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Reference to space and time through local adpositions and local cases :
beyond the proposals of C. de Groot, J. H. Connolly, and J. L. Mackenzie

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Reference to space and time through local adpositions and local cases :
beyond the proposals of C. de Groot, J.H. Connolly and J.L. Mackenzie

1. The expression of local semantic functions through adpositions or case marking and de Groot's analysis (1989)

1.1. The spatial or time reference of a state of affairs (SoA) is usually expressed by an adposition (pre- or postposition) and/or local case marking. The extension of these two means of expression largely varies from language to language. Here are some examples of languages with different systems of local reference.

In **French**, only prepositional phrases are available to express local reference and most of the spatial prepositions conflate the location and the direction values, e.g. *Je vais/Je suis à Rome*, [I am driving to Rome / I am in Rome] *J'entre/Je suis dans le Capitole* [I am entering the Capitol / I am standing in the Capitol].

From a typological viewpoint, **Malay** shares some morphosyntactic properties with Romance languages, although it is genealogically very far from them. For example Malay resorts only to prepositions for expressing local reference (Mintz 1994:100-112). The three main prepositions are *di* (for Location), *dari* (for Source) and *ke* (for Destination). In Malay verbs split into three groups according to their compatibility with those three prepositions :

- a) the first group ("inherently or semantically directional verbs" according to Mintz) is compatible with *ke* and/or *dari* but incompatible with *di*, e.g. *balik* (go/come back) is followed by *dari* (come back from) or *ke* (come back to), *pergi* (go) is followed only by *ke* (go to),
- b) the second group (non directional verbs) is compatible only with *di*, e.g. *tinggal di* N (stay in N),

c) finally the third group of verbs like *datang* (come / arrive) is compatible with the three prepositions : *datang dari* N (arrive/come from N), *datang ke* N (come to N), *datang di* N (arrive at N). In co-occurrence with *ke*, the relevant semantic component is the change of place, in co-occurrence with *di*, it is the place arrived at.

Di, *dari* and *ke* may combine with prepositional constituents originating as nouns in order to express locative or directional relations which include a component of interiority (*dalam* : in), of contact with an external upper surface (*atas* : on) or of space between two objects or places (*antara* : between), e.g. (Prentice 1987:931) :

	<i>di rumah</i> (at home)	
<i>di dalam rumah</i> ([be] in the house) (cf. Finnish : inessive case)	<i>dari dalam rumah</i> ([come] from inside the house) (cf. Finnish : elative case)	<i>ke dalam rumah</i> ([go] into the house) (cf. Finnish : illative case)

In Malay there is no equivalent of the manifold polysemy of the French preposition *à* :

French		Malay
<i>à</i> [_ / N _{location}]	→	<i>di</i>
<i>à</i> [_ / N _{destination place}]	→	<i>ke</i>
<i>à</i> [_ / N _{recipient}]	→	<i>kepada</i>
<i>à</i> [_ / N _{time position}]	→	<i>pada</i> (seldom <i>di</i>)

In classical **Latin** local reference is expressed either through autonomous case marking (in co-occurrence with names of places, ex. *eo Rom-am*_{accusatif}, I am walking to Rome vs. *sum Rom-ae*_{Locative}, I am in Rome) or with prepositions governing the accusative or the ablative or alternatively both cases (ex. directional : *intro in Capitoli-um*_{accusative}, I am entering the Capitol vs. locative : *sum in Capitoli-o*_{ablative}, I am in the Capitol). **German** has a system of local reference similar to the Latin system (especially concerning the prepositions governing an alternative case marking)¹ and furthermore has some postpositions (ex. NP_{dative} *gegenüber*, in front of) and discontinuous adpositions (ex. *von* _{dative} [...] *aus* : from N onwards).

The **Turkish** case system includes three local cases : directive (*ev-e* : home), locative (*köy-de* : in the village) and ablative (*köy-den* : from the village), some local

¹ Six German prepositions are followed by the dative case when expressing a location and by the accusative case when expressing a direction : *an, auf, in, über, unter* und *zwischen*.

prepositions and numerous postpositions governing the locative, the directive or the ablative case.

According to de Groot (1989:16) and Abondolo (1987:585), the number of cases in **Hungarian** is uncertain. Most of them have local reference as their primary function, e.g. the inessive *-ban* : in (location), the elative *-bo'l* : out of, the illative *-ba* : into, the superessive *-n* : on (location), the delative *-ro'l* (from²), the sublative *-ra* : on/against with directional sense), the adessive *-na'l* near (location), the ablative *-to'l* (from near), the allative *-hoz* : near with directional sense) and the terminative *-ig* : (until). De Groot (like Abondolo 1987:585) points out that these case markings are organised into threefold micro-systems contrasting a locative, a lative (or directional) and an ablative value, e.g.

case marking	<i>-ban</i>	<i>-ba</i>	<i>-bo'l</i>
naming	"inessive"	"illative"	"elative"
value	locative	lative	ablative
translation	<i>in</i>	<i>into</i>	<i>out of</i>

The six postpositions expressing the relations UNDER, BEHIND, BENEATH, BESIDE, BETWEEN and IN FRONT OF are similarly structured, e.g.

postposition	<i>alatt</i> [NP ___]	<i>ala'</i> [NP ___]	<i>alo'l</i> [NP ___]
value	locative	lative	ablative
translation	<i>under</i> _{location}	<i>under</i> _{direction}	<i>from under</i>

Most postpositions do not govern any specific case, e.g. *Budapest-Ø felé* (towards Budapest) but few govern the superessive case, like *keresztül* (via) : *Keceskemet-en*_{superessive} *keresztül* (via Keceskemet).

It is noteworthy (cf. Stolz, 1992:58-60) that the demonstrative determiners (and only they) agree with the head of the NP : not only is the case marking is shared but the postposition is too e.g.

• in the inessive case :

ab-ban az a'gy-ban (in this bed)
 this-iness the bed-iness

² According to Stolz (1992:58) the superessive, the sublative and the delative cases compose a structured set of three "upper" local cases. He contrasts *a ha'zon* (superessive : on the top of the house) with *a ha'zra* (sublative : onto the top of the house) and *a ha'zro'l* (from the top of the house). De Groot does not point out this value of the delative case.

- with a postposition governing the nominative case :

ez alatt a hí'd alatt (under this bridge)
 this under the bridge under

- in the superessive case governed by the postposition *keresztül* :

ez-e-k-en az orsza'g-o-k-on keresztül (through these countries)
 dem-lv-pl-sup art country-vl-pl-sup through
 (lv = linking vowel)

Finally, **Finnish** also has a paradigm of six local cases (cf. Karlsson, 1987:99-110) : the inessive, ex. *talo-ssa* (in the house), the elative, ex. *vede-stä* (out of the water), the illative, ex. *talo-on* (into the house), the adessive, ex. *pöydä-llä* (on the table / location), the ablative, ex. *maa-lta* (from the country(side)) and the allative, ex. *tuoli-lle* : (on(to) the chair / direction), which are organised as in Hungarian :

case marking	-ssa	-on	-stä
naming	"inessive"	"illative"	"elative"
value	locative	lative	ablative
translation	<i>in</i>	<i>into</i>	<i>out of</i>

As in Hungarian, some postpositions exhibit three alternations, one locative, ex. *a-lla* (locative *under*), one 'lative', ex. *a-lle* (directional *under*) and one ablative, ex. *a-lta* (*from under*), cf. Karlsson 1987:188 :

Koira on pöydä-n alla. The cat is under the table.
Koira ryömi pöydä-n alle. The cat slipped under the table.
Tule esiin pöydä-n alta ! Come from under the table !

