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Space in Languages

Linguistic Systems and Cognitive Categories

edited by Maya Hickmann and Stéphane Robert

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Space in Languages

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Volume 66

Space in Languages: Linguistic Systems and Cognitive Categories
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Linguistic Systems and Cognitive Categories

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Table of contents

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INTRODUCTION

Space, language, and cognition

Some new challenges

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1. Why space?

In the Kantian tradition space is a universal cognitive primitive, an "a priori form of intuition", that conditions all of our experience. It is then of particular interest to study the linguistic expression of space, since languages seem to capture and to make explicit the constraints of experience on the construction of spatial reference. At the same time, language confers to spatial representations some referential "detachability", that distinguishes these representations from those produced by our perceptual experience of space. This fundamental property allows speakers to dissociate and to choose among different components of spatial reference and to express other (temporal, causal, argumentative) meanings.

Other linguistic analyses argue that spatial values are neither basic nor even purely spatial, but rather that spatial terms intrinsically carry many other values concerning, for example, functional properties of entities, their force or resistance, and the goals towards which speakers construct space in their utterances. According to this conception, space in language is therefore not primitive, but already the result of a construction based on our experience in interaction with the world. A number of questions then arises. To what extent does space, as it is linguistically encoded, reflect perceptual experience and which aspects of this experience do different languages encode? Does space constitute a pure and primitive category from which other linguistic meanings are derived and what are the mechanisms that allow this process?

Finally, research in the last twenty years has revealed wide variations in spatial systems across languages. These variations concern, for example, the nature of the linguistic devices expressing spatial information, the particular distinctions they encode and highlight the most, and the reference systems that are used by speakers. In addition, various studies show that linguistic and cultural systems determine – at least partially – the nature and cognitive accessibility of the information that is selected by speakers. This evidence has cast some doubts on the supposedly universal proper-

ties of spatial categories, thereby raising questions concerning the impact of linguistic categorization on spatial cognition.

2. Overview of book contents

The study of space is framed in this volume within an interdisciplinary perspective, in which different scientific traditions contribute complementary concerns and methodologies: descriptive, typological and diachronic linguistics, philosophy, cognitive and developmental psychology, psycholinguistics, neurosciences.

Part I (*Universals, variability, and change*) proposes typological and diachronic analyses of spatial systems. Particular attention is placed on universal and variable aspects of these systems, showing how some of these systems have evolved through the emergence, reorganization, or disappearance of categories or through some more general structural changes. Some chapters also address questions that are at the center of subsequent parts: analyses of deixis in language directly touch on issues related to the pragmatics of discourse (Part II) and discussions of the notion of "salience" directly touch on issues concerning spatial cognition (Part III).

Part II (*The nature and uses of space in experience and in discourse*) concerns the nature and uses of spatial language in discourse and in relation to our experience of space. The papers in this section discuss how semantic information is distributed across clauses, how linguistic categories interact, and how informational components may be explicit vs. implicit and inferred from context. Some papers also address questions concerning cognition (Part III) by asking whether "spatial" values in language inherently involve other values or by comparing spoken and signed languages along some of the typological issues discussed at length elsewhere (Part I).

Part III (*Space, language, and cognition*) touches on fundamental issues concerning the relation between spatial language and cognition. It examines the impact of linguistic variation on how spatial information is expressed, perceived, and categorized by adults and children, as well as how spatial representations may break down in pathology. Discussions include whether linguistic variation affects speakers' perception, how pathology might inform us about the existence of distinct systems for linguistic and non-linguistic representations, whether language structures children's spatial cognition as they acquire typologically different systems.

Universals, variability, and change

The volume begins with discussions of the variability of spatial systems across languages: What components of space do linguistic systems encode and by what means? What are the scope and limits of linguistic variation? How do spatial systems evolve

over time and what are the causes of these changes? How does the study of sign language bear on these questions from a typological point of view?

Linguistic typology studies the types and limits of linguistic diversity. For example, comparing what could be logically expressed with what languages actually express allows us to classify languages according to the types of distinctions they make. Spatial systems include different means of expressing location (Creissels, Grinevald, Vandeloise) and motion (Slobin, Kopecka, Peyraube; also see Hickmann in Part III), as well as different frames of reference used to locate entities in space (see Marchello-Nizia; also see Robert for linguistic insights in Part II and Dokic and Pacherie for epistemological questions in Part III).

Because languages use a limited number of means to express meanings, they differ in the distinctions they systematically express. As shown by Grinevald in relation to location, languages vary first in the nature of the spatial information they encode. Each language selects some information components towards which it directs speakers' attention, leaving other components more or less implicit and to be inferred. In this respect, languages differ widely in their degree of semantic "granularity". Thus, languages may vary in the number of spatial prepositions they provide. Some even provide a unique semantically vacuous preposition, but express locations indirectly through constructions that indicate the position of entities ('the pot is [standing vertical] by the fire'). Again, languages may distinguish only a few positions ('lying', 'standing', 'sitting', 'hanging') or a great number of positions (up to fifty positions, for example, 'sitting on bottom', 'sitting on one's haunches', 'sitting huddled'. . .).

Languages also differ in the density of the information they convey through the phenomena of lexicalization and "conflation" (Talmy 1985, 1991, 2000). Different types of information may be expressed in a unique form, for example posture can conflate with verticality, dimensionality, texture, permanence, animacy, number. Some distinctions may not be expressed at all. For example, Creissels shows that some languages use distinct morphemes to express location ('to be at'), the source of a motion ('to come from'), and destination ('to go to'), but two or three distinctions may conflate into a unique morpheme, without further detail. Furthermore, spatial information may be distributed across various devices and subtle combinations thereof (verbs, prepositions, postpositions, affixes, particles, nominal classifiers) (Grinevald, Kopecka, Creissels).

