Function versus regions in spatial language: a fundamental distinction

Michel Aurnague, Laure Vieu

HAL Id: hal-00939058

https://hal.science/hal-00939058v3

Submitted on 27 Jun 2017

Function versus regions in spatial language:

a fundamental distinction

Michel Aurnague and Laure Vieu

CLLE-ERSS/CNRS, University of Toulouse Jean Jaurès & IRIT/CNRS, University of Toulouse Paul Sabatier

ABSTRACT

The meaning of spatial expressions has attracted growing interest over the past three decades. Ever since the first studies were conducted in the late 'sixties, the semantic modelling of locative adpositions has favoured geometrical concepts such as regions. However, an alternative approach to spatial adpositions emerged at the beginning of the 'eighties, emphasizing the importance of functional concepts. This chapter sketches the historical background to the development of these two perspectives. Relying on formal and typological arguments, it shows that an approach grounded in both function and geometry/regions provides a better account of spatial adpositions in all their richness.

Keywords: adposition (simple/elementary vs. complex), (adpositional) argument, Basque, containment, force, French, function, geometry, internal localization nouns (ILNs), location/place, positional predicate, postural predicate, projective relation/adposition, region or space portion, relational approach, space, support, vector, Yuhup

INTRODUCTION[1]

After three decades of research on the expression of space in language, the time has come to take stock of the analyses and proposals that have emerged to explain the functioning of static spatial prepositions and, more generally, adpositions (including cases).[2] This is the goal we pursue in this chapter, chiefly examining the semantic aspects of spatial adpositions. We begin with an overview of the most significant studies in this field, highlighting two main ways of tackling the semantics of locative markers. One is essentially geometrical, and usually involves the notion of region, whereas the other lends greater importance to the functions of entities. In the section on prepositions/adpositions as relations, we then demonstrate that the arguments of spatial prepositions are not given the same status in these two frameworks, which therefore differ in their more or less *relational* character. Drawing chiefly on typological and crosslinguistic data, the section on typological issues and the ensuing Discussion suggest that an approach combining function and geometry (in particular, inclusion in a region) is more accurate than a point of view that only takes one of these two aspects into account. As we will see, this type of approach allows us to gain a much more subtle and contrasting picture of static spatial adpositions in language.

---

[1] We would like to thank Jacques Durand for his stylistic advice on a previous version of this chapter. We are also grateful to the reviewers and the proofreader for their helpful commentaries on both the form and content of our contribution.

[2] In this chapter, the term *adposition* is used quite weakly, as it covers prepositions, postpositions and cases. Moreover, we often mention prepositions and adpositions together (e.g. *preposition(s)/adposition(s)*), in order to indicate that, in spite of focusing on prepositional markers, our remarks and observations are likely to apply to the entire category of adpositions as we define it.

TWO OPPOSITE VIEWS ON SPATIAL PREPOSITIONS: A REVIEW

The systematic study of spatial markers and descriptions really only emerged in the 1980s, after decades of only sporadic research on these aspects of language (see, for instance, Leech 1969). Talmy and Herskovits were among the most important initiators of this research field, in that they were the first to engage in in-depth and systematic study. However, their analyses were mainly based on existing conceptions of spatial semantics. In particular, they continued to analyze the meaning of spatial prepositions using tools and concepts of a mostly geometrical nature, designed to characterize the way in which entities occupy space (e.g., points, lines, planes, dimensions, boundaries, alignment, enclosure). For instance, Talmy (1983; see also Talmy 2000 for a revised version of this paper) analyzed the semantics of spatial prepositions in terms of (geometrical) *abstract schemas* that supposedly represent the spatial configurations formed by the target (or located) and landmark (or locating) entities denoted by linguistic descriptions. Assigning a geometrical construct to an entity of the world (within a schema) involves several mechanisms, including *idealization* and *abstraction*. For her part, Herskovits (1982, 1986) explained the behaviour of spatial prepositions by combining, for each of these markers, a *core/ideal meaning* with a set of *use types* intended to account for possible deviations of actual uses from what is predicted by the core meaning only (possibly supplemented by pragmatic principles). The core meaning is a central element of Herskovits' proposal and, as in Talmy's approach, it applies not to the spatial entities themselves, but to their geometrical idealizations.

The 1980s and 1990s were marked by yet another attempt to model locative prepositions – also of a geometrical nature – that continues to have a considerable impact on research, probably because of its positioning at the syntax-semantics interface. We are thinking here of the proposals put forward by Jackendoff (1983, 1990) to account for spatial expressions as part of his *conceptual semantics*. Capturing the semantics of static spatial prepositions and adpositions within this theoretical framework mainly involves applying a function (*Place*-type function) to a *reference object* or landmark entity (denoted by the prepositional complement) thus defining a specific region within which the target entity evoked by the description has to be situated (Jackendoff 1983: 164): [Place PLACE-FUNCTION ([THING])] (*in the room, on the table, between the trees, under the house*). Thus, this framework uses the same mechanisms – introduction of a region and localization of the target within this region via the single relation of geometrical inclusion – to analyze all the locative (static) prepositions and adpositions of a given language. Differences between the prepositional markers therefore rely solely on the association of distinct regions with the landmark, by means of several 'PLACE-FUNCTION' operators (*under/near/on/inside the table*; cf. Jackendoff 1983: 161).