The preposition meaning 'in the middle of' exhibits analogous variants : *keske -llä* (locative), *-lle* (lative), *-ltä* (ablative). Postpositions and prepositions may govern the Genitive, the Partitive and in particular instances the Illative.

Confronted with such a variety of means of expression , C. de Groot (1989,1990) reflects the common opinion of the community of researchers in FG obtaining prior to the new proposals of Mackenzie (1992) and Hengeveld (1992) when he proposes to restrict the number of lexical parts of speech to three (N, V, Adj) and therefore to reject the notion of "lexical preposition". Thus every local relation (either spatial or temporal) between a predication and an object or between two predications or two objects must be subsumed by a particular local function.

1.2. Unlike Chomsky's X-bar theory (1970) — one of the fundamentals of the current version of Generative Grammar — which regards adpositions as being a part of speech structurally similar to those of nouns, verbs and adjectives, this principle has a particular merit : it reminds us that from a typological viewpoint, adpositions are only one of the means of relating objects to predications and that they may either combine (in a distinctive or in a redundant way) with case markings or express the semantic function of simple case marking. Yet, one crucial drawback arises : in this view the inventory of local semantic functions strictly depends on the range of adpositions available in a particular language. How many different semantic functions were for exemple to be distinguished for the English translations of Hungarian *allat* : *under, below, beneath* and *underneath* ?

In order to avoid this particular dead-end, J.H. Connolly (1994, 1995) and J.L. Mackenzie (1992a, 1992b) have, respectively, put forward two separate analyses ; Connolly, one dealing with the English temporal prepositions and Mackenzie, one on spatial prepositions, which are partially related but whose crucial distinction lies in the role assigned to the lexicon :

- Connolly regards the English time prepositions as properly **grammatical**. As in de Groot's view the expression rules directly operate on the basis of the components of the underlying structure, but unlike de Groot their input is most frequently a "relational formula" (between time intervals).
- Conversely Mackenzie regards the English spatial prepositions either as **grammatical** when they are the mere expression of one of the five local semantic functions he accepts, or else as **lexical**. In the latter case the local reference of the utterance is viewed as composed from one of the five spatial semantic functions and the content of the lexical entry of a spatial preposition.

In §2 I shall summarize Connolly's arguments, in §3 Mackenzie's proposal, in §4 I shall compare Mackenzie's inventory of spatial functions with the conceptual local functions of Jackendoff and in §5 I shall submit a homologous treatment for both domains of local reference before revisiting in §6 the distinction between semantic local functions and morphological local case marking for such languages as Hungarian or Finnish.

2. The grammar of temporal prepositional reference in English according to John Connolly (1994, 1995)

In the domain of temporal relations, J. Connolly isolates three semantic functions : Time Pos(ition), Dur(ation) and Frequ(ency) and two formulations of the relation :

(a) the **simple** formulation : the time interval (or time point) referred to by the time satellite is directly related to the SoA through one of the three functions³ (1994:307) :

(17) *The parcel arrived at noon*
 (Past e₁ : arrive_v
 ((d1x₁ : parcel(x₁))Processed) (e₁)
 : [(d1x₂:noon(x₂))TimePos](e₁))

(24) *The amnesty will last for two weeks.*
 (Fut e₁ : [last_v
 ((d1x₁:amnesty(x₁))∅)(e₁)
 : [i2x₂:week(x₂))Dur](e₁))

(b) the **relational** formulation : the time interval (or time point) referred to by the time satellite is indirectly related to the SoA through a set of relations between time intervals (or time points). One of them is the time interval/point referred to by the semantic function TimePos, Dur or Frequ. I shall begin by presenting those analyses of Connolly which I regard as uncontroversial. Concerning the less satisfactory analyses, I shall put forward counter-proposals respecting the notational principles initiated by Connolly.

(I) The analysis of *before noon* as a TimePos satellite is uncontroversial : the SoA e₁ is localized at a specific time point d1x₂ which is anterior to the time point referred to by the formula d1x₃:noon(x₃).

(15) *The parcel will arrive before noon.*
 (FUT e₁: [...](e₁) : [(d1x₂:(d1x₃:noon(x₃):x₂ < x₃))Time-pos](e₁))

(II) But the formal treatment of the satellites introduced by *until* and *since* is questionable :

³ For the sake of simplicity I shall maintain Connolly's numbering of the examples.

(19) *The amnesty lasted until Sunday.*

(PAST e₁:[/asN
 (d1x₁:amnesty(x₁))∅](e₁)
 : [d1x₂:(d1x₃:Sunday(x₃) : x₃=(x₂)l)]Dur](e₁))

In this formulation, x₂ refers to an interval open in the past and closed in the future whose end-point is symbolized by (x₂)l . The point is that the partial formula d1x₃:Sunday(x₃) refers to an interval and not to a time point. That interval cannot have the same duration as the end-time point (x₂)l unless (x_i)l is reinterpreted as the final sub-interval of (x_i). If the sentence means that the amnesty lasted until an instant x₂ located at Sunday, only a notation like (x₂)l ∈ x₃ is relevant. The same criticism applies to (21) :

(21) *The amnesty has lasted since Sunday*

(PERF e₁:[...](e₁)
 : [(d1x₂:(d1x₃:Sunday(x₃) : x₃ = l(x₂))]Dur](e₁))
 → Counter-proposal :
 : [(d1x₂:(d1x₃:Sunday(x₃) : l(x₂) ∈ x₃)]Dur](e₁))

(III) Last but not least I regard the notation for the sentences (9b) and (9a) below in which the satellites *after three days* and *three days ago* respectively appear as inherently inconsistent. Concerning (9b) :

(9b) *The parcel arrived after three days.*
 (PAST e₁:[...](e₁) : [(i3x₂:day(x₂): x₃ < x₂)Time-pos](e₁))

I pinpoint two problems : on the one hand the initial reference point of the interval of *three days* does not appear in the notation, on the other hand the notation of time intervals and points with variables intended to symbolize entities is a source of confusion.