However, as pointed out by Talmy, whereas the spatial lexicon can be quite rich (particularly because of conflation phenomena), grammatical forms relevant to space come in a relatively closed set of categories. Speakers must therefore select among these pre-packaged schemata when depicting spatial scenes. Furthermore, the universal inventory of fundamental spatial elements that combine to form whole schemata is relatively limited. Expressing a spatial scene requires a process of "schematization", that is the selection of some characteristics, that relies on some among a relatively limited set of elements in each relevant category.

For example, the category of "number" pertains to individual components of spatial scenes. In closed-class items (i.e. classes with a closed inventory such as gram-

matical forms), this category may only include four members in relation to space: the ground may consist of just one object (*near*), of two objects (*between*), of several objects (*among*), and of numerous objects (*amidst*). According to Talmy, this property is a special characteristics of spoken language as compared to other cognitive systems. Furthermore, Talmy and Vandeloise both note that classical geometric tools do not accurately account for the distribution of linguistic spatial components such as prepositions. In this respect, it is worth noticing that language is neutral with respect to particular dimensions of Euclidean geometry. This neutrality makes languages flexible and allows them to make maximal use of a limited number of components. For example, with respect to the dimension of "magnitude", the preposition *across* can apply to a situation of any size and the preposition *near* can describe the distance between planets in the solar system or between two houses within a relatively small region.

Thus, languages vary noticeably in the spatial distinctions they explicitly make, but they also vary in other respects. Interestingly, comparing the types of distinctions that are found across languages to the set of all logical possibilities shows three points. First, all types seem to exist most of the time, but a few patterns are predominant and some are very rare. Second, existing types often correspond to a common linguistic area or linguistic family, but this rule is by no means absolute. Third, different patterns may be found within one language, so that it might be best to talk of "strategies" used by languages rather than of language types.

The same conclusions hold for location and for motion. The expression of a basic motion event in natural languages involves several semantic components: a figure (or target), that is the entity in motion and/or to be located; a ground (or landmark), that is the entity in relation to which the figure is located; the path of motion; the manner in which motion is carried out; and the cause of motion. Three of these components are central across languages: manner (e.g., English *to run, to walk, to fly*), path (*to run in, out, up/down, across*), and ground (*to run into the room, to run into the garden*). Languages differ in how they encode path and manner, but also in the attention they pay to manner. In his pioneer work, Talmy (1985, 1991, 2000) suggests that languages can be divided into two groups in terms of the ways in which they encode the core feature of a motion event, namely its path. Verb-framed languages (such as Romance or Semitic languages) typically convey path information by lexicalizing it in the main verb (e.g., French *entrer, sortir, monter, traverser*). In contrast, satellite-framed languages (such as Germanic and Slavic languages) encode path in satellites, such as particles, prefixes, or prepositions associated to the main verb (English *to walk* ***into,*** *to climb* ***up,*** *to run* ***across***). The use of satellites to encode path allows the main verb of the clause in S-languages to be available to encode other dimensions of motion events, for instance manner (*to* ***walk*** *into, to* ***climb*** *up, to* ***run*** *across)*.

As pointed out by Slobin, languages differ considerably in their lexical and morphological means of expressing manner, thereby attributing different degrees of salience to this dimension. For example, various common manner verbs in English (*to walk, creep, trample… on the plants*) can hardly be translated into French. Manner is expressed with more limited means in V-languages, frequently in subordinate

manner verbs, that are merely optional (*entrer **en courant, en rampant** …*), and it is most frequently not expressed at all. Slobin proposes a third language type, namely "equipollently-framed" languages, in which path and manner are expressed by equivalent grammatical forms (also see Slobin 2003, but see a critique by Peyraube in this volume). Verbs may be serial, bipartite (a complex of two verbs, one expressing manner, the other path) or generic, combined with coverbs encoding path and manner. As we will see (Part II), the nature of these morphological means has important consequences for the degree to which manner is salient in discourse.

Levinson's major work has also shown the existence of different frames of reference across languages (e.g., Levinson 2003). As summarized in this volume (Robert in Part II, Dokic and Pacherie in Part III), three kinds of frames of reference can serve to locate entities: (1) an *intrinsic* frame of reference, in which coordinates are determined by the inherent features of the ground object (*He's in front of the house*: the house has an intrinsic orientation defining its front); (2) a *relative* or anthropocentric frame of reference, where the coordinate system is based on an external viewer or point of view (*He's to the left of the house*: the left of the house is defined relative to the speaker's position); (3) an *absolute* frame of reference using fixed bearings such as cardinal points (*He's north of the house*). When the point of view is the speaker, the relative frame of reference is also called "egocentric" or "deictic". Several authors in this volume also point out the crucial role of the speaker's deictic space for language, that is the space in which the speaker is taken as reference point (Marchello-Nizia for French, Robert for an African language, Vandeloise more generally).

Three chapters add a diachronic perspective to the description of spatial linguistic systems, providing interesting examples of how systems evolve through time. They illustrate a semantic change in the values of French demonstratives (Marchello-Nizia), as well as structural changes in the expression of motion events in French (Kopecka) and in Chinese (Peyraube). In all cases, changes were not abrupt, but unfolded in several stages over centuries. In addition, all three cases illustrate the existence of some "hybridization" within given languages at given points in time and show that this observed language-internal variability corresponds to the more general variability that can be observed across languages. That is, during the course of its history, a given language evolves from one type of system into a different type that is found in other languages.