This *standard* geometrical approach to spatial adpositions, that is, a geometrical point of view with a single relation of location (i.e., inclusion) and several operators, each determining a different region with respect to the landmark, gained a great deal of currency over the following two decades. Formal syntax is a

good example of this trend, as it particularly focused on spatial prepositional phrases (PPs) from the late 1990s onwards, following Koopman's (2000) seminal study. Den Dikken (2010: 100), for instance, proposed the following structure for spatial adpositions, where the PP is dominated by an *aspectual* projection that accounts for the distinction between static and dynamic locations (Asp$^{[PLACE]}$ vs. Asp$^{[PATH]}$, generalized as Asp$^{[SPACE]}$) and is in turn dominated by a constituent that encodes deixis: [$_{CP}$ C$^{[SPACE]}$ [$_{DxP}$ Dx$^{[SPACE]}$ [$_{AspP}$ Asp$^{[SPACE]}$ [$_{PP}$ P]]. As in Koopman (2000), the Place label of the Asp constituent was directly inspired by Jackendoff's research and, one again, conveys a (regional) geometrical view of how spatial adpositions behave.[3]

Given their impact over the past few years, two additional contributions need to be mentioned to complete this overview of geometrical approaches to spatial prepositions. They respectively concern the domains of formal semantics (Zwarts and Winter 2000) and morphosemantics (Kracht 2002). The former (Zwarts and Winter 2000) focuses on projective prepositions[4] and their modification in expressions such as *10 metres behind the house*. Following Zwarts (1997), the authors propose a geometrical approach, but one which nevertheless differs from the standard view, in that it uses vectorial operators instead of regional ones. Thus, a prepositional phrase picks out a set of vectors and the relation of location

---

[3] It should, however, be noted that, within generative research, Svenonius (2006, 2010) provides the most detailed and subtle analysis of static locative PPs by trying to split the functional head 'Place' into several distinct components (Svenonius 2010: 144). See Aurnague and Vieu (2013) for further details.

[4] Scholars usually assume that projective prepositions or relations locate a target through the projection of an oriented axis originating in the landmark. In the literature, this category of markers is often contrasted with topological prepositions or relations introducing configurations in which the target and landmark are *connected* or *coincident* to some extent. The topological terms in which this second category is defined are, in our view, open to criticism.

ceases to be one of inclusion, although it is still a single relation. Admittedly, unlike regions, vectors intrinsically represent a relation between two points in space that encodes both orientation (vector angle) and distance (vector length). As a consequence, this framework can be regarded as semirelational (see below for discussions on the relational character of this proposal).

In the latter, Kracht (2002) sees locative markers as comprising three elements: a *modalizer* (M) indicating the static, coinitial, cofinal, transitory or approximate nature of the location relation; a *localizer* (L) specifying the underlying static configuration between the target and the landmark; and a *determiner* phrase that identifies the landmark. These three elements give rise to the structure [M [L [DP]]], in which M and L form a morphological unit. The formalization developed by the author to capture the meaning of static spatial markers or localizers (*in*, *at*, *on*, *between*, *under*, etc.) systematically follows the same general schema which, despite being geometrical and formulated in terms of regions, is totally relational, as each localizer denotes a different relation between regions. This general schema (Kracht 2002: 187) takes as its argument the *object* (target entity; type *e*) introduced by the determiner phrase and maps it to a *parametrized neighbourhood*, or set of regions ($r^{\bullet}$), varying along time (function $e \to (i \to r^{\bullet})$). In order to form the expected configuration with respect to the landmark, the targets must belong to this neighbourhood.

In opposition to this long tradition of geometrical approaches, a new linguistic trend appeared in the 1980s. This maintained that the functional aspects of entities

and the physical world play a central role in the semantics of locative markers. Vandeloise (1986, 1991) was the originator and most important representative of this trend (for a recent interdisciplinary overview of the role of function in language and space, see Carlson and van der Zee 2005). Focusing on the functional description of prepositions, he defined five groups of (functional) *universal* features: anthropomorphic principles/form of the human body, naive physics, access to perception, potential encounter, and general and lateral orientations (Vandeloise 1986: 22-30). It is through naive physics (by essence, functional) that Vandeloise most clearly illustrated the limitations of a strictly geometrical approach. For instance, the spatial configurations displayed in Figure 1 (adapted from the author; Vandeloise 1986: 232-3; see Vieu 1991: 211) were intended to prove the superiority of the container/content relation and the notion of containment, in order to correctly predict the uses of the preposition *dans* 'in'. In fact, whether it is at the bottom of a bowl (Figure 1a) or *covered* by an upturned bowl (Figure 1b), a sugar lump (rather, the region it occupies) is always included in the convex hull of the landmark (more exactly, in the convex hull of its containing part)[5]. A semantic definition of *dans* based on these geometrical aspects would therefore license the use of this marker in both situations. By contrast, a functional definition based on the container/content relation and the notion of containment enables Vandeloise to restrict the application of *dans* to the

---

[5] Vandeloise suggested to restrict the application of the convex hull operator to the entities' containing parts, thereby justifying recourse to function even when determining regions such as insides. Vieu (1991: 207-9) – see also Aurnague and Vieu (1993) and Aurnague and others (1997) – later showed that the calculus thereby becomes even more complex, as it has to take the containing ability of every single concavity of the landmark into account.

first configuration (Figure 1a), for only in this case does the landmark prevent both the lateral *and* vertical displacement of the target.
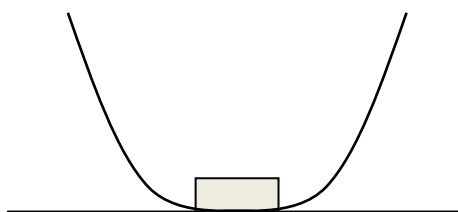
1a *Le sucre est dans/*sous le bol* 'The sugar lump is in/*under the bowl'
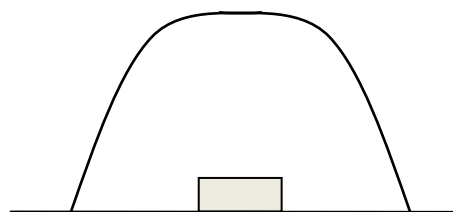
1b *Le sucre est *dans/sous le bol* 'The sugar lump is *in/under the bowl'

Figure 1: Containment and the preposition *dans* 'in' (adapted from Vandeloise 1986: 232-3)

Vandeloise formulated his proposals within a specific framework. For him, each preposition was associated with an *impulsion* (central concept). This impulsion was underlied by a family resemblance network (Wittgenstein 1953) made up of features that could give rise to usage rules. He also identified a set of pragmatic principles governing recourse to locative prepositions (principles of neighbourhood, fixation, transfer, etc.).