As a matter of fact, what sentence (9b) expresses is that the event e₁ has taken place at a specific instant which I shall symbolize with t₁ in such a way that a time-interval t₂ composed of an undetermined series of three days [i3x₂ : day(x₂)] separates from a reference point which I refer to with t₃. Thus t₃ is the starting point of t₂ t₃(t₃ = lt₂) and its end point is t₁ : t₁(t₁ = t₂l). Therefore I propose to replace Connolly's notation by the following :

(PAST e₁:[...](e₁)
 : [d1t₁ : [d1t₂ : [i3x₂ : day(x₂)]] : t₃ = lt₂ : t₁ = t₂l]Time-position] (e₁))

↑ ↑ ↑ ↑
 event-time interval of entity starting point
 three days of time of the
 reference three days

Similarly, sentence (9a)

(9a) *The parcel arrived **three days ago***

is represented by the underlying structure (13a) in which E_1 refers to the 'deictic center' :

(13a) (PAST e_1 : [*arrive*_V($d1x_1$:*parcel*(x_1))_{Proc}](e_1)
 : [*i3x_2:day*(x_2) : $x_2 < E_1$]_{Time-Pos}](e_1))

Here the instant at which the parcel arrives has no notation. My proposal is to introduce it as in the revised notation of (9b) : the time-point t_1 of the event is located as the starting point of a timespan of three days whose end point is the speech-time E_1 :

(PAST e_1 : [*arrive*($d1x_1$:*parcel*(x_1))_{Proc}](e_1)
 : [(**$d1t_1$** : [**$d1t_2$** : [*i3x_2:day*(x_2))]] : $t_1 = lt_2$: $E_1 = t_2l$]_{Time-pos}](e_1))

↑
↑
↑

event-time
interval of *three days*
deictic center

The same criticism is applicable to the symmetrical treatment of the satellite *in three days* in sentence (14) :

(14) *The parcel will arrive **in three days**.*

(FUT e_1 : [...](e_1) : [(*i3x_2:day*(x_2): $E_1 < x_2$)_{Time-pos}](e_1))

→ Counter-proposal :

(FUT e_1 : [...](e_1)

: [(**$d1t_1$** : [**$d1t_2$** : [*i3x_2:day*(x_2))]] : $E_1 = lt_2$: $t_1 = t_2l$]_{Time-pos}](e_1))

Let us conclude :

- According to Connolly, no time preposition may be regarded as "lexical", thus none appears in the lexicon and the meaning of each preposition is to be described inside the underlying structure.
- One may criticize the enhanced complexity of the underlying structure involved by this principle.
- But one must keep in mind that in any case Connolly's "relational formulae" are to appear in one or another component of the model, either in the underlying structure, as he claims, or in the lexicon as Mackenzie assumes for those prepositions which he regards as lexical, that is for the great majority of them.

3. The grammar of English spatial prepositions according to J. Lachlan Mackenzie (1992a, 1992b)

J.L. Mackenzie resorts to notational conventions diverging from those of de Groot (1989) and Dik (1989) :

- (a) Following Hengeveld (1992) (and a small hint by Dik 1989:.....) he enriches the notation with predicate variables f_i, f_j , which are especially useful for distinguishing types of predicates according to their respective part of speech, and
- (b) for brevity, he deliberately fails to close the representations of SoAs and entities by not reiterating the corresponding variable.

Were he to introduce the place variable p_i into the underlying structure of the PP [*at the theatre*] localizing a SoA, that would yield the following formula in Dik's notation⁴ :

$$(\pi_2 e_1 : (...)(e_1) : ([d1p_1 : theatre_N(p_1)]_{Loc}) (e_1))$$

Mackenzie's notational convention is at the same time poorer by introducing the SoA variable (e_1) only once and richer by inserting a predicate variable within the scope of the place variable :

$$(\pi_2 e_1 : (...)) : (d1p_i : f_i : theatre_N)_{Loc}$$

the latter may be omitted in short notation :

$$(\pi_2 e_1 : (...)) : (d1p_i : theatre_N)_{Loc}$$

In addition to the three semantic functions Place, Direction and Source introduced by Dik, Mackenzie distinguishes two further functions : on the one hand a Path function , on the other two specifications of the Direction : the bounded Allative and the unbounded Approach. The five resulting local functions are expressed in English by five grammatical prepositions⁵ :

Locative	Source	Path	Allative	Approach
<i>at</i>	<i>from</i>	<i>via</i>	<i>to</i>	<i>toward(s)</i>

Instead of Connolly's relational formulae, he introduces adpositional predicates ; as in Jackendoff's conceptual semantics (see below §4), they are one-place-

⁴ Supposing that in the scope of a spatial preposition the reference of *the theatre* is a place like *Paris* or *Italy* rather than the building occupying that place.

⁵ When introducing a Time-Position or a Recipient, *to* remains a grammatical preposition.

predicates whose single argument is assigned the semantic function Ref(erence), e.g. for the preposition *on* :

$$on \ [_ \ NP \ (x_i)] \ \rightarrow \ on_P \ (x_i)_{Ref}$$

In the underlying structure of a sentence like *The dog was under the table*, the local satellite *under the table* splits into two embedded constituents :

(a) the SoA is localized at a place :

$$p_i \ (d1(p_i)_{Ref})_{Locative} \ \rightarrow \ at \ some \ place: \ p_i$$

(b) then the place p_i is related to a thing x_i :

$$p_i: \ under_P(d1x_i: \ table_N) \ \rightarrow \ under \ the \ table: \ x_i$$

(c) therefore the full location formula relates the SoA to the abstract place p_i and p_i to the thing x_i ⁶ :

$$(d1p_i: \ under_P(d1x_i: \ table_N)_{Ref})_{Loc} = at \ some \ place: \ p_i \ under \ the \ table: \ x_i$$

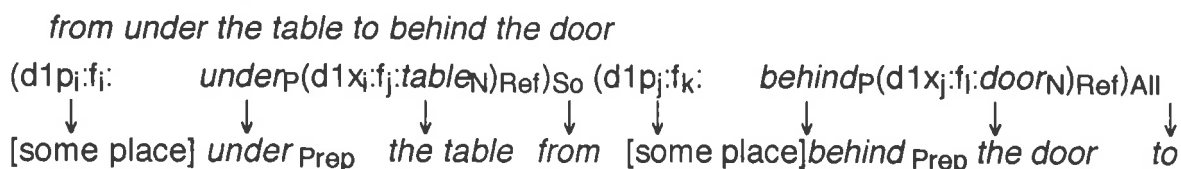
In English three methods of expressing the combined effect of a semantic function and an adpositional relation must be specified :

(a) The allative semantic function can be left unexpressed : ex. *The cat slipped [*to] under the table / [*to] behind the door.*

(b) Concerning the compound prepositions *into* and *onto* there is a correlation between their semantic and their morphological composition.

