This will provide evidence for the distinction into the particular modes and also for the markedness hierarchy. Hjelmslev has categorized the cases (not only the local ones) into four types. We can reproduce his division as follows. Say that a locative expression E has feature +TO if there is a nonempty segment of I which does not end I during which the mover is totally outside of E. If there is no such segment, E has feature −TO. Let E have feature +FROM if the mover is in E at some nonempty subinterval of I which does not begin I. If no such interval exists, E has value −FROM. Now the four modes can be characterized as follows.

	−TO	+TO
−FROM	stative	cofinal
+FROM	coinitial	transitory

This classification fits well with the markedness hierarchy, which is as follows. [18]

$$\text{stative} < \text{cofinal}, \text{coinitial} < \text{transitory}$$

We see that the markedness increases with the number of + signs. Moreover, it is easy to see that the course of movement becomes increasingly more complex with the number of + signs. Further below we will see that in Avar the transitory cases are marked derived from the cofinal ones by a separate

[18] Notice that this classification does not extend further. Tsez for example uses the approximative, which falls outside of this hierarchy. It is therefore doubtful that the analysis can be maintained as it stands.

suffix, and that non–stative cases are in turn derived from the stative cases by a suffix. The latter phenomenon is also found in Kâte and Selepet (New Guinea). Now, if this hierarchy is correct, we expect also to find that if a language whose morphology or syntax systematically distinguishes some modes will distinguish all four of them if and only if it has a distinct transitory mode. The facts are as follows. Avar, Votiac and Greenlandic Eskimo employ the transitory mode in their case systems. They have all four modes, and the locative cases each exist in all four modes. Finnish and Hungarian (and many other language noted below) each have three modes (therefore not the transitory mode), but each locative case exists in all three modes. Furthermore, Hungarian locative appositions (which are postpositions) come in three kinds, one for each mode. Most Indo–European languages do not have any locative cases. Latin, for example, although it has a case called *ablative*, this case hardly functions as a locative case. It usually needs a preposition to go with. One can observe, however, that the locative prepositions with accusative denote cofinality. When the ablative is used without a preposition it denotes the inessive (see [5]). Proto–Indo–European had a locative. German however presents a rather consistent use of case to signal mode; traces of this system can be found in other Indo–European languages as well (e. g. Latin, as noted above). German has no locative cases, but it uses the dative/acusative contrast to mark the distinction between stative and cofinal mode with certain prepositions.

Avar Many Caucasian languages have a rather full set of locatives. This is exemplified by the languages Avar, Tabassaran and Tsez. Each of the three is highly transparent morphologically. The data on Avar is taken from [5]. There are 27 cases, of which 20 are locative cases. They are summarized in Table 2. We notice that in Avar there is a systematic distinction between all four modes. We also note that the transitory mode is derived from the cofinal mode by the suffix `-n`. Further, the cofinal mode is derived from the stative mode by means of `-a` or `-ssa`, while the coinitial mode is derived by means of `-e`. Hence, the case suffix of the transitory cases is really a series of three morphemes. Furthermore, and more importantly, we can see that the modalizer follows the localizer, which is as predicted for a head final configuration.

Table 2: The Locatives of Avar

Configuration ↓	Mode → Stative	Coinitial	Cofinal	Transitory
on	-da	-d-e	-da-ssa	-da-ssa-n
at	-q	-q-e	-q-a	-q-a-n
under	-ƛ'	-ƛ'-e	-ƛ'-a	-ƛ'-a-n
in	-ƛ	-ƛ-e	-ƛ-a	-ƛ-a-n
in a hollow	-∅	-∅-e	-∅-ssa	-∅-ssa-n

Table 3: The Locatives of Tsez (Non-Distal)

Configuration ↓	Mode → Stative	Coinitial	Cofinal	Approximative
in	-ā	-āy	-ā-r	-āɣor
among	-ɬ	-ɬ-āy	-ɬ-er	-ɬ-xor
at	-x(o)	-x-āy	-xo-r	-x-āɣor, x-ār
under	-ƛ	-ƛ-āy	-ƛ-er	-ƛ-ɣor
on (horizontal)	-ƛ'(o)	-ƛ'-āy	-ƛ'o-r	-ƛ-āɣor, -ƛār
on (vertical)	-q(o)	-q-āy	-qo-r	-q-āɣor, -q-ār
near	-de	-d-āy	-de-r	-d-āɣor, -d-ār

Tsez The Tsez system is even richer than that of Avar. This is because it distinguishes more local functions and second because each local case comes in two varieties, a non–distal and a distal one. The local cases are shown in Table 3 and 4, which are taken from [7]. [19] The difference of a distal case as opposed to a non-distal case is that the former marks the location as invisible or distant (whence the name). This is not explicated further in the cited source, but has been clarified in personal communication by Bernhard Comrie. Notice that Tsez has four modes, but in contrast to Avar the fourth mode is the approximative rather than the transitory mode.

[19] The morphological segmentation is also due to [7]. Some notes on pronunciation. [ɣ] is an uvular fricative, [q] an uvular affricate. [ƛ] and [ƛ'] are both lateral affricates, the latter in addition ejective. [ɬ] is a lateral fricative.

Table 4: The Locatives of Tsez (Distal)

	Mode →			
Configuration ↓	Stative	Coinitial	Cofinal	Approximative
in	-āz	-āz-ay	-āz-a-r	-āz-a
among	-ł-āz	-ł-āz-ay	-ł-āz-a-r	-ł-āz-a
at	-x-āz	-x-āz-ay	-x-āz-a-r	-x-āz-a
under	-ƛ-āz	-ƛ-āz-ay	-ƛ-āz-a-r	-ƛ-āz-a
on (horizontal)	-ƛ'-āz	-ƛ'-āz-ay	-ƛ'-āz-a-r	-ƛ-āz-a
on (vertical)	-q-āz	-q-āz-ay	-q-āz-a-r	-q-āz-a
near	-d-āz	-d-āz-ay	-d-āz-a-r	-d-āz-a

Finnish Finnish has six locative cases, corresponding to the configuration 'in' and 'at', using stative, cofinal and coinitial mode. Moreover, there is a nominative, a partitive, an essive, a translative, an abessive, a comitative and an instructive. (See Karlsson [20] for details.) The accusative is claimed not to be a genuine morphological case. Tabe 5 shows the locative cases. [5] adds a third row, consisting of the essive, the partitive and the translative. The essive specifies a quality, and the translative a change into some quality.