The notions of *control* and *force(s)* subsequently led Vandeloise (2001: 134-47) to divide static (as opposed to *kinematic*) spatial relations into *projective* (*au-dessus de* 'on top of/above', *à gauche de* 'to the left of') and *dynamic* prepositions (e.g., *dans* 'in', *sur* 'on', *contre* 'against'), on the grounds that the latter imply an exchange of forces between the target and the landmark (see Discussion). By emphasizing the exchange and transmission of forces that concepts like

containment and support are likely to imply, Vandeloise intended to show that the semantics of many spatial prepositions results from the interaction between target and landmark, such that these markers have to be processed in a true relational way (i.e., taking their two arguments into account).

PREPOSITIONS/ADPOSITIONS AS RELATIONS: SOME FORMAL ACCOUNTS

The issue of *relationality* is central to the formal treatment of prepositions, and distinguishes quite clearly between the two traditions we have just described.

The functional approach to prepositions and, more generally, adpositions can only be a semantically relational one, as meaning construction relies on the interactions between the two arguments of the adposition, and thus associates a different relation with each locative marker (see above).

While geometrical approaches are generally syntactically relational (at some point, they are forced to connect the landmark entity denoted by the prepositional complement to the target entity), they are not necessarily semantically (fully) relational. For instance, the standard approach mentioned above, and illustrated by Jackendoff's proposals (1983, 1990), analyses all prepositions/adpositions on the basis of a single spatial relation (geometrical inclusion) and a set of operators acting on the prepositional complement, that is, on the landmark entity only. No semantic relation is involved in the operators. Differences between

prepositions/adpositions are thus accounted for by the assignment of different regions to the landmark, and not by different relations.

Although Zwarts and Winter's approach (2000) is also based on geometrical operators (see 'Two opposite views on spatial prepositions'), it can be regarded as semirelational because, instead of regions, the operators assign sets of vectors to the landmark entity, and vectors encode orientation and distance relations between points in space.

Nevertheless, whether they utilize regional or vectorial operators, these geometrical approaches cannot adequately account for all configurations. This arguably stems from a lack of relationality, as a single location relation treats all the space points occupied by the target entity in the same way, independently of the locative marker. This single relation is usually appropriate for orientation configurations described by projective prepositions/adpositions (e.g., *The post office is to the left of the town hall*), but not for fixed-distance configurations (e.g., *The post office is 20 metres from the town hall*), especially null-distance or contact configurations denoted by the preposition *on* (e.g., *The cage is on the table*) (see Aurnague and Vieu 2013; Vieu 2009).

In contrast to the dominant, operator-based trend in geometrical approaches, Kracht (2002) showed that a geometrical approach to adpositions in terms of regions can be semantically fully relational, providing it takes account of the target in the construction of meaning and associates a different relation with each

locative preposition/adposition (see 'Two opposite views on spatial prepositions').
The issues that led Kracht to adopt a semantically fully relational perspective
precisely concerned the preposition *on* and corresponding contact configurations
(Kracht 2002: 190).

Taking the target into account when determining the appropriate meaning allowed
Kracht to overcome these issues. However, his geometrical approach was unable
to express, for instance, the essential role played by the notion of functional
support in the semantics of *on,* as highlighted by Vandeloise's example of a pear
hanging just above a table, barely touching it: the pear is not supported by the
table and is not *on* it (Vandeloise 2001: 138).

It is for this reason that we have chosen to adopt a resolutely functional, and thus
semantically fully relational, approach to spatial prepositions (Aurnague and Vieu
1993; Aurnague et al. 1997). However, instead of perpetuating the function versus
geometry dichotomy that characterizes the literature on locative markers (see
Introduction), we claim that the two are inseparable, more often than not, with
functional properties going together with geometrical constraints on entities and
their relations. We account for these interdependencies in a three-level
(geometrical, functional, pragmatic) approach.

TYPOLOGICAL ISSUES

Combining functional and geometrical (in particular regional) points of view on locative markers – rather than contrasting them – does not only make sense because function often appears to be closely related to geometry. Crosslinguistic observations indicate that functional and regional ways of locating coexist in many languages of the world. From this perspective, function and geometry (through regions) can be regarded as complementary tools, allowing us to draw a much more subtle picture of static locative markers (which are often around this fundamental fault line). In the rest of this section, and in the Discussion that follows, we try to illustrate this point.