	Relation <i>in</i>	Relation <i>on</i>
locative function	<i>in</i> : (... f_i : <i>in</i> _P ...)Locative	<i>on</i> : (... f_i : <i>on</i> _P ..)Locative
allative function (... <i>to</i>)	<i>into</i> : (... f_i : <i>in</i> _P ...)Allative	<i>onto</i> : (... f_i : <i>on</i> _P ...)Allative

(c) If a Path is to be located between a source and a destination , both semantic functions Source and Allative must be expressed. In the following representation the arrows starting from the constituents of the underlying structure symbolize the input of each expression rule



Let us conclude concerning Mackenzie's notation : it makes a clear distinction between grammatical spatial prepositions which directly denote one of the five local semantic functions and lexical spatial prepositions

⁶ (d1) specifies the place as defined and sigular. A similar proposal has been made for the logical analysis of French direction(al) prepositions in Döpke & Schwarze 1981.

- expressing separately an adpositional predicate (ex. *behind the door* in the scope of *from*)
- or combining a semantic function and an adpositional predicate either by composing both morphologically (*into*, *onto*) or by deleting the expression of the semantic function (e.g. *slip behind the door*). One remarkable merit of this proposal is that it takes the specific meaning of each spatial preposition into account. But Mackenzie remains silent about the format of the entry of lexical prepositions in the lexicon. In particular he does not make clear whether their definition is to be made up of a list of (possibly fuzzy) **truth conditions** (as in formal⁷ or computational⁸ semantics) or to consist of an **analogical** representation evaluated in comparison with a prototype⁹.

4. Comparing Mackenzie's with Jackendoff's proposal

In the framework of his "lexical-conceptual semantics", R. Jackendoff (1983 and 1990:43-44) makes a crucial distinction between [EVENT] and [STATE] sentences. This theory is based on the localist hypothesis in which every SoA is regarded as a proper or derived localization or as a change of localization. To this end, Jackendoff introduces the conceptual classes [PLACE] and [PATH].

A **state** is conceived either as the localization of a thing in a place :

[STATE] → [State BE ([THING], [PLACE])]

or as the orientation of a thing toward a path (ex. *The sign points toward New-York*),

[STATE] → [State ORIENT ([THING], [PATH])]

or as the extension of a thing along a path (ex. *The road goes from New-York to San Francisco*) :

[STATE] → [State EXT ([THING], [PATH])]

An **event** is conceived either as the displacement of a thing on a path :

[EVENT] → [Event GO ([THING], [PATH])]

or as the maintenance of a thing in a place :

[EVENT] → [Event STAY ([THING], [PLACE])]

or as caused by a thing or an event :

[EVENT] → [Event CAUSE ({[THING / EVENT]}, [EVENT])]

⁷ See e.g. Wunderlich 1991 on the semantics of the German preposition *um* (round).

⁸ See e.g. M. Bras (1990) about the computation of the meaning of the French spatial prepositions.

⁹ See the contribution of C. Vandeloise, (esp. 1986) for a semantic analysis of French spatial prepositions originating in R. Langacker's cognitive grammar.

A **place** is conceived as the assignment of a local function to a thing :

[PLACE] → [Place PLACE-FUNCTION ([THING])]

The preposition *at* is the basic expression of the place-function (1983:54) and is selected for derived localizations, e.g. for *the light is red*

[STATE] → [State BEIdentification ([LIGHT], [AT ([RED])])]

Finally, a **path** is conceived as the assignment of one of the five following directional functions to a thing or a place :

[PATH] → [Path {TO / FROM / TOWARD / AWAY_FROM / VIA} ([{THING / PLACE})]

Jackendoff's argumentation about transitional local reference is similar to Mackenzie's :

"An example of a Path with a reference Thing is *to the house* ; an example of a Path with a reference Place is *from under the table*, where the trajectory begins at the Place "under the table"."(1990:44)

Jackendoff's list of local functions encompasses one function more than Mackenzie's : *away_from*, because two path specifications are supposed to intersect : goal-path vs. source-path and [+/-bounded]. As to the directional value [-bounded], Jackendoff claims that "the reference object or place does not fall on the path, but would if the path were extended some unspecified distance" (1983:165) :

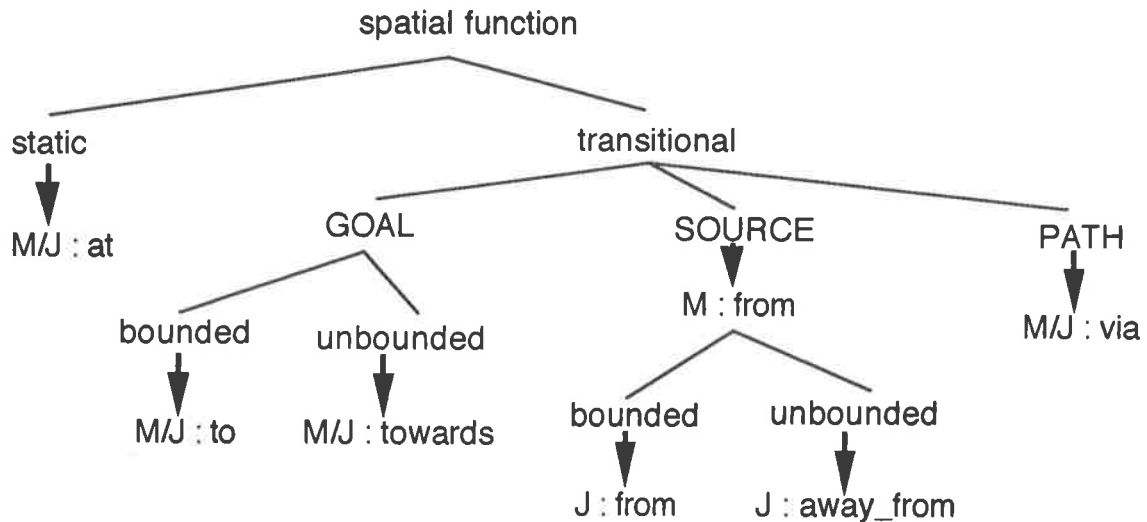
path specifications	bounded path	direction
goal-path	<i>John ran to the house</i>	<i>John ran toward the house</i>
source-path	<i>John ran from the house</i>	<i>John ran away from the house</i>

Jackendoff's primitive distinction between bounded and unbounded source function is not to be found in Mackenzie's paradigm (Figure 1)¹⁰ :

¹⁰ Mackenzie [personal communication] does not regard *away from* as a linguistic unit. Therefore it cannot express a relational concept. Indeed focalizing the source localisation in *He ran away from home* yields *It is [from home] that he [ran away]* instead of * *It is [away from home] that he ran*. Thus there does not seem to be any constituent [*away from home*]. On the other hand, according to Mackenzie, *John ran away from the house* can be used equally easily where the motion is from inside (boundary-crossing) or where the motion is from the vicinity of the house.