For example, spatial systems may undergo structural changes that reflect typological shifts. With respect to motion events, Peyraube shows that Chinese evolved some ten centuries ago from a verb-framed language encoding path information in the main verb to a satellite-framed language encoding path in satellites, namely in directional complements. Inversely, Kopecka shows that French evolved since about the 14th century onwards from a satellite-frame language encoding path in verbal prefixes to a predominantly verb-framed language where path is lexicalized in the verb. Nonetheless, French has retained a secondary satellite-framed system, which is a less productive remnant of its previous state (e.g., verbs such as *écrémer* 'to take off cream', *atterrir* 'to land on earth').

French demonstratives also evolved from a personal value (in Latin) to a spatial semantic value (in Modern French) through a stage during which they referred to the speaker's sphere (anything that is linked to the speaker, whether spatial or not). This change went smoothly through several stages before reaching its present state and an ambiguous construction plays a pivotal role in this process, explaining the final semantic reanalysis. Interestingly, the spatial value of French demonstratives (which is very common cross-linguistically) is not primary, but rather appears to be the result of a long evolution that took place during more than twelve centuries. Marchello-Nizia argues that the evolution from Latin to Modern French, far from starting with a spatial meaning and gradually moving further away from it, seems to have gone through a "cyclic" change, as do some other morphemes: it moved from spatial to personal meanings (Latin), then to subjective-pragmatic meanings (Old French), before returning to spatial meanings (Modern French).

Finally, Talmy compares how spoken and signed languages represent space. Signed languages are of particular interest because, in comparison to spoken languages that are linear, they are spatialized and multidimensional systems. They use a gestural subsystem (face, head, torso representations), a gradient subsystem of "bodily dynamics", and an associated somatic subsystem including facial expressions. However, according to Talmy, spoken and signed languages share the property of containing two subsystems, one "open-class" or lexical subsystem (typically the roots of nouns, verbs, and adjectives) and one "closed-class" or grammatical subsystem, consisting of relatively few forms that are difficult to augment. These two subsystems basically perform two different functions when they combine in the sentence: open-class forms largely contribute conceptual content, while closed-class forms determine the conceptual structure of the scene to be construed by language. Spoken and signed languages can therefore be considered as two language modalities.

As shown by Talmy, a crucial property that is specific to how signed language represents space appears to be the structural characteristics of scene-parsing in visual perception. Thus, in comparison to spoken language, signed language can mark finer spatial distinctions with its larger inventory of structural elements, of categories, and of elements per category. It can represent many more of these distinctions in any particular expression. It also represents these distinctions independently in the expression, not bundled together into pre-packaged schemata. In addition, its spatial representations are largely iconic with visible spatial characteristics; with respect to this last point, Sallandre also shows the central role of *highly iconic structures* in discourse. She further demonstrates that signers may use a variety of different handshapes (*proforms*), which are all available in French Sign Language, to denote a given referent, depending on the particular properties on which they choose to focus, given their relative relevance in discourse. As further discussed below (Part III), these properties have consequences for how the brain might organize cognitive functions related to space in different systems. However, because both systems represent spatial situations schematically and structurally, they nonetheless share properties that are central for language use at the discourse level (Part II).

The nature and uses of space in experience and in discourse

A second set of questions concerns space in experience and in discourse. How are linguistic systems used to construct spatial reference at the discourse level? Are "spatial" values in language autonomous or must we take into account other values that are relevant to our experience of space and necessary to characterize language use in discourse?

As shown above, spatial information is distributed across different components of the sentence in ways that vary across languages within a certain range of possibilities. As shown by Grinevald, spatial information can be overt or covert, redundant or underspecified, and even entirely absent in extreme cases where the location of an entity must be inferred from its posture or shape. Indeed, discourse analysis reveals that the semantics of space, as well as meaning in general, is compositional and distributed, because language inherently involves linearization and sequencing. In contrast to vision, which is a holistic and multidimensional process, verbalization imposes the need to break down information into discrete and successive pre-constructed units.

However, as a counterpart to this constraint, another property of language gives it a special kind of power: different sentence elements interact with each other, thereby creating new meanings. As shown by Vandeloise, particular ways of combining spatial prepositions with different verbs and constructions may confer new meanings to the sentence and to the units within sentences themselves. For example, French *contre* ('against') cannot be used with intransitive motion verbs (**L'enfant va contre le mur* '*the child goes against the wall'), because voluntary motion verbs describe the *will* of the mover, who is assumed not to move deliberately into an obstacle, unless s/he is mad (*Le forcené court contre le mur* 'The madman runs up against the wall'). The sentence construction itself contributes to spatial meaning. Transitive motion verbs are used when there is a dynamic exchange between the agent and the patient (*John breaks the wood*), while intransitive motion verbs are used when there is no such dynamic exchange between the subject and the complement (*The bird is above the tree)*.

It is worth noticing that despite some important differences across systems, spoken and signed language share common properties at the discourse level. As pointed out by Talmy, both have basic elements that combine in order to structurally schematize scenes. Both group their basic elements within some categories that themselves represent particular categories of spatial structure. Both follow some conditions on the combination of basic elements and categories into a full structural schematization. Both also follow conditions on the co-occurrence and sequencing of such schemata within a larger spatial expression. Both allow speakers to amplify some semantic elements or parts of a schema by means of open-class lexical forms outside the schema. And in both subsystems a spatial situation can often be conceptualized in more than one way, so that it is amenable to alternative schemata.

Talmy's analysis, then, shows the extendability of linguistic prototypes and the existence of processes that deform schemata. In line with this insight, Vandeloise's analysis of spatial prepositions in discourse reveals first that their values vary according

to the terms with which they are used. It also points out that the semantics of spatial terms involve notions that are related to our *experience*, rather than to a conception of space in terms of Cartesian axes. Such notions include, for example, the transmission of energy and forces, the cause of motion, control, intentionality, will, and even the agent's satisfaction. More generally, some important asymmetries found in the uses of prepositions (*The bird is in front of the house,* but **The house is behind the bird*) result from the fact that spatial prepositions are not devoted to a purposeless description of space, but rather serve as *instructions* in order to help locate a specific target. In order to guide the addressee, the speaker uses the most conspicuous landmark possible and a bird is not a good landmark to locate a house.