(5.1) Olen Suomessa turisti-na.
be-1.Sg.Pres Finland-INESS tourist-ESS
I am in Finland as a tourist.

(5.2) Isä on tullut vanha-ksi.
father-NOM be-3.Sg.Pres become-Sg.Past old-TRANS
Father has become old.

The partitive is familiar also from French and Russian. It has a range of uses. It can be used for the subject and for the object. If a subject is in the partitive, its number or size is undetermined. If the object is in the partitive it is only partially affected by the action, the action is non–resultative. The essive, translative and the partitive are clearly not locative cases. However, even if a case is not a locative, we can nevertheless attribute a mode to it. The essive would for example be in static mode — it denotes that at event time the relevant actant has a property denoted by the DP carrying essive case. The translative is the cofinal variant of the essive, because the proposition that the actant has the said property at the end of the interval.

Table 5: The Local Cases of Finnish: talo (*house*)

Configuration ↓	Mode → Stative	Cofinal	Coinitial
in	talossa	taloon	talosta
on	talolla	talolle	talolta

The coinitial counterpart would therefore say that the actant has the said property at the beginning of the event time. Here are some typical sentences where this kind of case would be appropriate.

(5.3) T–shirts have come out of fashion.
(5.4) Harold made a statue from a block of wood.

In the first case, the subject turns from being fashionable into not being fashionable. In the second case the block of wood ceases to be a block of wood. The partitive, however, is clearly not of that kind. [20] [21] There is a certain degree of transparency in the morphology. We repeat in Table 6 the table given in [5]. We can see that there is a morpheme -s- for the

[20] I have been informed by Aarne Ranta that there are some uses of the partitive in which it forms a series together with the essive and translative. One type of such series is exemplified by some locative prepositions:

essive	partitive	translative
takana	takaa	taakse
behind	(from) behind	to behind
luona	luota	luokse
at	from	to

(luo is better translated by French 'chez', and the other forms of luo are translated analogously.) In poetic language one also finds taaksi. The base forms, taa and luo may be used in place of taakse and luokse, respectively. The other example is kotona (at home), kotoa (from home), which are in the essive and the partitive, respectively. The corresponding form in the translative, *kotiksi, is however missing. Instead, one has to use the illative kotiin. There are a few more examples, but the number is very small. Hence this is a nonproductive pattern.

[21] Finnish has what could be called a perlative case. As was brough to my attention by Aarne Ranta. Examples (which are formed regularly by affixing -tse) are meritse (through the sea), maitse (through the land) and postitse (by/through mail).

Table 6: The Local Cases of Finnish

Configuration ↓	Mode → Stative	Cofinal	Coinitial
∅	∅-na	-∅-ne	-∅-ta
in	-s-sa (< -*s-na)	-s-se (< -*s-ne)	-s-ta
on	-l-la (< -*l-na)	-l-le (< -*l-ne)	-l-ta

Table 7: The Local Cases of Hungarian

Configuration ↓	Mode → Stative	Cofinal	Coinitial
in	házban	házba	házból
at	háznál	házhoz	háztól
on	házon	házra	házról

configuration 'in', and a morpheme -l- for the configuration 'at'. [22] There is a morpheme -ta for the coinitial mode, and a morpheme -Da for the stative mode, where D stands for reduplication. (It results according to Blake from an *n.) Only the cofinal mode falls out of the picture. Notice that the configuration is closer to the stem, as expected.

Hungarian The local cases of Hungarian are listed in Table 7. We can see that Hungarian adds to the Finnish locatives another configuration. It differentiates in contrast to Finnish the configurations 'in', 'at' and 'on'. There is also a peculiarity of the Hungarian appositions that is worth mentioning. First of all, all appositions are postpositions; moreover, they govern almost without exception the nominative case. Since the nominative has a zero suffix, it is quite hard to distinguish between a postposition and a case suffix. What is more, locative postpositions also participate in the tripartite mode–system. Consider, for example, the configuration of being under (infraessive). It is perfectly conceivable to add any of the four modes to the

[22] The case of the illative needs some argumentation. We can see the -s- when the noun ends in a long vowel. For example, the illative of Espoo is Espooseen.

Table 8: Hungarian Locative Postpositions

Configuration ↓	Mode → Stative	Cofinal	Coinitial
under	alatt	alá	alól
above	fölött	fölé	fölül
next to	mellett	mellé	mellől
in front of	előtt	elé	elől
behind	mögött	mögé	mögül
among	között	közé	közül

infraessive. However, to our knowledge no language has cases corresponding to these functions. What is more, appositions are provided mostly for the stative mode, and the other modes must be provided by other means. For in example, in English we can say (5.5) for the static mode, but in order to use the coinitial mode we need to say something like (5.6). So, from under is the complex that signals the configuration 'under' in coinitial mode.

(5.5) Jack is under the table.
(5.6) Jack emerged from under the table.

Hungarian, by contrast, provides a systematic way to form a set of three postpositions corresponding to the stative, cofinal, and coinitial mode.

(5.7) A cica az asztal alatt.
the cat the table under-STAT
The cat is under the table.

(5.8) A cica az asztal alá fut.
the cat the table under-COFIN run-3.SG.PRES
The cat runs under the table.

(5.9) A cica az asztal alól jön ki.
the cat the table under-COINIT come-3.SG.PRES out
The cat comes out from under the table.

That this is a regular feature of the Hungarian appositional system is shown in Table 8.

Table 9: Some German Locative Prepositions

in	in	auf	on
an	at	unter	under
vor	in front of	neben	next to
über	above	zwischen	between

German German has no locative cases. However, there is a fair number of appositions (which are prepositions throughout) which can be used with either dative or accusative case. When there is a choice between accusative and dative then the rule is that the accusative case must be used for the cofinal mode while the dative must be used for the stative mode. Table 9 shows some of these prepositions. So we have in (5.10) an event were Erwin is flying somewhere above the Alps for the whole event time, while in (5.11) he went once across the Alps.

(5.10) Erwin flog über den Alpen.
Erwin flew above the-DAT Alps
Erwin was flying above the Alps.

(5.11) Erwin flog über die Alpen.
Erwin flew above the-ACC Alps
Erwin flew over the Alps.

Notice that there is otherwise no grammatical regularity involving the coinitial mode or the transitory mode, in concordance with our markedness hierarchy.