First, from a typological point of view, we can make two important predictions, concerning languages that mainly convey static location through adpositional elements (including cases), and languages whose locative expressive means rely both on adpositional elements and on other kinds of markers (e.g., postural predicates, positional predicates). According to our first prediction (Prediction A), languages with a markedly adpositional spatial system express the main functional relations between targets and landmarks through *simple* or elementary adpositions (e.g., simple prepositions). By contrast, region-based location basically resorts to *complex* adpositional items (e.g., prepositional locutions). The second prediction (Prediction B) concerns languages with a greater variety of spatial markers, and states that nonadpositional elements mostly introduce functional relations between

entities, while regional location once again relies essentially on complex adpositions.[6]

French data (see Discussion; and Aurnague and Vieu 2013) are in line with Prediction A, as functional notions such as containment, support, opposing forces or directions, and spatial routines are encoded by simple prepositions like *dans* 'in', *sur* 'on', *contre* 'in front of', *face à* 'facing', and the routine-based interpretation of *à* (*Baudouin est au piano* 'Baudouin is at the piano'; Vandeloise 1988), while the regional location mode has to resort to complex prepositional elements, such as the association of a strictly locative *à* 'at' with an internal localization noun (ILN; Aurnague 1996, 2004; Aurnague et al. 2000; Borillo 1988): *au haut de* 'at the top of', *à l'avant de* 'in the front of', *à l'intérieur de* 'inside', *au bord de* 'at/on the edge of', *au centre de* 'in the centre of', *au milieu de* 'in the middle of', and so on.

Analyses of static location in Basque provide a similar picture. This language features a general inessive case which, contrary to fully pragmatic accounts of such markers, can only refer to specific functional configurations, namely containment (and, by extension, inclusion), support and social routines (Aurnague

---

[6] These predictions are based on empirical observations that we believe have a more general validity. They reflect the fact that many (typologically different) languages include a system of spatial terms/nouns, sometimes known as *relational spatial nouns* or *internal localization nouns* (ILNs), as we call them here, from which complex adpositional elements can be compositionally built in order to locate entities in the *regions* these spatial terms denote (Svorou 1994). As regards *function*, its primary role in location processes (plus the difficulty of expressing functional properties in a compositional way) means that functional spatial markers often take the form of simple adpositions (in markedly adpositional languages) or specific grammatical devices (in languages with a greater variety of spatial markers).

1999, 2004)[7]: *Liburua armairuan da* (book-def. cupboard-iness. is 'The book is in the cupboard'); *Kartela paretan da* (poster-def. wall-iness. is 'The poster is on the wall'); *Antton pianoan da* (Antton piano-iness. is 'Antton is at the piano'). In other words, not every kind of spatial configuration can be conveyed by this spatial case and situations of *infrativity*, for instance, where the target is located under the landmark (e.g., key under a tablemat; sugar lump under a bowl; see Figure 1b) or horizontal interactions between the target and the landmark involving forces and contact (e.g., cupboard leaning against a wall) require the addition of further linguistic material. Alongside this basic static case, Basque provides speakers with a set of complex adpositions associating a postposition or ILN with the inessive: *(-(r)en) gainean* ((-poss. gen.) top-iness. 'at the top of'); *(-(r)en) barnean* ((-poss. gen.) interior-iness. 'inside'); *(-(r)en) hegian/bazterrean/ertzean* ((-poss. gen.) edge-iness. 'at/on the edge of'); *(-(r)en) erdian* ((-poss. gen.) centre-iness. 'in the centre/middle of'), and so on. When they appear in a spatial description, these complex adpositions indicate that the target is located within the region delimited by the postposition (i.e., contact with the material part of the landmark is not compulsory): *Ulia tapizaren ertzean da* (fly-det. carpet-poss. gen. edge-iness. is 'The fly is at/on the edge of the carpet'). Therefore, the patterns in the Basque adposition system also correspond to Prediction A, with a single static case expressing three main functional relations

---

7 In Spanish, the preposition *en* has a very similar semantic content. It not only refers to containment or inclusion, and support, but also to spatial routines (although in the latter case, it competes with the preposition *al*): *El libro está en el armario* 'The book is in the cupboard'; *El cartel está en la pared* 'The poster is on the wall'; *Alex está en el piano* 'Alex is at the piano'. Moreover, and contrary to what Noonan (2010: 163, 167) maintains, the specific connection between *en* and the notion of support means that this preposition cannot be treated as the semantic and structural equivalent of *encima de* in the corresponding contexts: *La lámpara está (colgando) ??en/(por) encima de la mesa* 'The lamp is (hanging) on/above the table'.

between targets and landmarks, and a set of postpositions or ILNs from which complex items can be built in order to locate targets in a regional way. Data for Zulu (Taylor 1996) suggest a similar organization of static markers (single locative + set of complex prepositions), thus lending additional support to Prediction A.

An illustration of Prediction B can be found in Ospina's (2010) paper on the expression of static location in Yuhup, a language of Northwest Amazonia spoken by about 500 people today. Markers of static location in Yuhup include a set of postural and positional predicates. The semantics of postural predicates is based mainly on two notions: the spreading (vs. folding) of a spatial entity – prototypically a human being –, and the more or less active role of this target when stabilizing on a landmark. Four situations can be defined on the basis of these notions, which can be viewed as a refinement on support configurations (Ospina 2010: 206-9): a dynamic sitting posture ($\tilde{p}eb^m$), standing (_ket_), and passive sitting (wob^m) and lying postures (_ɟet_). A human being in a sitting posture, for instance, could either be in a crouch, resting on his/her heels (dynamic), or in a crouch with his/her buttocks on the ground (passive; see Figure 2). In addition to these postural predicates, there are four positionals in Yuhup, two related to support and suspension/hanging – to be stuck/adhering (_dak_), to be suspended/hanging ($\tilde{k}a\text{ʔ}$) – and two referring to containment or inclusion – to be inserted (cud^n), to be immersed (_tuʔ_) (Ospina 2010: 209-12). On the whole, this system of postural and positional predicates is mainly intended to express

refinements on functional configurations of support or suspension and containment/inclusion.[8]

---

[8] The static constructions of Yuhup set out in this section can become even more precise if a complex predicate is added (Ospina 2013: 155-62). Some of these predicates combine a prefix with a radical, and allow the speaker to describe the target's posture with greater accuracy. It is important to note that four of the eight dispositional prefixes listed in Ospina (2013: 158-9) indicate how external support does or does not contribute to the stabilization of the human body or one of its parts. From this point of view, we can say that Yuhup is obsessed not only with space (like other Amerindian idioms) but also, and more specifically, with support.