We saw above that the semantics of spatial terms often combine spatial values with other components because of the phenomenon of conflation. Another characteristic of language is that spatial terms always have non-spatial uses. This property is not specific to spatial language, but results from the more general polysemous nature of linguistic units. This point is alluded to by Vandeloise's provocative title "Are there spatial prepositions?". His final answer to this question is positive, but as long as one conceives of space in language as a component of human concrete external experience, rather than as a geometric tool.

Cadiot et al. further argue against the predominant view in cognitive linguistics that space should be reduced to topological properties. Thus, they criticize the typological distinction between verb- and satellite-framing by analyzing a number of French verbs, showing the numerous dimensions that are involved in contextualized verbal uses. These dimensions include mecanicity, correct functioning, surprise, and non-control in examples such as *Le moteur marche* ('The engine is running'), *Ca marche bien, ton affaire?* ('Is your business going well?'), *Il nous a fait marcher !* ('He put us on!'), *tomber dans les pommes* ('to pass out'), *tomber amoureux* ('to fall in love'). Such uses, they argue, cannot be accounted for in the currently available frameworks of cognitive linguistics, except by postulating secondary processes of deriving "metaphorical" meanings in various artificial and counter-productive ways. Cadiot et al. defend a holistic view of semantics and of perceptive experience which is in line with phenomenology and *Gestalt* theory. Language, in this view, reflects perceptual experience in which space (like time) is constantly reconstructed by the perspective of an active subject. The dynamic field of experience involves not only spatial perception but also dimensions pertaining to action (such as manner, gesture or attitude) and to qualitative evaluation (such as surprise, telicity, intentionality, anticipation). These "praxeologic" and subjective dimensions are present in the core semantics of motion verbs but activated to different degrees as a function of the situation and discourse context, as is also the case for the spatial value of these terms.

Non-spatial uses of spatial markers are also discussed by Robert in the particular case of deictic space (also see by Marchello-Nizia in Part I). If deictic elements are used to refer to the space of the speaker, they always have at least an extended use to refer to the space of discourse, particularly to designate a term that is close or far away in previous speech. This special discursive use of spatial terms illustrates another property of

language, namely its reflexiveness, that is the property whereby language can be used to "talk about" language. In the case of Wolof studied by Robert, the use of deixis goes far beyond the spatial location of an entity, pervading the entire language (noun determination, predication, subordination) and playing a special role in the construction of various relationships of syntactic dependency. Through a special suffix indicating the absence of localization in the speech situation, Wolof also provides a striking example of how "deixis in absentia" plays a central role for linguistic construals.

Finally, as demonstrated by several papers, discourse analysis reveals another important point concerning linguistic variation. Although different ways of expressing space may coexist in a given language system, some may be scarcely used in discourse, while others, on the contrary, may be obligatory and even overexploited. This variation results from the fact that languages choose particular strategies about which elements they consider to be most *salient* for the description of situations. These choices can be purely conventionalized or induced by the morphosyntactic constraints of each system.

Grinevald (in Part I) illustrates this point with two groups of Amerindian languages that make extensive use of the same morphological devices, but that do so in totally different ways. Tzeltalan languages make pervasive use of positional roots in locative predicates, but also in a very productive derivational system (such as numeral classifiers and verbs, intransitive and transitive constructions). Such frequent positional roots therefore systematically direct attention to spatial characteristics of entities. In Jakaltek-Popti' directionals are also massively used. However, because they have evolved to express an *abstract notion of trajectory* in space, they can be used in the absence of any motion on the part of spatial entities, as shown by their use with verbs of perception or with verbs of saying ('He saw her [up] [away]' or 'He said hello [up] [towards] to her'). In these cases directionals serve to perspectivize scenes, indicating the reference point from which the scene is to be conceived, somewhat like a camera which takes different points of view.

Slobin's analysis of an extensive corpus of texts (in Part I) concludes that lexicalization and morphosyntactic patterns constrain information focus in discourse. In contrast to speakers of satellite-framed languages, speakers of verb-framed languages virtually never mention manner, focusing on emergence, appearance, or changes of state and showing a strong preference for marking state changes in the verb root. Although V-languages provide means of expressing manner, speakers seldom do so in spontaneous discourse, because such constructions unnecessarily *foreground* manner, given that their language selects state changes as the main information focus and provides no compact construction that allows joint attention to state changes and to manner. Hickmann's study (in Part III) provides developmental evidence for this claim, showing that adults and children frequently express both path and manner in English, but only path in French. As a result of verb- vs. satellite-framing, speakers also organize their discourse in very different ways, compactly expressing information within utterances in English, but distributing it across several utterances in French, particularly at young ages. Finally, in addition to these strong cross-linguistic dif-

ferences, particular discourse factors (such as presuppositions, contrastive contexts, world knowledge of particular event properties) influence discourse organization in both languages by inviting speakers to express or to ignore the manner of motion.

Space, language, and cognition

Cross-linguistic analysis raises central questions concerning the relation between language and cognition. Although this fundamental question is not specific to space (Gentner & Goldin-Meadow 2003; Gumperz & Levinson 1996; Lucy 1992; Nuyts & Pederson 1997), it has been particularly debated in relation to this domain across the cognitive sciences. The special status of space in this respect may reside in the fact that it is one of the most basic behavioural domains for survival in all species, but that it also displays considerable variations across systems in human languages. Linguistic representations depend on particular spatial systems, each displaying its own internal organization, but perceptual or cognitive processes contributing to our spatial representations have been assumed to be universal and independent of language. A major debate now opposes two contrasted views. The first assumes that linguistic and non-linguistic spatial representations are relatively independent from one another, the second that they are intimately related.