Other Languages Many Uralic languages have series of locative cases, but not always in this clear distinction. Cheremiss has a lativus, an inessive, an illative and an ablative (!) (see [2]). Mordvin has an illative, elative and inessive, an allative, ablative and lative, and a prolative ([22]). The so–called translative, however, has no spatial meaning, as has the translative of Finnish and the transformative in Hungarian. [23] Syriaenic has an inessive, elative and illative, and a prosecutive; a transitive and an egressive (see [27]). However, from the sources I have not been able to determine what the particular function of these case is. Some languages have a terminative and an approx-

[23] The name 'translative' for this case is therefore rather inappropriate.

Table 10: Locative Cases of Kâte and Selepet (New Guinea)

	Kâte	Selepet
INSTR	-zi	-nge
ABL	-o-nek	-on-gebo
LOC	-o	-on
ALL	-o-pek	-on-gen

imative. For Papuan languages (see [13]), Foley reports that there is at most one series of three locative cases (locative, allative and ablative). Moreover, there is hardly any language in which all three are distinct. Interesting for us is also the following fact. In the languages Kâte and Selepet the locative cases endings are in the directional cases derived from the locative by adding another suffix. This shows once more that the mode is an additional category different from location. Kayardild has a locative, an ablative and an allative ([12]). Greenlandic Eskimo has a four grade system of locative cases: a locative, an allative, and ablative and a perlative (called prosecutive by [18]).

6 Selection

In this section we shall discuss questions of selection of mode and configuration. We have argued earlier that local cases consist of two layers hence the complex of verb and local PP is semantically structured as follows:

$$V + [M + [L + DP]]$$

Moreover, from a semantical point of view, DP denotes an object, $L + DP$ a parametrized neighbourhood, and $M + L + DP$ is an event modifier. Syntactically, as well as morphologically, neither DP nor $L + DP$ is a complete expression. The DP must carry case, and if this case is a local case, it must be two–layered. This means that morphology and syntax force us to add elements which are not needed from the semantic point of view, because the verb may in fact not want to to take an adverbial, but rather some parametrized neighbourhood or some DP.

We shall argue that semantically the verb has three possibilities of entering a relationship with a locative PP. It can enter (a) a relationship with the entire complex $M + L + DP$, or (b) with only $L + DP$ and, finally, (c) it can enter a relationship only with DP. This means that it either needs a locative adverbial ((a)), or it selects a location ((b)) or it selects an object as its complement ((c)). We give examples. Take the verb walk. As the examples below show, we can modify the sentence John is walking by numerous locative PPs, be they static or directional. These facts can be reproduced in any language we know of.

(6.1) John is walking on the roof.
(6.2) John is walking to the shop.

In this case, the locative is an adverbial, and typically an adjunct because it enters with its full meaning. Now we look at the other extreme, case (c):

(6.3)	Andrew	thinks	about	Mary.
(6.4)	Andreas	denkt	an	Maria.
	Andreas	think-PRES-3SG	on	Maria-ACC
(6.5)	András	gondolkodik	Máriára.	
	András	think-PRES-3SG	Máriá-ALL	

In all these cases, the verb selects a particular locative, but the verb really enters a relationship with the DP contained in it. In (6.4), the verb denken selects an with accusative, which is the cofinal equivalent of the allative. However, neither Andreas nor Maria can be said to be moving. Of course, we can make up explanations as to why we find the allative. For example, we may think that the thoughts of Andreas are moving to Maria. But if we look at the English equivalent we find a totally different local expression. This suggests that the explanation can only be found in retrospect, once we know which locative to expect. The Hungarain example (6.5) differs from the German not in choice of case but in its morphological realization. Lets take a different example.

(6.6)	Peter	is	afraid	of	mice
(6.7)	Peter	hat	Angst	vor	Mäusen.
	Peter	has	fear-ACC	in front of	mouse-PL-DAT
(6.8)	Péter	fél		az	egerektől.
	Peter	afraid-PRES-3SG		DET	mouse-PL-ABL

The verb to be afraid takes genitive in English. In German we find the expression vor (*in front of*) and in Hungarian the ablative. Whatever explanation can be given for the choice of local expressions, we shall advance here the thesis that if an element is fixed regardless of the meaning of the entire sentence, then it has no interpretive impact. So, the allative in (6.4) and the ablative in (6.5), and the cases of (6.6) – (6.8) are purely syntactically motivated, they carry no meaning with them. This is what we mean when we say that the verb enters a relationship with the *DP*, and not with the locative.

Now, the interesting fact in connection with locatives is the intermediate case (b): the verb enters a relationship with the complex L + DP. This means, from a semantic point of view, that the verb selects a (parametrized) location as a complement. In this case, the localiser enters with its full meaning, but the mode does not. The mode is syntactically fixed. We have already met examples of such verbs. In Section 2.4 we have discussed the Finnish verbs unohtaa (*to forget*) and löytää (*to find*).

(6.28)	Tuovi	unoht-i	kirja-n	auto-on/*auto-ssa.
	Tuovi	forget-PAST-3SG	book-ACC	car-ILL/*car-INESS
	*Tuovi forgot the/a book *into/in the/a car*			
(6.29)	Tuovi	löys-i	kirja-n	auto-sta/*auto-ssa.
	Tuovi	find-PAST-3SG	book-ACC	car-ELA/*car-INESS
	*Tuovi found the/a book *out of/in the/a car*			

We have seen that unohtaa needs as a complement an illative, the inessive is implossible, löytää on the other hand needs the elative and rejects the inessive. In English the inessive is mandatory in both cases. Now, in English the sentences (6.30) are all grammatical, while the sentences (6.31) are not:

$$(6.30)\quad \text{Tuovi forgot/found the keys} \left\{\begin{array}{l}\text{on}\\ \text{under}\\ \text{at}\\ \text{near}\end{array}\right\} \text{the car}$$

$$(6.31)\quad \text{Tuovi forgot/found the keys} \left\{\begin{array}{l}{}^{*}\text{onto}\\ {}^{*}\text{from}\\ {}^{*}\text{away from}\\ {}^{*}\text{through}\end{array}\right\} \text{the car.}$$

The generalization is this: any static locative is compatible with forget or find, but no directional locative. In Finnish, we find that unohtaa is compatible with all cofinal locatives (in particular the cases allative and illative) and löytää is compatible with all coinitial locatives (in particular the cases ablative and elative). Thus, these verbs select semantically speaking a parametrized neighbourhood, and therefore select syntactically the mode. One should not confuse this with selection of case. These verbs are grammatical with any PP that has the same mode. As usual, if the mode is semantically vacuous and therefore syntactically freely assignable, we expect to find variation across languages. The Finnish example above is just one of many (see [14] for many more). It turns out that Uralic languages in general have a tendency to favour directional cases with many verbs that in Indo–European languages select static mode.