Figure 1

**Primitive semantic functions of spatial localisation
according to Mackenzie and Jackendoff**



From the viewpoint of universal grammar only the empirical study of numerous systems of local cases and adpositions will enable us to validate one of these hypotheses. The question is complicated because in order to classify paths one must cross two categories : boundedness and further or earlier movement beyond a threshold. The three local Hungarian cases Elative *-bo'l*, Delative : *-ro'l* and Ablative : *-to'l* seem to take that combination into account :

PATH / SOURCE function	+bounded / +beyond threshold	→	elative	<i>-bo'l</i>
	+bounded / -beyond threshold ¹¹	→	delative	<i>-ro'l</i>
	-bounded	→	ablative	<i>-to'l</i>

In contrast, the four Finnish local cases concerned with the SOURCE and the GOAL function : Elative vs. Ablative and Illative vs. Allative grammaticalize rather [+/-beyond threshold] than mere (un)boundedness. Yet for Mackenzie as well as for Jackendoff boundedness is a primary specification (at least for the Allative vs. Direction function in Mackenzie's paradigm), but not the crossing of a threshold. In Jackendoff's framework the distinction between Elative and Delative can be accounted for with different specifications of PLACE FUNCTION in the scope of FROM :

¹¹ According to Stolz (1992:58) the delative case additionally expresses a top-down movement.

- [PATH] → [Path **FROM** ([Place **IN** ([THING]))] (= Hungarian relative)
 [PATH] → [Path **FROM** ([Place **AT** ([THING]))] (= Hungarian delative¹²)
 [PATH] → [Path **AWAY_FROM** ([Place **AT** ([THING]))] (= Hungarian ablative)

In § 6, I shall outline a treatment of such paradigms of local cases in accordance with Mackenzie's proposal.

5. For a similar treatment of spatial and temporal prepositional reference in French

5.1. As in numerous other languages, many local prepositions in French can also have a temporal value (ex. *en juin / en France* [in June / in France], *à Paris / à la veille de la guerre* [in Paris, just before the war], (*aller*) *vers la forêt / vers le Nouvel-An*, [(go) towards the forest / around the New Year] *dans la maison / dans une heure* [in the house / in an hour] etc.). Therefore a heterogeneous functional analysis of the prepositions referring to space and to time is inappropriate and instead, we should be able to give a identical analysis.

To this end the degree of compatibility between both the theories of Connolly and of Mackenzie will be evaluated :

- (a) Both theories support the hypothesis that local semantic functions are limited in number : three for temporal functions according to Connolly, five for spatial functions according to Mackenzie.
- (b) They are also in agreement concerning the analysis of a part of the prepositional phrases, those which strictly express one of these semantic functions : as in the first grammar of semantic cases by C. Fillmore (1968), some English prepositions are supposed to reflect a particular semantic function.
- (c) Moreover, they agree in proposing to analyse the other prepositional phrases by splitting their meaning into a local semantic function on the one hand and a complementary piece of spatial or temporal information on the other hand.
- (d) Thus, they disagree only on the second component involved : for Connolly it is a "relational formula" which does not appeal to any lexical entry. Such a formula would also be relevant for a compound case marking : for ex. in Avar (a Causasian language) the spatial suffix *-d(a)* meaning 'on (the top of)' combines

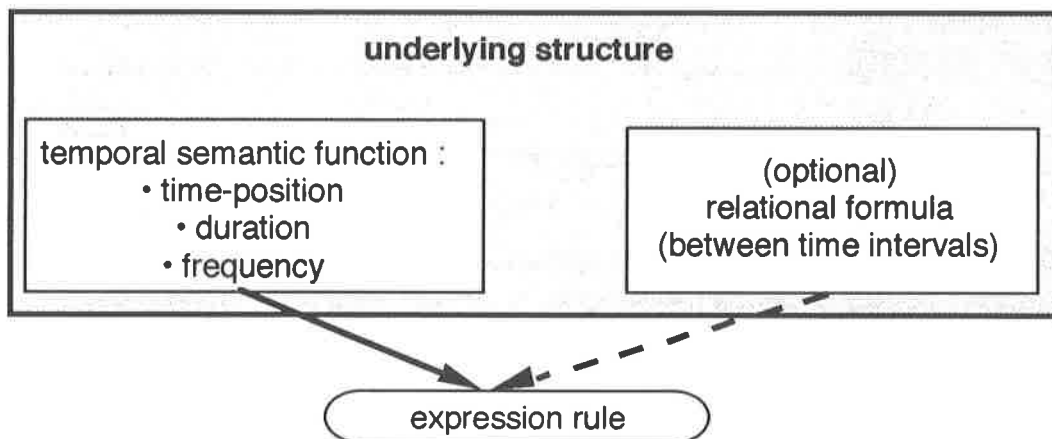
¹² According to Stolz's interpretation Jackendoff's formula should be replaced by :
 [PATH] → [Path **FROM** ([Place **ON** ([THING]))]

with case markings referring to four of Mackenzie's five spatial functions: *-d* (→ at + on), *-d-e* (→ on + to), *-da-ssa* (→ from + on) and *-da-ssa-n* (→ via + on), cf. Blake (1994:154). On the other hand, Mackenzie regards the second component as a prepositional predicate, in other words as a sort of relational formula requiring an entry in the lexicon.

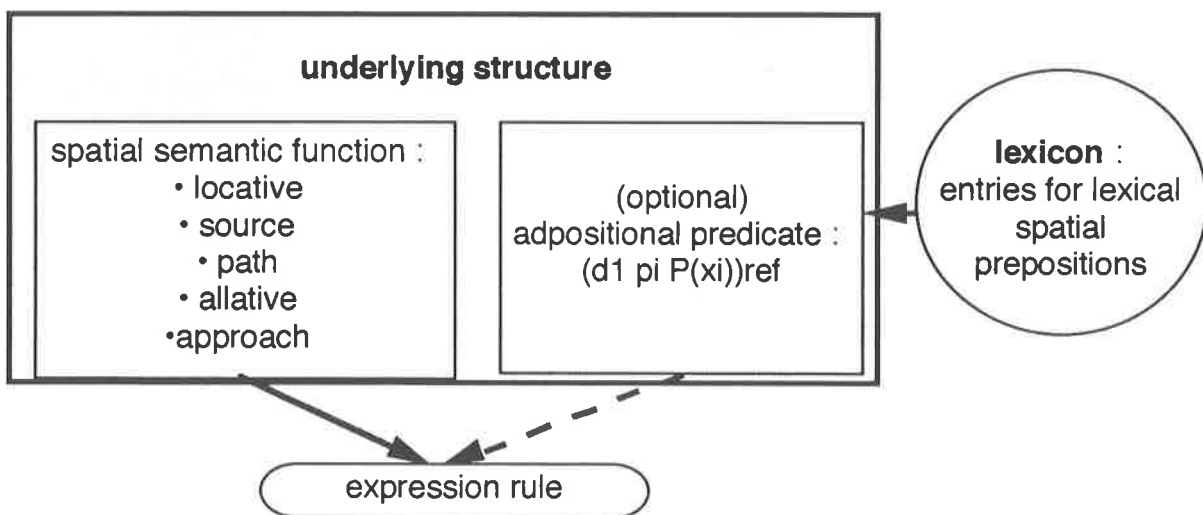
The following diagram illustrates to what extent the structure of the model is affected by both proposals (Figure 2) :

Figure 2

Connolly



vs. Mackenzie



5.2. Connolly's method is at first glance more economical than Mackenzie's since it does not rely on the lexicon. Therefore it is tempting to apply it to spatial reference. A set of primitive relators linking spaces one to another may be imagined which allow the construction of relational formulae of the same type as those formalized by Connolly between time adverbials. For example, while keeping Mackenzie's specification of a particular type of variables for places, one may introduce the relators SUB and PONE¹³ in order to analyse *from under the table to behind the door* :

(d1p_i : [d1x_i : table_N(x_i) : p_i **SUB** x_i])_{So} (d1p_j : [d1x_j : door_N(x_j) : p_j **PONE** x_j])_{All}

The configuration (d1p_i : [d1x_i : (...) : p_i **SUB** x_i])_{So} triggers the expression from *under* N and the configuration (d1p_j : [d1x_j : (...) : p_j **PONE** x_j])_{All} the expression to *behind* N. However, by themselves the relations p_i **SUB** x_i and p_j **PONE** x_j are not self-evident and must be defined in some part of the model.