2a *The woman/jaguar is sitting* (dynamically) *in the house*

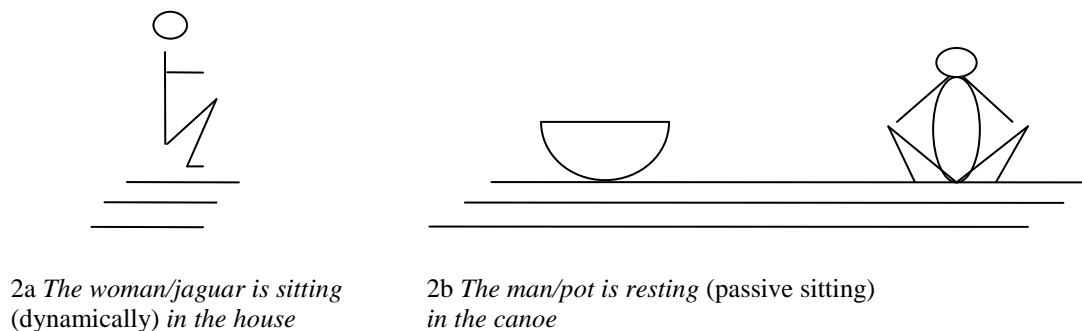2b *The man/pot is resting* (passive sitting) *in the canoe*

Figure 2: Dynamic vs. passive sitting postures in Yuhup (Ospina 2010: 206, 208)

Other markers of static location in Yuhup operate within the PP introducing the landmark entity. These markers include internal region nouns, as well as external region or distance particles that can combine with a landmark noun (a part noun and a general locative case may also be present) in order to express the spatial configuration made up by the target and the landmark in greater detail. The full spatial PP combines these elements in the following order (Ospina 2010: 204):

1-Nlandmark 2-Npart 3-N/Pregion 4-Pdistance (+ possible locative case on Nlandmark, Npart or Nregion).

In Yuhup, internal region nouns or ILNs (Ospina 2010: 217-20) allow the speaker to identify a material part of a landmark and, very often, an adjacent space portion, relying on orientational properties (vertical orientation: top vs. bottom, summit/top vs. base) or features related to topology and/or distance (inner edge, outer edge, centre, concave region, convex region). These markers behave in a

clearly regional manner, inasmuch as they delimit a spatial area within which a target entity can be located (through geometrical inclusion).[9] Like internal region nouns, most external region particles (Ospina 2010: 221-30) seem to have a nominal origin, while their semantic content is also focused on orientational or directional properties (vertical and frontal axes; position with respect to the main axis of a river: upstream vs. downstream). However, the actual semantic content of these linguistic items is different, because they identify a region that is external to the landmark (they can be likened to the *projective* adpositions found in other languages). They have several other syntactic-semantic and phonological peculiarities that differentiate them from internal region nouns, among which the fact that they are always accompanied by a distance particle (three levels of distance: close, proximal, distal) with which they form a single phonological unit.

To sum up, Yuhup is a good example of a language that does not only rely on adpositions to describe static spatial configurations. In accordance with Prediction B, static predicates in this language encode the location of a target with respect to a landmark, through a refinement of functional notions like support, suspension and containment. In parallel, a set of internal region nouns is available which, together with other units (e.g., part nouns, locative case), make it possible to delimit a spatial region within the landmark's frame of reference and locate the target therein (regional location). External region and distance particles still have a different status, as we will see later. The division of labour between functional

---

[9] It should be noted that although internal region nouns in Yuhup may contain functional information (orientation), this information serves to delimit the region associated with the landmark, not to relate the target to the landmark.

and regional markers of static location in Yuhup is not an isolated case, and several other languages with static spatial predicates, particularly those classified in Grinevald's (2006: 33) typology as Type III and even Type IV,[10] seem to obey a similar pattern.

DISCUSSION/CONCLUSION: TOWARDS A *CARTOGRAPHY* OF STATIC SPATIAL ADPOSITIONS

In a very instructive and influential paper, Levinson and Meira (2003) studied a set of nine genetically unrelated languages and tried to determine possible regularities or invariants among the spatial configurations encoded by their locative adpositions. Although the strongest universalistic assumptions were not corroborated by the data, interesting convergences arose when the authors adopted a statistical approach in terms of attractors and foci, as proposed in the extensions to Berlin and Kay's (1969) groundbreaking research on colour terms (see, in particular, Kay and MacDaniel 1978; Kay and Maffi 1999). Thus, the conceptual space or map that emerged from the nine languages under examination and their locative adpositions seemed to be divided into compact subsets corresponding to specific statistical attractors or foci (Levinson and Meira 2003: 505, Figure 10).

---

[10] Grinevald (2006) cites the positionals of Mayan languages as an illustration of Type IV. Tzeltzal is a famous example of an idiom featuring locative predicates, and we believe that some of its patterns are consistent with Prediction B. In addition to its many positional predicates that represent a refinement of the functional relations of containment and support (Brown 1994), it boasts various relational nouns and part nouns among its static spatial markers (Brown 1994; Levinson 1994). Although the morphosyntactic behaviour of part nouns differs from that of locative relational nouns (Levinson 1994), we have the impression that the former also display some kind of grammaticalization, at least at the semantic level (geometrical application to a broad range of entities, possibility of locating the target in a space portion adjacent to the landmark). More generally, these two categories of nouns seem to locate a target via a regional process.