A similar case is provided by the verb to arrive, German ankommen. While you may have been travelling all around the country, you arrive only at the very last moment. However, there is a difference. One would expect on this account that the verb selects cofinal mode. However, this is not so.

(6.31a) Wir kamen in London an.
(6.31b) *We arrived into London.
(6.32a) We arrived in London.
(6.32b) *Wir kamen nach London an.

The same holds for French and Hungarian. Yet, in Finnish the facts are different. Here, the confinal mode is mandatory.

(6.33a) *Saavuimme Lontoossa.
arrive-PAST-1.PL London-INESS
(6.33b) Saavuimme Lontooseen.
arrive-PAST-1.PL London-ILL

It is not unplausible that some semantic explanation can be found. We may say, for example, that to arrive is an achievement. Its event time is punctual, and so it does not tolerate any nonstative mode. The Finnish counterpart would then be analyzed as non–punctual, that is, an accomplishment verb.

If the verb selects only the mode, the location is defined only by means of the localiser and the *DP*. There is, perhaps surprisingly, a subtle interaction between the *DP* and the localisers. Inside the constituent $L + DP$, the DP serves as a landmark by which the localizer defines the location. The same location can be expressed by means of different localizers (you can be at the same time *in the house*, *outside of the cupboard*, *on the chair*, *under the lampshade* and so on). Few objects are such that a particular location corresponds uniquely to a relation defined by a localizer. When do we say that we are *near* a house, and when are we *at* the house? These are questions of delimition of closeness and of distance in general. Many other locators depend on the shape of objects, for example in. The question is how much curvature the object needs to have to allow for something to be *in* it rather than just *on*. The salad can be *in* a bowl but not *in* the plate! With other physical objects the intuition become somewhat more stretched. Why are we *in the garden* and not *on the garden*, but we can be *on the ship* while not *in the ship*? The answer is not easy. Notice that it is not really a mistake to say that you are *in the ship*, only the question is what that exactly means. At least in German this does not sound deviant but it focusses rather on the physical side of being in it (for example as a blind passenger, locked up together with the bananas). The default way of being in a ship is to be *on* it. I find the case of a garden harder, even though it ought to be easy to say what it means to be *on* the garden. You simply cannot say it like that.

So, we have cases where a noun determines the localizer more or less strongly, depending on factors other than shape. The intuitions are more or less uniform across the languages that I have been able to test (German, English, Hungarian and Finnish). It seems therefore that they are rather cognitively determined. However, there are also instances where the determination is arbitrarily fixed in the language, without a clear morphological or syntactical explanation. In these cases the selection of localizer is in the lexicon. One case are the names of cities in Hungarian. That one is in a city can be expressed either by the superessive or the inessive. The inessive is the default. There are however a lot of (notably Hungarian) places that require the superessive.

(6.34)	Superessive:	Budapest-en, Szeged-en, ...
	Inessive:	Párizs-ban, Berlin-ben, ...

We emphasize that it is only the localizer that is fixed. If you say that you are going to Budapest you use the sublative, but the illative for Paris. The same is true in Finnish. Some cities require adessive/allative/ablative (eg Tampere) while for the most part they require inessive/illative/elative (eg Helsinki). In English, German and Latin, to be in a city is construed with (the language equivalent of) in, in French with à, whose meaning is rather abstract. [24] In Hungarian, the place names ending in -falu and -falva (both mean 'village') differ in whether they take the inessive (-falu) or the superessive (-falva). Finally, Hungarian has two words for wedding, one to be

[24]Notice that the default in all languages is 'in'.

construed with the inessive (lakodalom) and the other with the superessive (esküvő).

7 Orientation or: Who is Moving?

In this section we will be concerned with the orientation of locatives, in particular with the specification of the mover in an event. Before we do so, we shall spend a few thoughts on the the distinction between argument and adjunct status of a locative. Nam, as well as Keenan and Faltz assume that locatives are intersective. This means that the following inferences are valid (where the left inference applies to subject oriented PPs and the right hand side to object oriented PPs).

$$\frac{\textsf{X Vs (Y) in L}}{\therefore \textsf{X is in L}} \qquad \frac{\textsf{X Vs Y in L}}{\therefore \textsf{Y is in L}}$$

We shall notice that this applies only to static locatives, but directional variants can be given as well:

$$\frac{\textsf{X Vs (Y) to L}}{\therefore \textsf{X moves towards L}} \qquad \frac{\textsf{X Vs Y to L}}{\therefore \textsf{Y moves towards L}}$$

This theory is incorrect, for several reasons. First, notice the following problem of Bierwisch ([3]):

(7.1) Ich arbeite in Dresden, aber ich wohne in Berlin.
I work in Dresden, but I live in Berlin.

This would be downright contradictory if from the first sentence we are entitled to conclude that I am in Dresden, and from the second that I am in Berlin. However, if I work in Dresden then I must be there; for example, the following is contradictory:

(7.2) *Heute habe ich in Dresden gearbeitet, aber ich war in Berlin.
Today, I worked in Dresden, but I was in Berlin.

On the other hand, (7.3) is fine:

(7.3) Heute war ich in Dresden, aber ich wohne in Berlin.
Today I was in Dresden, but I live in Berlin.

We conclude that the inference from working somewhere to being there is valid, but the inference from living somewhere to being there is not. On the other hand, to say that one lives in Berlin does mean that one is in Berlin, but one need not always be there. We explain the contrast with the distinction between argument and adjunct. If a locative is an adjunct, then the inference is valid, if it is an argument, however, care must be taken. Particularly striking cases are the German verbs wähnen and wünschen:

(7.4) Peter wähnte Maria in Paris.
Peter believed Mary to be in Paris.

(7.5) Peter wünscht sich die Maria an seine Seite.
Peter wants Mary to his side.