The drawback of such a notation is that it involves the introduction into the underlying structure of many relators which are unlikely to be conceptual primitives (in contrast with such time relators as t_i < t_j, t_i = t_j ou t_i = t_jl). Summarizing Brugmann's and Lakoff's argumentation, Taylor (1989:109-116) shows for example that the English prepositions *over* and *above* (which are translated the same way into French : *au-dessus*) are actually used in different contexts, but that these contexts are to be specified rather in reference to prototypical images than to truth-conditions.

Another well known example is the different distribution of Ge. *auf* and Fr. *sur* in contrast with Ge. *in* and Fr. *dans* . Compare (a-d) below :

auf / in	dans / sur	
(a) <i>auf der Landstraße</i>	<i>sur la route (de campagne)</i>	[on the way]
(b) <i>auf/in der Beethovenstraße</i>	<i>dans/sur la rue Beethoven</i>	[in the street]
(c) <i>in/auf der Gasse</i>	<i>dans la ruelle</i>	[in the alley]
(d) <i>auf/in dem Hof</i>	<i>dans/sur la cour</i>	[in the yard]

The basic meaning of Ge. *auf* and Fr. *sur* is identical : both prepositions localise a thing or a SoA ('figure') in contact with the upper surface of an area ('ground'). On the other hand, the basic meaning of Ge. *in* and Fr. *dans* is in both cases the localisation of a thing or a SoA ('figure') at or near the upper surface of the bottom of a container ('ground'). The different use of these prepositions in the contrastive examples above relies on the representation of the ground as 'area' or as 'bottom of a container'. In both languages a way is viewed as an area (cf. a) and an alley as the bottom of a container (cf. c), but a street and a yard are usually conceived of as

¹³ I.e. the Latin prepositions meaning respectively 'under' and 'behind'.

an area in German (*auf der Beethovenstraße / auf dem Hof*) and as the bottom of a container in French (*dans la rue Beethoven / dans la cour*) (cf. b, d).

Thus, in the underlying structure

(a) the set of the possible spatial relators would be open,

(b) such relators as ON(x/e,p) or IN(x/e,p) were to be specified respectively as

ON(x,l) iff LOCALISATION AT THE UPPER SURFACE OF (xThing/eSoA, PArea)

IN(x,l) iff LOCALISATION AT OR NEAR THE UPPER SURFACE OF THE BOTTOM OF (xThing/eSoA, PContainer)

These specifications involve the further definition of the thing-concepts AREA and CONTAINER and of the relational concepts LOCALISATION AT, LOCALISATION NEAR, UPPER SURFACE, BOTTOM OF. The recurrent question is : Where are such definitions to be situated if not in the lexicon ?

5.3. On the other hand, Mackenzie's analysis is clearly applicable to time prepositions. Here are some examples regarding the use of the French time prepositions *pendant*, *en*, *depuis* and *il y a*. For each illustration I shall mention first Connolly's representation (= JC) and then the unified representation (= UR) based on Mackenzie's. 'PC' and 'Prés' mean respectively "Passé Composé" and "Présent".

1. *Paul a travaillé pendant trois jours* [Paul worked for three days]

JC PC (e₁) : *travailler*_V([x₁ : *Paul*_{Np}(x₁)]Agent) (e₁)
 : [(d3x₂ : *jour*_N(x₂))Durée] (e₁)

UR (...) : [(d1t₁) : [i3x₃ : *jour*_N(x₃)](t₁)]Durée (e₁)
 [the grammatical preposition *pendant* does not appear in the UR]

Pendant is that preposition which is directly selected by the "Duration" function in the scope of an atelic predication (whereas *en* is ruled out).

2. *Paul travaille depuis trois jours* [Paul has been working for three days]

JC Prés (e₁) : *travailler*_V([x₁ : *Paul*_{Np} (x₁)]_{Agent}) (e₁)
 : [(d3x₂ : *jour*_N(x₂))_{Durée} | (E)] (e₁)

UR (...) : [(d1t₁) : *depuis*_P(i3x₃ : *jour*_N(x₃))_{Ref}(t₁)]_{Durée} (e₁)
 [The lexical preposition *depuis* appears in the UR]

In the scope of a predication viewed in a non perfect aspect, *depuis* refers to the duration of that part of the SoA which is observable until the deictic center E₁.

3. *Paul a résolu le problème en trois jours* [Paul solved the problem in three days]

JC PC (e₁) : *résoudre*_V([x₁ : *Paul*_{Np} (x₁)]_{Agt.}, [d1x₂ : *problème*_N(x₂)]_{Pat}) (e₁)
 : [(d3x₂ : *jour*_N(x₂))_{Durée}] (e₁)

UR (...) : [(d1t₁) : [i3x₃ : *jour*_N(x₃)](t₁)]_{Durée} (e₁)
 [the grammatical preposition *en* does not appear in the UR]

En is that preposition which is directly selected by the "Duration" function in the scope of a telic predication. In contrast *durant* (during) is ruled out.

4. *Paul revient dans trois jours* [Paul will be back in three days]

JC Prés (e₁) : *revenir*_V([x₁ : *Paul*_{Np} (x₁)]_{Agent}) (e₁)
 : [(d1x₂) : [(i3x₃) : *jour*_N(x₃) : x₂=(x₃) | : E₁= | (x₃)]_{PosTemp}] (e₁)

UR (...) : [(d1t₁) : *dans*_P(i3x₃ : *jour*_N(x₃))_{Ref}(t₁)]_{PosTemp} (e₁)
 [the lexical preposition *dans* appears in the UR]

Dans refers to a time position of e₁ in the future of the deictic center E₁ (whose distance from E₁ is specified here by '3x₃').