Research on infancy has contributed to the first view. Infants display numerous capacities from a few days or months onwards in a variety of domains. The child's "initial state" at birth seems to comprise some innate "core" knowledge (Spelke 2003) and/or a strong propensity to discover perceptual invariants (Mandler 1998), either of which might constitute the first universal foundation of cognition. In either case, it is assumed that children's task is to match their initial representations with the ones that are provided by language. In turn, language implies a new representational format that allows abstraction and/or interconnections among knowledge components during later development. In this respect, however, the processes whereby infants' precocious knowledge "connects" with later language developments remains somewhat mysterious.

A very different approach proposes that language structures cognition. According to one version (Vygotsky 1962; Hickmann 1987; Wertsch 1991, as well as recent research in Gentner 2003), language is a semiotic medium that has major implications for ontogenetic and phylogenetic development. General properties of language (multifunctionality, propositionality, self-reflexivity, temporal constraints on information processing) invite children to construct new forms of cognitive organization, allowing them to extract invariants and to participate in particular forms of reasoning. A second version (Whorf 1956; Bowerman & Choi 2003; Gumperz & Levinson 1996; Lucy 1992; Nuyts & Pederson 1997; Slobin 1996, 2003) goes further by postulating that language-specific properties partially transform our representations, thereby leading to particular patterns in language and cognitive development. Each language "filters" and "channels" the flow of information, inviting the child to construct a particular sys-

tem of categories and to organize information according to its mold. Opponents (e.g., Jackendoff 1996; Landau & Jackendoff 1993; Landau 2003; Clark 2003) reject this view on several grounds, arguing that language-specific properties might influence our language behaviors, but not other modes of cognitive organization beyond language itself. One problem frequently highlighted is the circularity of attempts to demonstrate the impact of language on cognition merely on the basis of language use.

These different issues are discussed from four perspectives in this volume. First, from a typological point of view, Talmy's analysis of substantial differences between spoken and signed languages (in Part II) leads him to challenge Fodor-Chomsky's proposal of a special language module in the brain. Admitting the existence of a "core" language system, he argues that this system is limited and connects with other parts of the neural system that are responsible for visual perception (essential to signed languages) and for other processes (particular to spoken languages).

Second, from a philosophical epistemological perspective, Dokic and Pacherie challenge Levinson's neo-Whorfian claim that frames of reference should infiltrate spatial representations in non-linguistic modalities, arguing that they are not necessary at the most basic level of perception. Geometrical properties of objects can be perceptually encoded independently of intrinsic frames of reference (a bottle in front of a chair is perceived as near the front side of the chair). The perceptual identification of directions across contexts presupposes their non-absolute identification within a given context (using demonstratives such as *this direction*). And perception need not use relative frames to *distinguish* directions in the perceptual scene (left/right vs. right/left), since the relevant distinction can be drawn in each perceptual context by demonstrative means (*from here to there*). Furthermore, whereas relative frames in language imply explicit representations of relations (referent, relatum, point of view), these frames are *implicit* in perception (not explicitly represented as such). Implicit frames provide a simple account of transfer across modalities. We need not assume that the target state can only exploit explicit representations in the source state, since relevant information can be implicitly nested in or associated with the source state. When we perceive a bottle next to a chair, we need not perceptually represent the bottle and the chair *as* bearing different spatial relations to parts of our body. In conclusion, frames of reference best characterize high levels of cognitive processing, whereas perception may be perspective-free at the most basic level.

Third, partial support for the relative autonomy of language and other behaviours comes from pathologies that show dissociations between linguistic and non-linguistic representations. Landau and Lakusta examine the performance of patients with Williams syndrome (WS), classically described as suffering from severe non-linguistic spatial impairments, while displaying relatively spared language. They first note that the only available evidence pointing to a common general deficit in WS speakers' verbal and non-verbal behaviours is far from conclusive in that it does not distinguish among different mechanisms that may cause apparent linguistic deficits.

Further evidence concerns how WS speakers represent motion and location. When these patients describe voluntary motion, the overall structure of their spatial lan-

guage is preserved and they only differ from matched controls in the frequency with which they express source information ("Source Vulnerability"). Source vulnerability, however, seems to be a general characteristic of cognitive architecture, also applying to normal populations, who privilege goals over sources. Static location was examined in three tasks (non-linguistic, language production, language comprehension). No significant difference among WS and control subjects can be observed in the non-linguistic task. In the linguistic tasks both groups respect cardinal axes (*above/below* or *over/under* and *next to* or *beside*) and neither correctly produces or comprehends horizontal directional terms (*right/left*). However, direction errors on the vertical axis were more frequent among WS children, reflecting deficits in their non-linguistic representations.

Landau and Lakusta's conclusion is that our views about the relation between language and cognition largely depend on "where we look". Spatial language emerges with normal structure despite the presence of other impairments, if we look at performance in tasks where language can only encode the spatial world in a coarse manner. However, linguistic impairments echo non-linguistic deficits if we look at tasks where spatial language encodes the spatial world in a fine-grained manner.

Similarly, Denis et al. examine the spatial discourse of Alzheimer patients, known to present a deficit in their ability to navigate in space, comparing their verbal performance with that of control subjects across three spatial tasks involving different demands: providing oral route directions in a familiar urban environment, describing familiar environments from memory but without the need to transform their knowledge into navigational instructions, and generating spatial discourse when relying on a map.