In (7.4), Peter merely believes that Mary is in Paris, she need not at all be there. In (7.5), Peter wishes Mary to come to his side, but she need to go there. In both cases, there is no valid inference concerning the location or change of location of Mary. However, both sentences do talk about the location of Mary, be it only inside some intensional operator. Hence, we conclude that the location of Mary is — semantically speaking — an argument, and not an adjunct. We conclude that therefore it is a syntactic argument as well.

Now, we have discussed in the previous section that verbs semantically selecting a location, select syntactically a specific mode. The interpretation of the mode is therefore nullified. It follows that the inferences regarding the mode are nullified as well. Take the Finnish verb jäädä (*to remain*).

(7.6) Tuovi jäi huoneeseen
Tuovi stay-PAST-3SG room-SG-ILL
Tuovi stayed in the room.

If the directional locative were truly a cofinal locative, the inference from (7.6) to that Tuovi would be moved into the room would be correct:

Tuovi jäi huoneeseen.
∴ Tuovi meni huoneeseen.

But this is contrary to fact, as is easily seen. On the other hand, the inference from (7.6) to that Tuovi was in the room *is* valid.

Tuovi jäi huoneeseen.
∴ Tuovi oli huonessa.

The moral is that the cofinal mode of (7.6) is syntactically selected and must therefore be left out of consideration. Hence, whatever is subject to syntactic

Table 11: Orientation of Locatives

Static	Directional	Symmetric	Source
Motion-Causative Verbs, Verbs of 'Sending/Carrying'			
drag, push, run; send, take			
O	O	O	O
Verbs of Placement, Verbs of 'Hunting'			
place, set, put; watch, hunt			
O	O	O	⋆
Verbs of 'Combining/Attaching', Verbs of 'Housing'			
mix, tape (music); contain, store, dienen (zu etw.)			
O	O	⋆	⋆
Vebrs of 'Perception', Vebrs of 'Communication', Verbs of 'Contact'			
find, see; call, cable, touch			
O	⋆	zugleich S,O	S, O
Verbs of 'Co-movement'			
escort, accompany, chase, drive, follow			
S, O	S, O	S, O	S, O
Verbs of 'Social Interaction'			
meet, embrace, marry, fight, visit			
S, O	⋆	⋆	⋆
Verbs of 'Judgement', Psych-Verbs, Intensional Verbs			
criticize, honor; adore; seek, mention			
S	⋆	⋆	⋆

selection must be left out of consideration. The inference is therefore valid with respect to static mode. Hence it compares with the English inference:

Tuovi stayed in the room.
∴ Tuovi was in the room.

That this inference is correct is a consequence of the meaning of stay. The locative PP is an argument, not an adjunct, since it is syntactically selected.

Recall from Section 2.3 the data on orientation. We reproduce the table in Table 11. Notice that this table makes use of the grammatical function, ie subject and object.

There is to our knowledge only one specific proposal in the literature, namely that of Gruber [16] and Jackendoff [19], who define the mover to be the theme of an event. We shall argue in this section that this claim is not correct. However, it implies a number of things that seem nevertheless right to us. Before we shall present the negative evidence, let us first say what is right about this proposal. First, notice that this proposal implies that the mover is not characterized by its grammatical function. Hence, in a passivized sentence the subject is a mover iff the object of corresponding active sentence is a mover. Second, only one element in an element can be a mover. We will see that this is correct. This will become important also in the next section. Third, directional PPs cannot be added if there is no mover. Let us start showing the last claim. If a directional PP is an adjunct and not an argument then it should be possible to add it to any VP. So we should get sentences like the following.

(7.1) *William observed Mary into the house.

For it is compatible with William's observing Mary that she is going into her house. If therefore the two are compatible, why is the sentence nevertheless ill–formed? The answer provided by the proposal is that the directional PPs must be construed with the mover and there is none. We shall see later that there are also intransitive sentences without a mover.

Let us make it clear what that means. In our semantics the latter fact follows simply because directional PPs must be construed with the mover. If that function is undefined, the sentences is semantically deviant. Hence, we derive that conclusion purely from the semantics. If syntactic argumenthood is to a large part semantically motivated — which is what we believe — then we shall derive from that the conclusion that directional PPs are in fact arguments. This is what we shall show in the next section.

Now we turn to the first observation, that the status of a mover is dependent on the grammatical function. The object of to bring and to fly are clear cases of movers. We expect therefore that the subject of the passivized sentence is a mover as well.

(7.2) Fred brought the bottles from the cellar to the holiday home.
(7.3) The bottles were brought from the cellar to the holiday home.
(7.4) Fred flew the airplane from Berlin over the Alps to Rome.
(7.5) The airplane was flown from Berlin over the Alps to Rome.

Therefore, the directional locative PPs modify those objects that are listed as movable, and this does not depend on their grammatical function. Similarly, standard passive as well as the kriegen–passive of German do not alter the linking of directional locatives. Next, even complex predicates behave as would be expected. Notice that since only intransitive verbs (of motion) are capable of listing an actant as moving, a complex predicate has at most one actant that is listed as moving. So, a directional locative is linked unambigously to the mover of the lowest predicate while nondirectional PPs can be linked to several actants (practically all of them).

(7.6a) The general ordered the officer to march the troops from the river to the city.
(7.6b) *The general ordered the officer from the river to the city to march the troops.
(7.6c) *From the river to the city the general ordered the officer to march the troops.
(7.7a) The general ordered the officer to march the troops in the forest.
(7.7b) The general ordered the officer in the forest to march the troops.
(7.7c) In the forest, the general ordered the officer to march the troops.

The fact that in (7.6b) the locative PP is understood to be adjectival rather than adverbial is an artefact of the verbs chosen here.

The invariance of movers under function change also applies to a class of sentences for which the Jackendoff/Gruber proposal would actually predict that there be no theme at all, namely the impersonal passive of German.

(7.8) Es wurde im Rathaus getanzt.
it was in-DEF townhall danced
People danced in the townhall.

(7.9) Es wurde aus allen Richtungen geschossen.
it was from all directions shot
People shot from all directions.

In these sentences there is no overt subject, and so one would expect that the locative PP cannot modify the verb. The subject position is filled by a dummy, but nevertheless the locative PP can modify the verb and specify some location or movement. Hence, the mover — although eliminated from the θ–grid — can nevertheless be accessed by a directional PP. This may actually be taken as a point that the argument status of the locative of directional PPs is semantic and not syntactic. So, we may argue that they are syntactic adjuncts, but can only be added if construable semantically.