5. *Paul est revenu il y a trois jours* [Paul came back three days ago]

JC PC (e₁) : *revenir*_V([x₁ : *Paul*_{Np} (x₁)]_{Agent}) (e₁)
 : [(d1x₂) : [(i3x₃) : *jour*_N(x₃) : x₂= | (x₃) : E₁= (x₃) |]_{PosTemp}] (e₁)

UR (...) : [(d1t₁) : *il_y_a*_P(i3x₃ : *jour*_N(x₃))_{Ref}(t₁)]_{PosTemp} (e₁)
 [the lexical preposition *il_y_a* appears in the UR]

Il_y_a refers to a time position of e_1 in the past of the deictic center E_1 (whose distance from E_1 is specified here by '3x3').

6. (*Maintenant*), *Paul est parti depuis trois jours.* (Paul has been gone for three days / Paul left three days ago)

JC Prés (e_1) : [Accompli *partir*_V][(x₁ : *Paul*_{Np} (x₁)]Agent) (e_1)
 : [(d3x₂ : *jour*_N(x₂))Durée] (e_1)

UR (...) : [(d1t₁) : *depuis*_P(i3x₃ : *jour*_N(x₃))Ref(t₁)]Durée (e_1)

We meet here a second type of use of the preposition *depuis* in the scope of a verbal predication viewed in the perfect aspect. In this case *depuis* N refers to the time-span t_1 starting at the occurrence of the SoA referred to by the verbal predicate and ending at the deictic center during which the resulting state remains true (i.e. in the meantime Paul did not come back).

Of course, these six examples are far from exhausting the inventory of French prepositions introducing time satellites and they leave out of account the interesting puzzle of non prepositional time satellites, e.g. *Paul travaille le week-end* ; *Marie est arrivée mardi, reste ici cette semaine et repart jeudi*, etc. [Paul uses to work during the week-end ; Marie arrived on Tuesday, is staying here this week and is going to leave on Thursday]. But they show the relevance of both aspectual categories : the aspectual **character** (or 'aktionsart') of the verbal predication and the aspectual **perspective** of the sentence.

As a matter of fact, **telicity** is an **aspectual character** which may affect the predication either intrinsically or according to the type of object. As an example of intrinsic telicity, see *trouver* which is a telic verb, whatever object it may govern. As an example of contextual telicity see e.g. *manger* which is the head of a telic predication when it governs an object referring to a bounded dish or a bounded quantity of feed (*to eat a steak / one pound of strawberries in /*for five minutes*), but when it governs an object referring to an unbounded quantity of food or an indeterminate number of courses or in the intransitive use, it is the head of an atelic predication (*to eat beef / potato chips for /*in one hour*)¹⁴.

¹⁴ The inheritance of (a)telicity between the levels of verb-root, full verb, verbal predication and sentence is outlined in François (1989:313-9).

Therefore, de Groot (1989:43) has suggested assigning the feature [+/-telic] to the argument of the predication selecting this aspectual character. In French, *pendant* and *en* are the grammatical Duration prepositions whose expression is triggered by the value of the feature [+telic] → *en*¹⁵ vs. [-telic] → *pendant*.

Furthermore, both uses of *depuis* in combination with a durative vs. momentaneous predication are sensitive to the **aspectual perspective** : *depuis* may combine with a momentaneous predication only in the scope of the perfect aspectual perspective. But the aspectual character is relevant as well, because the predication must refer to a change of state whose result is still true and visible/detectable at speech time.

? *Le juge a inculpé le cambrioleur depuis trois jours* (±The judge charged the burglar three days ago : The effects of the action are unclear)

vs.

Le juge a incarcéré le cambrioleur depuis trois jours (meaning : The judge has jailed the gangster three days ago & he is still in jail)

6. The expression of local semantic functions with paradigms of local cases (illustrated by Hungarian and Finnish)

In §4, I pointed to a formalization à la Jackendoff of the semantic structure underlying the use of three Hungarian local cases. According to Stolz' interpretation of the delative case as expressing a movement from an upper place or from the top of a thing (Stolz 1992:58), I propose a first substitution of the primitive conceptual functions for describing the meaning of **Delative** :

[Path **FROM** [Place **AT** [THING]]] → [Path **FROM** [Place **ON** [THING]]]

On the other hand, taking into account Mackenzie's criticism of the identification of a function AWAY_FROM, I propose a second substitution concerning the meaning of the **Ablative** case :

[Path **AWAY_FROM** [Place **AT** [THING]]] → [Path **FROM** [Place **NEAR** [THING]]]

and as an effect of symmetry a third substitution for the meaning of the **Allative** case :

¹⁵ This property of *en* only concerns its temporal use, but in its spatial use as well it is a grammatical preposition (*à* and *en* are in complementary distribution : *à Paris, en Normandie, aux Pays-Bas* [in Paris, in Normandy, in the Netherlands]).

[Path **TOWARDS** [Place **AT** [THING]]] → [Path **TO** [Place **NEAR** [THING]]]

Apart from the Terminative case, the resulting structure is identical for Place, Goal and Source localisation and reproduces the traditional distinction of the grammars of Hungarian (see Tompa 1972 mentioned by Stolz 1992) between three sorts of local cases,

- **internal** : Inessive, Illative, Elative,
- **upper** : Superessive, Sublative, Delative,
- and **external** : Adessive, Allative, Ablative.

Representation of the basic meaning of the Hungarian local cases with primitive conceptual functions according to de Groot (1989) and Stolz (1992)

specification of the Place function ↓	[State BE ([THING], [Place])]	[Event GO ([THING], [Path TO [Place]])]	[Event GO ([THING], [Path FROM [Place]])]
[Place IN [THING]]	inessive <i>a ha'zban</i> in the house	illative <i>a ha'zba</i> into the house	elative <i>a ha'zbo'l</i> out of the house
[Place NEAR [THING]]	adessive <i>a ha'zna'l</i> near the house	allative <i>a ha'zhoz</i> towards the house	ablative <i>a ha'zro'l</i> from the area around the house
[Place ON [THING]]	superessive <i>a ha'zon</i> on (the top of) the house	sublative <i>a ha'zra</i> onto (the top of) the house	delative <i>a ha'zto'l</i> from the top of the house

The basic semantic system of local cases of the two other main languages of the finno-ugrian family, Finnish and Estonian, is similar :

- According to Karlsson's data, in Finnish the Adessive, Allative and Ablative are able to express the values of the Hungarian superessive, sublative and Delative :

Representation of the basic meaning of the Finnish local cases with primitive conceptual functions according to Karlsson (1987:99-110)

specification of the Place function ↓	[State BE ([THING], [Place])]	[Event GO ([THING], [Path TO [Place]])]	[Event GO ([THING], [Path FROM [Place]])]
[Place IN [THING]]	inessive <i>talossa</i> in the house	illative <i>taloon</i> into the house	elative <i>talosta</i> out of the house
[Place NEAR/ON [THING]]	adessive <i>katolla</i> on the roof <i>asemalla</i> at the station	allative <i>katolle</i> onto the roof <i>työille</i> to the girl	ablative <i>katolta</i> from the roof <i>mereltä</i> at the sea

- According to Stolz's data, in Estonian the reduced paradigm of six local cases does not express the relations including the component [Place **ON** [THING]] :