On this basis, the authors introduced an implicational scale of spatial concepts, with which they tried to sketch out the possible sequences or routes that languages may follow when constructing a system of locative adpositions (Levinson and Meira 2003: 512, Figure 18).

Vandeloise (2010) has criticized Levinson and Meira's proposal on several counts. For a start, he points out that projective or external relations are excluded from their study, and that the spatial configurations proposed to the speakers of the different languages, as well as the ways in which these configurations are grouped around specific foci, are mainly grasped in terms of topological properties. He also notes that the labels used to identify the concepts and groups of concepts in both the semantic map and the implicational hierarchy are the names of English prepositions (e.g., AT, IN, INSIDE, NEAR, ON, ON-TOP, OVER) rather than language-independent notions. We will not go into Vandeloise's other criticisms here. However, we should underline that the topological viewpoint of Levinson and Meira's research, combined with the possible difficulty of characterizing complex adpositions, often leads the authors to address these complex adpositions and the simple adpositions that possibly head them in a similar way.[11]

---

[11] As we maintain in this section and in previous ones, we believe that a clear distinction has to be made between these two categories of items in order to correctly grasp the different types of localization (function vs. regions). See Noonan (2010) and Note 7 for a similar example of the *conglomeration* of simple and complex adpositions in generative grammar.

Vandeloise (2010: 179, Chart 3) suggests an alternative hierarchy of static spatial concepts, based on the opposition between projective and dynamic relations – the latter implying an exchange of forces – foregrounded in his earlier studies (see 'Prepositions/adpositions as relations' section and Vandeloise 2001: 134-47, 2004: 140-9). According to this schema of emergence, a general spatial relation (like *ta* in Tzeltal or *æt* in Old English) is available in some languages, whose meaning may develop into – or be supplemented by – two subsystems (either in these languages or in other ones). First, static spatial concepts may give rise to a set of adpositions conveying simple location/inclusion in a space portion: projective adpositions would gradually appear in this set, with markers of vertical separation appearing first, followed by ones based on horizontal separation (Vandeloise 2010: 178). Second, a group of adpositions may develop around the notions of control and the transmission of force(s) or energy, one example being the relations of containment and support (Vandeloise 2010: 179).[12]

By way of conclusion, and leaving aside these considerations about the emergence and creation of static spatial markers, we would like to put forward our own view about the arrangement, or *cartography*, of locative adpositions in language. We mainly flesh out Vandeloise's description, by adding complex adpositions based on ILNs (which, as we have already pointed out, constitute the main instrument of regional location). Figure 3 summarizes the most important concepts that we

---

[12] In this specific study, as in previous ones, the reasoned analysis of control and forces allowed Vandeloise to avoid treating tight-fit or attachment relations as completely separate configurations or loose ends. Instead, these spatial configurations were presented as prototypical cases or specializations of containment and support relations.

believe static spatial adpositions are likely to convey, as well as the three subsets into which they can be divided (the different concepts are illustrated by simple and complex French prepositions).[13] Functional location brings together concepts and relations involving control and forces (e.g., containment, support, opposing forces; for relations of tight fit and attachment, see Footnote 12), as well as spatial routines –concepts that are often expressed by simple adpositions. Region-based location consists in delimiting a space portion in which the target is located, and involves the notion of specified location/place. In many languages, complex adpositions derived from ILNs constitute the main mode of expression for this kind of location, relying on orientational, topological and distance notions. Finally, projective relations are often related to internal location – they usually call for similar morphosyntactic (e.g., complex adpositions, nominal origin) and semantic (e.g., orientation) tools – although they are meant to locate a target externally (cf., external and distance particles of Yuhup). Given this kinship, one would expect projective or external relations to locate in a purely regional fashion, but a closer formal look indicates that true relational processing of the corresponding adpositions is more effective and appropriate (see Aurnague and Vieu 2013).[14]

---

[13] Figure 3 does not claim to be exhaustive, and other static concepts and relations could arguably be added. For instance, the concept of *potential encounter* (Vandeloise 1986; e.g., *avant/après* 'before/after') could be regarded as a further component of functional location. Closeness/accessibility and betweenness/alignment are of particular interest, too, in that they are external relations that significantly interact with functional notions. See Vandeloise (1986: 81-8) on *près de/loin de* 'close to/far from', and Coventry and Garrod (2005: 158-9) and van der Zee and Watson (2005: 120-7) on *between*. More generally, closeness/accessibility and betweenness/alignment relations seem to call for relational (i.e., not exclusively regional) processing, like other projective and external relations (see below).

[14] In this connection, it should be noted that Vandeloise (1986: 41-43) had already observed that some orientational prepositions (static or related to motion) can bring three *terms* rather than two (target and landmark) into play, and are clearly governed by functional concepts (access to perception, potential

Regional location

[inclusion in a space portion,
specified location/place; *à* loc.]

Internal location (*à* + ILN)

   orientation (*au haut de, à l'avant de*)
   topology (*à l'intérieur de, au bord de*)
   distance (*au centre de, à l'extrémité de*)

             ⋯⋯⋯⋯⋯⋯⋯⋯➤ Projective/external location

                          orientation (*devant/derrière, au-dessus de/au-dessous de, à gauche de/à droite de*)

                          absolute/geographical orientation (*au nord de/au sud de, en amont de/en aval de*)

Functional location

Control, forces   Social routines (*à* rout.)