That is a viable option. Indeed, as we shall argue in the next section, we are leaning towards a theory that would take the compatitibility of these kinds of PPs as semantically rather than syntactically motivated.

We shall use the remainder of this section to demonstrate that the notion of a mover and that of a theme do not coincide. Here, we understand that a theme is that entity which is which is affected or undergoes change in a process. A theme can undergo change by coming into existing, by ceasing to exist, by changing its shape etc. It might also undergo change because it changes its location. It is the latter kind of theme that is a prototypical mover. Now, by that definition not every theme is a mover. Before we can begin to present the data, let us note that static PPs are of quite different nature. They may be construed either with the subject or with the object. We have for example

(7.10) The children were playing cards at the table.
(7.11) The children were playing cards under the table.
(7.12) John saw Mary at the corner.

Consider (7.10). Assuming that the children are sitting on some chairs at the table, (7.10) is true, since the children are at the table. (7.11) is true if for example the children are playing during the lesson at school, hiding the cards under the table. Hence we find that the PP can be construed to specify either the location of the subject or the location of the object. [25] Likewise, (7.12) can be true if John was standing at the corner when he saw Mary or if Mary was standing at the corner when John saw her. Again, the static PP is construed either with the subject or with the object. We take this as evidence that static PPs are real adjuncts. We shall also see that they can be added to any verb. [26] We shall demonstrate that this is so even if the verb is a verb of movement.

(7.13) John was kicking a ball on the balcony.
(7.14) John was flying a plane on the hill top.

Here, we shall assume in (7.14) that the plane is actually a small model airplane which John is flying by using telecontrol. Subject construal is enhanced if the PP is preposed.

[25] In (7.10) the PP can of course be construed with the objects and in (7.11) with the subject. These readings are however less preferred though not deviant.

[26] On some occasions, however, they are arguments, for example with the verb to live.

(7.15) On the balcony, John was kicking a ball.
(7.16) On the hill top, John was flying a plane.

Here it is more clear that the PP is modifying the event. We can use this as an answer to the questions: *what happened on the balcony/on the hill top*? Notice that a subject construed static PP can coexist next to a directional (object construed) PP.

(7.17) John was kicking a ball on the balcony into the neighbours garden.
(7.18) John was flying a plane on the hill top into the mais fields.

With this in mind we turn now to the question of the mover. Our approach is largely influenced by the work of Vogel [29], though in that work many questions of detail have been left open, so that a direct comparison is difficult to make. Furthermore, Vogel's approach is inherently static. That verbs actually denote a change is not reflected in the semantics.

We shall first consider intransitive verbs. Here, the single argument of the verb is not always a mover. An example are cognizers, subjects of verbs of sound emission or experiencers.

(7.19) *John believed this into the garden.
(7.20) *John was speaking into the garden.
(7.21) *John felt cold into the garden.

Here, we assume as the reading in (7.20) that John is moving into the garden during the event time. So, why can this be? Two answers come to mind. The first answer is that the admissibility depends on the Aktionsart. Certain verbs denote states and therefore a directional PP cannot be added. The second is that we may assume that certain θ–roles are not eligible for being a mover. The following examples refute the first alternative.

(7.22) *John is writing (the letter) into Hamburg.
(7.23) *John is hammering (the axe) into Hamburg.
(7.24) *John arrived into Hamburg.

Here, the verb denotes a process, but still the directional PP cannot be added, even if we add an object to make it telic. We conclude that it is not the Aktionsart that makes the directional PP felicitous, but rather that certain θ–roles can be movers and others not. [27] We can exclude on the

[27] To clarify the point that is argued here: with a state, no directional PP is felicitous. With other events, however, a directional PP might or might not be felicitous, and whether it is is actually independent of the Aktionsart.

basis of the above data that experiencers, agents and cognizers are among the roles that are not — or at least not always — eligible. Moreover, themes are also not always eligible. Here are some examples.

(7.25) The boat was floating from one side of the river to the other.

(7.26) Harry way running on the sidewalk from his house past the bank to the bakery.

(7.27) Alfred brought the bottles from his cellar to his holiday home.

(7.28) Fred flew the airplane from Berlin over the Alps to Rome.

In (7.25) – (7.28) we have verbs of movement; in (7.25) it is the boat that is moving, it is Harry (7.26), the bottles in (7.27) and the airplane in (7.28). Now, it seems that in (7.28) Fred is also moving in the same way as the airplane and therefore qualifies as a mover. This is certainly so unless Fred is flying it by telecontrol. Since the most common way to fly an airplane is to sit in it, the subject of to fly the aiplane will describe the same movement as the airplane. This however has nothing to do with the question which element of the sentence is the mover and hence with which element the PP is construed. To make the point visible we shall consider some more verbs.

(7.29a) Die Hunde trieben die Herde zum Fluß.

(7.29b) The dogs drove the herd to the river.

(7.30a) Die Polizei folgte den Verbrechern bis zum Stadtrand.

(7.30b) The police followed the gangsters to the edge of the city.

For the dogs to chase the herd to the river it is necessary that at the end the herd is at the river. Where the dogs are we do not know (presumably very close to the river). The sentences (7.30a/b) are very interesting in this respect. It is the only example of a transitive verb we know of where the mover is the subject. For if the police is following the gangsters to the edge of the city that means that the police is moving up to the edge, but where the gangsters are at that very moment is not clear. It may be hard to decide which of the two is the mover since we are assuming that the police is moving along a similar path as the gangsters are. But clearly, when the event ends it is the police that ends up at the end of the city while the gangsters may already be out of it. Hence we find that the police is the mover. At the same time, we shall say that the police is an agent. So, it does seem that agents can be movers. The same we would actually say for such verbs that describe active movements, as run, hop and so on.

This suggests that various θ–roles can actually qualify for movers. We have seen that even agents of a transitive clause can be movers. If that is so, can there be more θ–roles that are movers? Indeed, there are others as well.

(7.31a) Er durchbohrte mit einem Vanadiumbohrer den Stahl.
(7.31b) He was drilling a hole through the steel using a vanadium drill.

Here the drill is an instrument. Yet, it can be shown that it is the mover. Hence instruments can also be movers. Since it is neither subject nor object, the verb is not a verb of movement.