In the first task patients provided far less relevant spatial information than control participants, and particularly virtually no reorienting instructions that could guide a moving person's displacements. In the second task they also provided less information than controls, as well as more modalizing expressions, suggesting that visuo-spatial knowledge was less accessible to them (e.g., *I don't know very well*, *I can't remember the name of that street*, *It is quite difficult to explain*). With respect to the discourse issues discussed above (Part II), their verbal performance in these two tasks suggest that they may have some difficulties in discourse organization. Their spatial discourse not only contained little relevant information, but was also not coherent: it frequently consisted of a series of successive statements providing unrelated spots with little information about relevant surroundings or actions and rarely positioned landmarks relative to each other or relative to the observer. However, their deficit in generating spatial discourse virtually disappeared in the third task, where they are allowed to rely on maps. For example, like controls, they were sensitive to the relative relevance of actions vs. landmarks in different segments of their descriptions. Their main difficulty in generating route directions stems from their difficulty in retrieving spatial information, rather than from any underlying (purely) linguistic disturbance.

Finally, some chapters examine the linguistic and cognitive factors determining how children acquire spatial language across typologically different systems, suggesting that different languages might imply different forms of cognitive organization. In line

with Slobin (Part I), Hickmann shows that the typological properties of French and English strongly influence how adults and children talk about voluntary motion. English speakers express path and manner in compact structures (e.g., *to run in, up/down, away*), while French speakers do so less systematically, frequently focusing on path alone (e.g., *descendre* 'to descend') or distributing path and manner information across utterances (e.g., *elle fait du vélo [. . .] et elle traverse la route* 'she is biking [. . .] and she crosses the road'). These differences result from verb- vs. satellite-framing, that imply different lexicalization patterns leading speakers to pay less attention to manner in French than in English.

However, French and English children tend to encode path alone at the youngest ages, then to increasingly encode both manner and path with age. This common developmental progression reflects the impact of general cognitive factors. Encoding one information component is obviously simpler than encoding more and path is more basic than manner. Nonetheless, dense utterances are more frequent at all ages and with all event types in English than in French, and they increase most strikingly in French, where speakers must master the complex subordinate structures that are required by their system (e.g., *Il descend/traverse en courant* 'He descends/crosses by running').

Along with other developmental studies (Choi & Bowerman 1991; Slobin 2003, this volume), this research suggests that young children's language of motion reflects typological properties, despite similar developmental progressions across languages resulting from general cognitive determinants. From early on children construct a spatial language that tightly fits the adult system and they then further tune into this system during language and cognitive development.

3. Concluding remarks

Space has been and remains a rich source of intriguing and challenging questions for the cognitive sciences, providing the grounds for debates concerning the existence and implications of universal vs. variable aspects of linguistic systems and highlighting questions concerning the relation between language and cognition. Various approaches based on complementary descriptive and experimental methods have converged or diverged with respect to these issues, reaching conclusions that have led to different theoretical frameworks.

The contributions in this volume present two sorts of data. They provide general and specific analyses of space in language showing the diversity of spatial systems across languages and during their evolution. They also present theoretical discussions and empirical evidence concerning human verbal and non-verbal behaviors, their evolution in ontogenesis, and their break-down in pathology. The resulting debates have two major types of implications. They first renew old questions concerning the nature of language, which has been viewed either in terms of distinct and entirely autonomous levels of organization or as an integrated semiotic system relating forms, functions, and meanings in communicative context. They also have implications for

our understanding of cognitive processes, viewed either as entirely autonomous from linguistic processes or as intimately related to them. Evidence from both linguistic and psycholinguistic analyses indicate that varied modes of cognitive organization are (at least partly) associated with varied modes of linguistic organization, but also that linguistic and cognitive organization may be (at least partly) dissociated, for example in the cases of various pathologies.

Many empirical questions remain open. As shown in this volume, one fundamental point of disagreement concerns the relation between linguistic and non-linguistic representations. The revived Whorfian hypothesis that is presently debated across the cognitive sciences must be tested on the basis of evidence that directly relates speakers' verbal and non-verbal behaviours. Related to this point are a number of controversial questions, both theoretical and methodological, concerning how to capture non-linguistic representations and to demonstrate linguistic mediation: Are non-linguistic representations pervasive and implicit to any behaviour? How should they be assessed? By what mechanisms can they be linguistically mediated? What is the nature of the resulting changes?

A related point concerns the debated specificity of language and cognition in the human vs. other species. We need phylogenesis evidence for or against the significant role of human language in shaping human-specific cognitive processes during evolution. Few answers are available and they show again the methodological and theoretical difficulties facing any attempt to specify the qualitative cognitive changes that might depend on human language (see Gentner & Goldin-Meadow 2003). Although this volume does not directly tackle phylogenetic development, the contributions therein provide developmental analyses that point to some of the directions to be pursued. For example, more evidence concerning infants is necessary to support the views that cognition is linguistically mediated from very early on or that linguistic mediation is a secondary phenomenon characterizing only later developmental phases.

These questions require an interdisciplinary approach that can fully spell out and empirically address the many problems that still remain to be solved. The joint interdisciplinary enterprise that is illustrated in this volume shows the invaluable merits of crossing the boundaries that have long prevented researchers from going beyond the limits of their scientific traditions in order to construct general theories of human language and cognition. Such theories must be continuously renewed and revised in the light of theoretical, methodological, and empirical advances, that present recurrent challenges across the cognitive sciences.

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PART I

Typology of linguistic systems: Universals, variability, and change

CHAPTER 1

Encoding the distinction between location, source and destination

A typological study

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This article analyzes the contribution of adpositions or case affixes to the encoding of the distinction between localization, the source of motion, and the destination of motion. It proposes a typology and examines the case of languages in which locative adpositions or case affixes are not sensitive to these distinctions. Particular attention is placed on a strategy particularly common among the languages of Subsaharan Africa, whereby the valency properties of motion verbs are organized in such a way that the distinction is always unambiguously encoded at the level of the verb.