Representation of the basic meaning of the Finnish local cases with primitive conceptual functions according to Stolz (1992:87)

specification of the Place function ↓	[State BE ([THING], [Place])]	[Event GO ([THING], [Path TO [Place]])]	[Event GO ([THING], [Path FROM [Place]])]
[Place IN [THING]]	inessive <i>raamatus</i> in the book	illative <i>raamatusse</i> into the book	elative <i>raamatust</i> (extracted) from the book
[Place NEAR [THING]]	adessive <i>raamatul</i> near the book	allative <i>raamatule</i> towards the book	ablativ <i>raamatult</i> from the book

Since the underlying structure is supposed to carry the pieces of local information suitable for triggering the selection of the relevant case marking into the expression component, introducing as many local semantic functions as there are, for ex. in Hungarian cannot be a satisfactory solution with regard to universal grammar. But one can imagine a recursive system of local semantic functions on the basis of one primitive function **loc_space**, whereby the designation of the derived functions clearly shows the combination of two components :

{loc_stat... / dest... / source...} x { ..._in, ..._at, ..._on, ..._near).

loc_space	→	{loc_stat, loc_dest, loc_source, loc_path}
loc_stat	→	{loc_stat_in, loc_stat_at, loc_stat_on, loc_stat_near, etc.}
loc_dest	→	{loc_dest_in, loc_dest_at, loc_dest_on, loc_dest_near, etc.}
loc_source	→	{loc_so_in, loc_so_at, loc_so_on, loc_so_near, etc.}

In this way a conceptual classification derived from Jackendoff's is exploited at two levels :

- as a recursive system of semantic functions for the selection of the local case markings,
- in the lexicon for the semantic interpretation of the lexical local adpositions.

As for (a), it is well known that in classical Latin three cases are able to express a local function without being introduced by a preposition :

loc_stat :	locative case ex. <i>Caius habitat Romae, Lugduni, ruri, hic</i> Caius lives in Rome, Lyon, in the country, here	question : <i>ubi.. ?</i>
loc_dest :	accusative case ex. <i>Eo Romam</i> I am going to Rome	question : <i>quo... ?</i>
loc_source :	ablative case ex. <i>Redeo domo</i> I am coming from home	question : <i>unde... ?</i>
loc_path :	no autonomous case marking (expressed by the preposition <i>per</i> governing the Accusative)	question : <i>qua... ?</i>

Thus, three of the four specifications of loc_space may be expressed (under quite restrictive conditions for each of them) with an autonomous case marking :

loc_space → {loc_stat, loc_dest, loc_source, loc_path}
 => **locative** => **accusative** => **ablative** *per* + accusative

As for (b) I agree with Mackenzie that in English the grammatical spatial prepositions are *at*, *to*, *towards*, *from* and *via*. In the following table, these prepositions appear in bold letters as expressions of some of the compound relations of the recursive system, whereas the lexical prepositions appear in italics :

loc_space	→	{loc_stat, loc_dest, loc_source, loc_path}	
			=> via
loc_stat	→	{loc_stat_in, loc_stat_at, loc_stat_near}	
		=> <i>in</i>	=> at => <i>near, around</i>
loc_dest	→	{loc_dest_in, loc_dest_at, loc_dest_near}	
		=> <i>into</i>	=> to => towards
loc_source	→	{loc_source_in, loc_source_at, loc_source_near}	
		=> <i>off, out of</i>	=> from => ? <i>away from</i>

I shall illustrate the power of this unified treatment by comparing the underlying structure of a Finnish sentence exhibiting an illative case marking and its English counterpart in which the local object is introduced by the (compound) preposition *into* (see Karlsson1987:104) :

[Fin] *sä ajaa auto-n autotalli-in*
 Father drive Sg3 car+accusative garage+illative
 Father drives the car **into** the garage

[Fin] *sä ajaa auto-n autotalli-in* →
 (PRES e₁: *ajaa*
 ([d1x₁ : *isä*(x1)]Agent,
 [d1x₂ : *auto*(x2)]Goal,
 [d1x₃ : *autotalli* (x3)]loc_dest_in))
 (e₁)

[Engl] *Father drives the car into the garage* →
 (PRES e₁: *drive*
 ([d1x₁ : *father*(x1)]Agent,
 [d1x₂ : *car*(x2)]Goal,
 [d1p₁ : *in*_P [d1x₃ : *garage* (x3)]ref (p1)]loc_dest))
 (e₁)

The Goal argument expresses in both sentences a static internal localisation (*in...*) resulting from a displacement (*...to*). In English the preposition *into* is regarded as lexical. In the underlying structure the Goal meaning is symbolized by the function *loc_dest*, while the (resulting) internal localisation is borne by the prepositional predicate *in_P* whose conceptual formulation [_{Place} IN [THING]] must be defined in the lexicon.

In the underlying structure of the equivalent Finnish sentence, the localizing NP *autotalli* is directly related to the SoA by the function *loc_dest_in* which, as a specification of *loc_dest*, aims at describing the Finnish case system.

However, it must be kept in mind that local cases exhibit derived uses as well, for ex. the Illative can express a relation of temporal goal as in :

viiko-sta viikko-on
 week+relative week+illative
 from week to week

This means that the selection of an Illative or Elative case marking can be triggered as well by another local semantic function, in this case by **time_pos_dest** or **time_pos_source** regarded as two specifications of Connolly's *time_pos* function.

7. Concluding remarks

The aim of this paper was twofold :

- (a) to unify the underlying representation of spatial and temporal prepositions by taking the suggestions of Connolly and Mackenzie into account,
- (b) to examine the relation studied by de Groot between the inventory of local semantic functions and the paradigm of local cases in those languages which have an extensive paradigm of local cases, like Finnish and Hungarian .

As to (a)

- I have pointed out the similarity between the six spatial functions of Jackendoff and the five partially corresponding functions of Mackenzie
- and I have argued for a unified mode of representation distinguishing, like Mackenzie, between grammatical adpositions directly selected by a local semantic function and lexical adpositions listed in the lexicon and combining with a local semantic function (§5.2-3).

As to (b)

- I have suggested (in §6) a twofold recourse to Jackendoff's conceptual spatial functions in the lexical definitions of lexical prepositions and (in modified form) as a recursive system of local semantic functions in order to match them with the means of expression of each language.

In this way, the three Malay prepositions, *di*, *ke* and *dari* which express respectively the Locative, Allative and Ablative localization and build a basic micro-system combining with other prepositional constituents, are grammatical, whereas the constituents with which they combine appear in the underlying structure in the form of adpositional predicates. On the other hand, for a language like Avar which exhibits a paradigm of compound local cases whose second constituent expresses a value of Locative, Allative, Ablative or Perlative localization, the recursive system of local semantic functions makes it possible to construe such specifications as **loc_path_on** for the compound case *-da-ssa-n*. The construal of this highly specified function is in itself indicative , since the second case suffix *-ssan* expresses the **loc-path** function and the first *-da* the further specification **_on**.

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