Now we actually have a problem. If we are correct then if there is a θ–role of a mover (alias theme) then we would have arguments carrying two different θ–roles. That would be a blunt violation of the θ–criterion. Hence, the proposal by Jackendoff/Gruber forces us to give up the θ–criterion. However, we claim that even if one is prepared to grant this, still the proposal cannot go through. We shall present two arguments for this position. The first is cognitive and the second more linguistics in nature. The first argument is that the notion of a mover is naturally present no matter how it is conceptualized as a θ–role. Let us try to make this precise. Let Alfred sit next to a big machine, drilling a hole with some drill into a big block of steel. Then, whatever Alfred means by doing that, we can see that the drill slowly makes its way through the steel. So there is a drilling event constituted by a drill going through the steel. It is important to notice that this event is constituted by the drill going through the steel, not by, say, Alfreds moving restlessly on his chair or the steel suddenly starting to turn a bit. The notion of constitution used here is more or less directly connected with what object we take into focus, ie on what kind of process we actually concentrate. If it is the drill, then the drill is the mover because its moving constitutes the event of drilling.

Now, this is what we can witness by direct perception. Notice that anything connected with intention or thought is absent. [28] This picture can be conceptualized in several ways. We can see Alfred as the agent of the event, and we can see the drill as the instrument by which Alfred obtains a hole in the steel. But at the same time we can also think of the drill as the agent, which makes its way through the steel. There are different ways of conceptualizing the event and they lead to a different distribution of θ–roles. However, it is important to note that the event of drilling is *not* constituted

[28] There is an abvious parallel with the locational PPs. It can be shown that they can only be construed with the active participants, ie those that are visibly present at the event. Also here, the primary stimulus is important.

by the fact that the drill is used as an instrument.

The scond argument against taking movers as θ–roles comes from the fact that although the notion of a mover is invariant under lexical processes the θ–roles are not. (This is supported by the data given in this and the next section.) For example, there are prefixes in German which transform a locational PP into a theme (eg durch-). (See the next section.) Hence, if it is possible to change the θ–grid but not eliminate nor add a mover, the latter must be considered more deeply rooted. Consequently, we shall say that the concept of mover is independent of whether or not the drill is an instrument. So, the reason why certain θ–roles are eligible for movers and certain others are not is simply the fact that the former roles are compatible with the bearer of the role constituting the event by moving, while that cannot be the case with the latter type of role. A cognizer is never a mover because in order to experience something one (arguably) never has to move. Whether or not you know something is simply independent of whether or not you move.

It has been observed that in transitive verbs quite often the object is the mover. This is often derived as follows. (See [29] for an outline and a critique of these proposals.) Assume that verbs of motion are basically intransitive and that transitive verbs of motion are actually causatives. A causer, however, is not a mover. Hence the basic meaning of the transitive verbs of motion is exemplified with the transitive verb to roll:

$$\lambda y.\lambda x.\mathsf{cause}'(x, \mathsf{roll}'(y))$$

This shows the point made earlier that in complex constructions it invariably is the case that there is only one mover. This however is not due to the fact that there can only be one thing that moves. The verb to kick has arguably the following analysis: x kicks y if x moves his leg to hit y. However, it turns out that y and not x's leg is the mover of kick.

(7.32) John kicked the ball into the net.

So, there is no general rule we know of by which a mover is assigned in complex events. Interesting is the the verb to shoot. Only if it means *cause to fly* it tolerates a directional PP modifying the undergoer. In the other meaning (*kill by shooting*) only a coinitial PP can be used, simply because there is no mover present in the event.

(7.33) Alfred shot the arrow through six cardboards into the target.
(7.34) *Alfred shot the rabbit into the forest.
(7.35) Alfred shot the rabbit from the balcony.
(7.36) Alfred shot into the forest.

So, in (7.33) the arrow is moving through six cardboards and then into the target. This is so, since the arrow is listed as moving. In (7.34), neither Alfred nor the rabbit are movers, and so the sentence is ungrammatical. In (7.35), Alfred is the origin of the shooting but not himself moving. Apparently, it is the bullet that is moving, whence (7.36) is ok.

8 Verbal Prefixes

German and Hungarian allow verbs to take a number of prefixes. Examples are

Hungarian	German	
be(le)-	hinein-/herein-	into
ki-	heraus-/heraus-	out of
át-	hindurch-	through

The Hungarian verb ugrik (to jump) can take any of these prefixes. Similarly the German verb springen (to jump). So we have beleugrik (to jump into), kiugrik (to jump out of) and átugrik (to jump through). Neither of these verbs is transitive. Here are some Hungarian examples with German counterparts.

(8.5) Paul beugrott a vízbe.
Paul INTO-jump the water-ILL
Paul sprang in das Wasser hinein.
(8.6) Paul kiugrott a vízból.
Paul OUT OF-jump the water-ELA
Paul sprang aus dem Wasser heraus.
(8.7) Paul átugrott a kereken át.
Paul THROUGH-jump the hoop through.
Paul sprang durch den Reifen hindurch.

The German data looks different only because the prefixes are separable, and the verb second movement leaves them at the end of the sentence. In a subordinate clause the two are together.

(8.8) Ich sah, wie Paul in das Wasser hineinsprang.
I saw how Paul into the water INTO-jump

Further, the verbal prefixes can also function in German as postpositions. In that case they act as modalizers. We have expressions like

(8.9) vom Brett herab, aus dem Haus heraus
down from the board, out of the house

In this case the difference only shows up in writing. (Is is also audible as a different stress pattern.) The modalizer is written as a separate word. [29]

Now, the facts are as follows. herausspringen cannot be used with anything but an origin; hindurchspringen cannot be used with anything but a path; finally, hineinspringen cannot be used with anything but a destination.

(8.10a) Ich sah, wie Paul vom Brett herabsprang.
I saw Paul jump from the board.
(8.10b) *Ich sah, wie Paul vom Brett durch den Reifen herabsprang.
I saw Paul DOWN-jump from the board through the hoop.
(8.10c) Ich sah, wie Paul vom Brett durch den Reifen sprang.
I saw Paul jump from the board through the hoop.
(8.11a) Ich sah, wie Paul durch den Reifen hindurchsprang.
I saw Paul THROUGH-jump thruogh the hoop.
(8.11b) *Ich sah, wie Paul vom Brett durch den Reifen hindurchsprang.
I saw Paul THROUGH-jump from the board through the hoop.