1. Introduction

All languages must encode in some way or another the distinction between localization, the source of motion, and the destination of motion, but they differ in the way spatial adpositions or case affixes participate in the encoding of this distinction. The most recent reference on this question is Shay and Seibert (2003), which includes a series of case studies on a variety of languages. This articles proposes a typological approach of the contribution of verbs and adpositions to the encoding of this distinction.

Logically, five different patterns can be imagined:

– Pattern 1: each of the three meanings essive, ablative and allative appears without any ambiguity in the choice of adpositions or case affixes;
– Patterns 2a–c: locative adpositions or case affixes express without ambiguity one of these three types of meanings only, and conflate the other two, with three logical possibilities: (a) ablative vs. essive-allative, (b) allative vs. essive-ablative, and (c) essive vs. allative-ablative;
– Pattern 3: the use of locative adpositions or case affixes is not sensitive to the distinction between localization, the source of motion, and the destination of motion.

2. The situation in European languages

Among these five logically possible patterns, only two are commonly found in European languages: Pattern 1, in which each meaning is encoded by means of specialized adpositions or case affixes – ex. (1) and (2), and Pattern 2a, in which essive and allative conflate, and ablative only is expressed by means of specialized adpositions or case affixes – ex. (3) and (4).[1]

(1) *Spanish*[2]

a. *Los niños están en la playa*
DEF.M.PL child.PL be.S3PL ESS DEF.F.SG beach
'The children are on the beach'

b. *Voy a la playa*
go.S1SG ALL DEF.F.SG beach
'I am going to the beach'

c. *Vengo de la playa*
come.S1SG ABL DEF.F.SG beach
'I am coming from the beach'

(2) *Basque*

a. *Bilbo-n bizi naiz*
Bilbao-ESS living be.S1SG
'I live in Bilbao'

b. *Autobus hau Bilbo-ra doa*
bus this Bilbao-ALL go.S3SG
'This bus is going to Bilbao'

c. *Autobus hau Bilbo-tik Donostia-ra doa*
bus this Bilbao-ABL San+Sebastian-ALL go.S3SG
'This bus is going from Bilbao to San Sebastian'

(3) *Catalan*

a. *Els hem trobat a la botiga*
O3PL AUX.S1PL find ESS/ALL DEF.F.SG shop
'We found them at the shop'

b. *Els hem enviat a la botiga*
O3PL AUX.S1PL send ESS/ALL DEF.F.SG shop
'We sent them to the shop'

c. *Vénen de la botiga*
come.S3PL ABL DEF.F.SG shop
'They are coming from the shop'

1. A list of abbreviations can be found at the end of the chapter.

2. Examples without indication of a source have been obtained from informants.

(4) *Bulgarian*

a. *Majka-ta na Nikola raboti v bolnica-ta*
mother-DEF.F.SG of Nikola work.S3SG ESS/ALL hospital-DEF.F.SG
'Nikola's mother works in the hospital'

b. *Tja vliza v bolnica-ta*
she enter.S3SG ESS/ALL hospital-DEF.F.SG
'She is going into the hospital'

c. *Tja izliza ot bolnica-ta*
she go/come+out.S3SG ABL hospital-DEF.F.SG
'She is going out of the hospital'

This does not mean that every European language should be easy to classify as a language following either Pattern 1 or Pattern 2a. In general, in each individual European language, one of these two patterns clearly predominates, at least regarding the uses of the most basic spatial adpositions (i.e. those that provide a minimal specification of the spatial configuration to which they refer). But the predominance of one type in a language does not exclude the presence of the other. In fact, the general rule in European languages is the coexistence of the two types, and the uses of a given adposition or case affix do not necessarily conform to the same type in all contexts. For example, in most contexts, the Spanish preposition *en* unambiguously expresses an essive meaning, in opposition to the allative preposition *a*; but with verbs expressing penetration *en* is compatible with an allative meaning (as in *Entró en la habitación* '(S)he came/went into the room'), and the same is true of the essive case ending of Basque.

In other words, there is considerable variation, among European languages, and even within the limits of each individual language, regarding the sensitivity of adpositions and case affixes to the distinction between localization and destination of motion. By contrast, across European languages, the ablative is almost always obligatorily encoded by means of adpositions or case affixes that do not occur in contexts implying an essive or allative meaning. The Italian preposition *da* – ex. (5) – is an exception to this rule, but such exceptions are not common in European languages and French – ex. (6) – illustrates a more common situation, in which the spatial preposition expressing the meaning carried by Italian *da* in ex. (5) cannot occur in an ablative context without combining with a specialized ablative adposition.

(5) *Italian*

a. *Abito da mio zio*
live.S1SG DA my uncle
'I live at my uncle's'

b. *Vado da mio zio*
go.S1SG DA my uncle
'I am going to my uncle's'

c. *Vengo da mio zio*
come.S1SG DA my uncle
'I am coming from my uncle's'

(6) *French*

a. *J'habite chez mon oncle*
s1sg-live chez my uncle
'I live at my uncle's'

b. *Je vais chez mon oncle*
s1sg go chez my uncle
'I am going to my uncle's'

c. *Je viens de chez mon oncle*
s1sg come abl chez my uncle
'I am coming from my uncle's'

3. The question of typological generalizations

The question we must examine now is whether the overwhelming predominance of Patterns 1 and 2a observed in the languages of Europe extends to the languages of the world. In fact, of the three remaining types, only Types 2b and 2c seem to be really exceptional.

A fairly obvious typological generalization is that, if adpositions or case affixes conflate two of the meanings essive / allative / ablative and provide a distinct expression for the third one, the meanings that conflate are almost always essive and allative: the pattern 'allative vs. essive-ablative' (Pattern 2b), illustrated by Dinka – ex. (7), seems to be extremely rare,[3] and I know of no evidence for the pattern 'essive vs. allative-ablative'.