   containment (*dans*)
   support (*sur*)
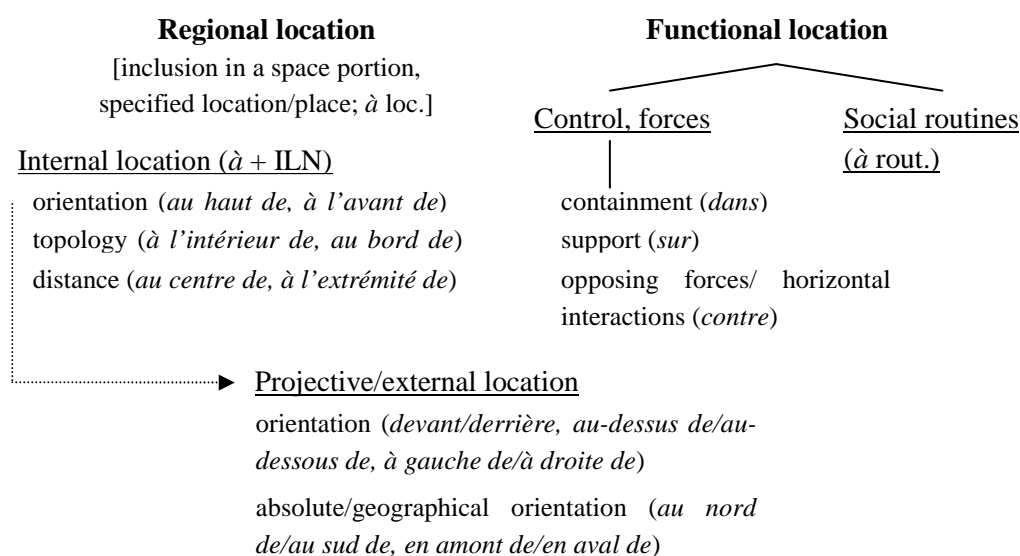   opposing forces/ horizontal interactions (*contre*)

Figure 3: Geometry/regions, function and the *cartography* of locative adpositions in language

The division of labour between geometry/regions and function that underlies this panorama of locative markers probably has important cognitive consequences. In the wake of Ungerleider and Mishkin's (1982) seminal observations, and later assumptions about the *what* and *where* systems in language (Landau and Jackendoff 1993), we could justifiably argue that the *where* system should be divided into a genuine *where* component (geometrical way of locating) and a *how* component (functional way of locating). This division would have the advantage of answering the criticisms levelled at Landau and Jackendoff's proposal on the basis of languages such as Tzeltal (Brown 1994).

encounter). See also Coventry and Garrod (2005: 153-158) for the possible influence of functional features on the interpretation of projective prepositions such as *above*, *below*, *in front of*, *behind*, etc.

BIBLIOGRAPHY

Aurnague, M. (1996) 'Les noms de localisation interne: tentative de caractérisation sémantique à partir de données du basque et du français', *Cahiers de Lexicologie*, 69: 159-92.

Aurnague, M. (1999) 'Cas inessif du basque et connaissance du monde: l'expression de l'espace a-t-elle horreur du vide (sémantique)?', in M. Plénat, M. Aurnague, A. Condamines, J.P. Maurel, C. Molinier and C. Muller (eds) *L'emprise du sens: structures linguistiques et interprétations, Mélanges offerts à Andrée Borillo*, Amsterdam: Rodopi (coll. Faux Titre 174).

Aurnague, M. (2004) *Les structures de l'espace linguistique: regards croisés sur quelques constructions spatiales du basque et du français*, Leuven/Paris: Peeters.

Aurnague, M., Boulanouar, K., Nespoulous, J.L., Borillo, A. and Borillo, M. (2000) 'Spatial semantics: the processing of internal localization nouns', *Cahiers de Psychologie Cognitive/Current Psychology of Cognition*, 19(1): 69-110.

Aurnague, M. and Vieu, L. (1993) 'A three-level approach to the semantics of space', in C. Zelinsky-Wibbelt (ed.) *The Semantics of Prepositions: From Mental Processing to Natural Language Processing*, Berlin: Mouton de Gruyter.

Aurnague, M., Vieu, L. and Borillo, A. (1997) 'Représentation formelle des concepts spatiaux dans la langue', in M. Denis (ed.) *Langage et cognition spatiale*, Paris: Masson.

Aurnague, M. and Vieu, L. (2013) 'Retour aux arguments: pour un traitement "relationnel" des prépositions spatiales', *Faits de Langues*, 42: 17-38.

Berlin, B. and Kay, P. (1969) *Basic Color Terms: Their Universality and Evolution*, Berkeley, CA: University of California Press.

Borillo, A. (1988) 'Le lexique de l'espace: les noms et les adjectifs de localisation interne', *Cahiers de Grammaire*, 13: 1-22.

Brown, P. (1994) 'The INs and ONs of Tzeltal locative expressions: the semantics of static descriptions of location', *Linguistics*, 32: 743-90.

Carlson, L. and van der Zee, E. (eds) (2005) *Functional Features in Language and Space: Insights From Perception, Categorization, and Development*, Oxford: Oxford University Press.

Coventry, K.R. and Garrod, S.C. (2005) 'Towards a classification of extra-geometric influences on the comprehension of spatial prepositions', in L.A. Carlson and E. van der Zee (eds) *Functional Features in Language and Space: Insights From Perception, Categorization and Development*, Oxford: Oxford University Press.

Den Dikken, M. (2010) 'On the functional structure of locative and directional PPs', in G. Cinque and L. Rizzi (eds) *Mapping Spatial PPs. The Cartography of Syntactic Structures vol. 6*, Oxford: Oxford University Press.

Grinevald, C. (2006) 'The expression of static location in a typological perspective', in M. Hickmann and S. Robert (eds) *Space in Languages: Linguistic Systems and Cognitive categories*, Amsterdam/Philadelphia: John Benjamins.

Herskovits, A. (1982) 'Space and the prepositions in English: regularities and irregularities in a complex domain', doctoral thesis, Stanford University.