We assume that the prefix makes the process into an accomplishment. Furthermore, we shall assume that the event of jumping through is constituted

[29] These postmodifiers do pose interesting questions. Consider the sequence of prefix, say heraus-, and a verb, or alternatively of a directional PP and the postmodifier heraus. In both cases, the directional PP is fixed both in configuration and mode. Hence we have

(i) Ich sah, wie Erwin aus dem Haus herauskam.
I saw, how Erwin out of the house OUT OF-came
(ii) *Ich sah, wie Erwin von dem Haus herauskam.
I saw, how Erwin from the house OUT OF-came
(iii) *Ich sah, wie Erwin in das Haus herauskam.
I saw, how Erwin into the house OUT OF-came

This is interesting since it suggests that verbs select a directional PP in its directional meaning while at the same time selecting both mode and configuration. We will not explore this further. There is an alternative approach to this data. We may assume that German has locative cases, which are realized by prepositions (therefore in the syntax) but not by cases (ie morphologically). Then, heraus can be said to select the elative in German, which is realized by the preposition aus.

by some mover x and a thing y through which x jumps. The event e of jumping occupies the longest time stretch at which x is jumping. However, the event of jumping through, e', may only contain part of e. It is constituted by x's moving through y, and nothing more. So the very moment x enters y we start the clock for e' and the very moment x leaves y we halt it. Let us take a concrete example. Suppose we watch Apollo come back to earth. We know that everything will end well, and that the capsule is going land in the pacific. But the moment we are watching it high up in the sky, though we may say that it is falling, we are not prepared to say that it is falling into the water. So, we consent to (8.12), but neither to (8.13) nor to (8.14).

(8.12) Die Kapsel fällt.
The capsule is falling.
(8.13) Die Kapsel fällt in das Wasser.
The capsule is falling into the water.
(8.14) Die Kapsel fällt in das Wasser hinein.
The capsule is INTO-falling into the water.

We conclude that directional PPs are part of the constitution of an event. If I report that the capsule is falling into the water then I am referring to an event in which the capsule is falling, and moreover, which is minimally constituted by its falling into the water. While other PPs can enlarge the event (adding a destination etc), the verb with the prefix cannot be so enlarged. We attribute this to the fact that the prefix turns the event into an accomplishment. What is accomplished is already specified by the prefix. That is to say, a process can go with the whole set of three directional θ–roles, but an accomplishment cannot. There are cases when achieving something we actually also achieve something else. To enter a house we must go through a door. Hence, at the same time we enter the house we are also going through the door. In this case it is legitimate to add the relevant PP.

(8.15a) He entered the house through the door.
(8.15b) Er betrat das Haus durch die Tür.

So, whether or not another directional PP is legitimate depends on how exclusive the event is construed with respect to other events. This account also works for the verb to put. We shall say in the case of put that the event of putting is confined to the moment where the object ends up in its final location. So, while you can be moving an object around before putting it onto the table, the event of putting is the very last moment when you do put it there. This will explain why no other directional PP is legitimate here. A similar case is provided by the verb to arrive, German ankommen. While you may have been travelling all around the country, you arrive only at the very last moment. However, there is a difference. One would expect on this account that the verb selects cofinal mode. However, this is not so.

(8.16a) Wir kamen in London an.
(8.16b) *We arrived into London.
(8.17a) We arrived in London.
(8.17b) *Wir kamen nach London an.

The same holds for French and Hungarian. Yet, in Finnish the facts are different. Here, the confinal mode is mandatory.

(8.18a) *Saavuimme Lontoossa.
arrive-PAST-1.PL London-INESS
(8.18b) Saavuimme Lontooseen.
arrive-PAST-1.PL London-ILL

It is not unplausible that some semantic explanation can be found. We may say, for example, that to arrive is an achievement. Its event time is punctual, and so it does not tolerate any nonstative mode. The Finnish counterpart would then be analyzed as non–punctual, that is, an accomplishment verb.

For completeness we shall also say that German (in distinction to Hungarian) has verbal prefixes that make a verb transitive by turning a directional PP into an accusative complement. Examples are:

ent-	*origin*
durch-	*path*
be-	*destination*

So we have the following alternatives ((8.19) versus (8.20) and (8.21) versus (8.22)).

(8.19) Erwin kletterte auf den Baum.
Erwin climbed onto the tree
(8.20) Erwin bekletterte den Baum.
Erwin BE-climbed the tree
(8.21) Erwin sprang durch den Reifen.
Erwin jumped through the hoop
(8.22) Erwin durchsprang den Reifen.
Erwin THROUGH-jumped the hoop

These prefixes are not productive to the same degree. In KinyaRwanda, one can also turn a directional PP into a direct object, likewise a stative PP. (See [15] for relevant examples.) The verbs formed with these particles do not tolerate any other directional PP.

(8.23) *Ich sah, wie Erwin von Berlin die Alpen durchflog.
I saw how Erwin THROUGH–flew the Alps from Berlin.

(8.24) *Ich sah, wie Erwin nach Rom die Alpen durchflog.
I saw how Erwin THROUGH–flew the Alps to Rome.

However, these verbs do tolerate approximatives, which are formed in German using the postfixes her (coming from) and hin (going to) or aus (away).

(8.25) Ich sah, wie Erwin von Berlin aus die Alpen durchflog.
I saw how Erwin THROUGH-flew the Alps coming from Berlin.

(8.26) Ich sah, wie Erwin nach Rom hin die Alpen durchflog.
I saw how Erwin THROUGH-flew the Alps going to Rome.

9 Conclusion

We have shown in this paper that direcional locative expressions consist of three parts: a modalizer, a localizer and a DP. Localizers exist in large numbers while there are up to four modalizers, specifying to the static, the cofinal, the coinitial and the transitory mode. The combination of a modalizer and a localizer typically forms a morphological unit, either being a case or a preposition. We have shown that there exists a markedness hierarchy with the static mode being the least marked, and the transitory mode the highest. Directional locatives in the nonstatic mode can only be construed with the (unique) entity that constitutes the event by moving. Finally, we have shown that directional locatives are selected by their verbs. A number of questions have been left open. We have seen that there exists a fair number of locative expressions (even locative cases) that do not fit the schema. An example is the approximative but also those expressions that denote directions in which one is going. Also, we have talked a lot about the constitution of an event and how the fact that an event is constituted in one or the other way makes a difference whether or not some locative is appropriate. However, we feel that this approach is not developed to satisfaction, and though it might be initially appealing, it needs to be worked out in detail.

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