Herskovits, A. (1986) *Language and Spatial Cognition: An Interdisciplinary Study of the Prepositions in English*, Cambridge: Cambridge University Press.

Jackendoff, R. (1983) *Semantics and Cognition*, Cambridge, MA: MIT Press.

Jackendoff, R. (1990) *Semantic Structures*, Cambridge, MA: MIT Press.

Kay, P. and McDaniel, C.K. (1978) 'The linguistic significance of the meanings of basic color terms', *Language*, 54: 610-46.

Kay, P. and Maffi, L. (1999) 'Color appearance and the emergence and evolution of basic color lexicons', *American Anthropologist*, 101(4): 743-60.

Koopman, H. (2000) 'Prepositions, postpositions, circumpositions, and particles', in H. Koopman (ed.) *The Syntax of Specifiers and Heads*, London: Routledge.

Kracht, M. (2002) 'On the semantics of locatives', *Linguistics and Philosophy*, 25(2): 157-232.

Landau, B. and Jackendoff, R. (1993) '"What" and "where" in spatial language and spatial cognition', *Behavioral and Brain Sciences*, 16: 217-38.

Leech, G.N. (1969) *Towards a Semantic Description of English*, London: Longman.

Levinson, S.C. (1994) 'Vision, shape, and linguistic description: Tzeltal body-part terminology and object description', *Linguistics*, 32: 791-855.

Levinson, S.C. and Meira, S. (2003) '"Natural concepts" in the spatial topological domain – adpositional meanings in crosslinguistic perspective: an exercise in semantic typology', *Language*, 79(3): 485-516.

Noonan, M. (2010) '*À* to *Zu*', in G. Cinque and L. Rizzi (eds) *Mapping Spatial PPs. The Cartography of Syntactic Structures vol. 6*, Oxford: Oxford University Press.

Ospina Bozzi, A.M. (2010) 'Localización estática en yuhup' in G. Cabrera Becerra (ed.) *Viviendo en el bosque: un siglo de investigaciones sobre los makú del Noroeste amazónico*, Medellín: Universidad Nacional de Colombia.

Ospina Bozzi, A.M. (2013) 'Localización estática y prefijos locativos en yuhup', in A.M. Ospina Bozzi (ed.) *Expresión de nociones espaciales en lenguas amazónicas*, Bogotá: Publicaciones del Instituto Caro y Cuervo & Universidad Nacional de Colombia.

Svenonius, P. (2006) 'The emergence of axial parts', *Norlyd: Tromsø Working Papers in Linguistics*, 33(1): 49-77.

Svenonius, P. (2010) 'Spatial P in English', in G. Cinque and L. Rizzi (eds) *Mapping Spatial PPs. The Cartography of Syntactic Structures vol. 6*, Oxford: Oxford University Press.

Svorou, S. (1994) *The Grammar of Space*, Amsterdam/Philadelphia: John Benjamins.

Talmy, L. (1983) 'How language structures space', in H.L. Pick and L.P. Acredolo (eds) *Spatial Orientation: Theory, Research and Application*, New York: Plenum.

Talmy, L. (2000) *Toward a Cognitive Semantics* (vol. 1 & 2), Cambridge, MA: MIT Press.

Taylor, J.R. (1996) 'The syntax and semantics of locativised nouns in Zulu', in M. Pütz and R. Dirven (eds) *The Construal of Space in Language and Thought*, Berlin, Mouton de Gruyter, 287-305.

Ungerleider, L.G. and Mishkin, M. (1982) 'Two cortical systems', in D.J. Ingle, M.A. Goodale and R.J.W. Mansfeld (eds) *Analysis of Visual Behavior*, Cambridge, MA: MIT Press.

Vandeloise, C. (1986) *L'espace en français: sémantique des prépositions spatiales*, Paris: Seuil.

Vandeloise, C. (1988) 'Les usages statiques de la préposition *à*', *Cahiers de Lexicologie*, 53: 119-48.

Vandeloise, C. (1991) *Spatial Prepositions: A Case Study in French*; trans. A.R. Bosch, Chicago, IL: University of Chicago Press.

Vandeloise, C. (2001) *Aristote et le lexique de l'espace: rencontres entre la physique grecque et la linguistique cognitive*, Stanford, CA: CSLI.

Vandeloise C. (2004) 'Are there spatial prepositions?', in M. Hickmann and S. Robert (eds) *Space in Languages: Linguistic Systems and Cognitive Categories*, Amsterdam/Philadelphia: John Benjamins.

Vandeloise, C. (2010) 'Genesis of spatial terms', in V. Evans and P. Chilton (eds) *Language, Cognition and Space: The State of the Art and New Directions*, London: Equinox.

Vieu, L. (1991) 'Sémantique des relations spatiales et inférences spatio-temporelles: une contribution à l'étude des structures formelles de l'espace en langage naturel', doctoral thesis, University of Toulouse Paul Sabatier.

Vieu L. (2009) 'Representing content: semantics, ontology, and their interplay', habilitation thesis, University of Toulouse Paul Sabatier.

van der Zee, E. and Watson, M. (2005) 'Between space and function: how spatial and functional features determine the comprehension of *between*', in L.A. Carlson and E. van der Zee (eds) *Functional Features in Language and Space: Insights From Perception, Categorization and Development*, Oxford: Oxford University Press.

Wittgenstein, L. (1953) *Philosophical Investigations*, New York: MacMillan.

Zwarts, J. (1997) 'Vectors as relative positions: a compositional semantics of modified PPs', *Journal of Semantics*, 14: 57-86.

Zwarts, J. and Winter, Y. (2000) 'Vector space semantics: a model-theoretic analysis of locative prepositions', *Journal of Logic, Language and Information*, 9: 169-211.