(7) *Dinka* (Andersen 2002)

a. *tı̰k à̰-tò̰ok mà̰ac*
woman decl-make+fire fire.abs
'The woman is making a fire'

b. *kṳ̀ jò̤ol t̪á̰aɲ mɛ̰̂ɛɛc*
and do+then.3sg press.cf.nf fire.all
'and then he pressed it into the fire'

c. *myè̤et̪ à̰-tɔ̤̀ mɛ̰́ɛɛc*
food decl-be+present fire.ess/abl
'The food is on the fire'

d. *rɛ̤́ɛc à̰-mṳ̀ul bḛ̀y mɛ̰́ɛɛc*
fish decl-crawl.cp out.all fire.ess/abl
'The fish is crawling out from the fire'

3. To my knowledge, the only evidence for this pattern concerns languages spoken in North East Africa – see for example Mous (1993: 105) on Iraqw.

By contrast, Pattern 3 is exceptional in the languages of Europe and of many other areas, but it is common and event predominant in some areas, particularly in Subsaharan Africa.

4. Systems of spatial adpositions or case affixes that do not mark the distinction between localization, source, and destination

Languages in which spatial adpositions or case affixes never participate in the encoding of the distinction between localization, the source of motion, and the destination of motion, are extremely common in Subsaharan Africa, in particular within the Niger-Congo phylum.

In such languages, locative expressions (adpositional phrases, case-marked noun phrases or locative adverbs) by themselves provide no clue to the choice between the roles of localization, source or destination. Localization is the default interpretation, and the roles of source or destination can be assigned by verbs only. The general rule is that each motion verb has at most one locative argument to which it unambiguously assigns either the role of source or that of destination. For example, the verbs commonly glossed as 'come' in bilingual dictionaries have the same deictic implications as English *come* (motion towards the deictic center), but the only role they can assign to their locative argument is that of destination. Consequently, their locative argument necessarily refers to the deictic center and it is absolutely impossible to refer to the source of the motion by simply combining them with an adpositional phrase or locative adverb; in order to express 'come from', another verb, commonly glossed as 'leave' (and by itself devoid of any deictic implication) must be used, alone or in combination with the deictic verb 'come'.

More generally, in the languages of Subsaharan Africa that follow this pattern, constructions in which a single motion verb combines with two locative expressions referring respectively to the source and the destination of motion are impossible: the meaning expressed in English by a sentence such as *The man went from the village to the river* necessitates the combination of two verbs in a construction whose literal meaning is something like *The man left the village and went to the river* or *The man, after leaving the village, went to the river* – ex. (8).

(8) *Tswana*

a. *Monna o dule motse-ng*
1man s3:1 leave.PFT 3village-LOC
'The man left the village'

b. *Monna o ile noke-ng*
1man s3:1 go.PFT 9river-LOC
'The man went to the river'

c. *Monna o dule motse-ng a ya noke-ng*
1man s3:1 leave.PFT 3village-LOC s3:1.SEQ go 9river-LOC
'The man went from the village to the river'

Interestingly, in the languages of Subsaharan Africa this particular kind of formulation with motion verbs does not necessarily imply a more general tendency to encode events treated as single events in most languages by means of sequences of verbs. It is not limited to so-called serializing languages, since it is independently motivated by the impossibility to encode the distinction allative vs. ablative by means of adpositions or case affixes.

In many West-African languages, the role of source can be assigned by a very limited set of motion verbs, in some languages by one verb only. Other motion verbs are of two types:

– they either assign the role of destination (and consequently must be combined with a verb glossed as 'leave' to encode the source of motion),
– or they can assign neither the role of source nor the role of destination (and consequently must be combined with a verb glossed as 'leave' to encode the source of motion and with a verb glossed such as 'go' to encode the destination of motion).

For example, in many West-African languages, even among those that have no marked tendency for serialization, the equivalent of the English construction *run from A to B* necessarily involves three verbs, something like *leave A run go B*. Despite the 'exoticism' of this construction, it would not be correct to characterize it as more 'analytical' than its English equivalent: the real contrast is that the words that act as role assigners in this construction are grammatically verbs, and not adpositions.

It may be interesting to observe that in African languages the properties of motion verbs as role assigners are often different from those suggested by their most common English equivalent. For example, the Baule verb *wandi* 'run' cannot assign the role of destination (and must combine with *kɔ* 'go' or *ba* 'come' to express the destination of motion), but can directly combine with a locative expression to which it assigns the role of source – ex. (9).

(9) *Baule*

a. *wàndí kɔ̀ bé bò*
run go they LOC
'Run towards them!'

b. *wàndí bé bò*
run they LOC
'Run away from them!'

In the African languages that strictly follow this pattern and that have an applicative derivation, a frequent use of the applicative suffix is to derive verbs assigning the role of goal to a locative complement from verbs that, in their non-derived form, either do

not have any locative argument or have a locative argument to which they assign the role of source.[4]

For example, Tswana has an applicative suffix whose canonical use can be defined as licensing the presence of a direct object representing a participant that cannot be encoded as a core argument of the same verb in its non-derived form. The same applicative suffix can license the addition of direct objects with a variety of semantic roles, as can be seen from ex. (10) and (11).

(10) *Tswana*

a. *Ke bereka thata*
s1s work hard
'I am working hard'

b. *Ke berekela bana*
s1s work.APPL 2child
'I am working for the children'

c. *Ke berekela tiego*
s1s work.APPL 9delay
'I am working because of the delay'

(11) *Tswana*

a. *Kgosi e ne ya atlhola monna*
9king s3:9 AUX s3:9.SEQ condemn.PFT 1man
'The king condemned the man'

b. *Kgosi e ne ya atlholela monna bogodu*
9king s3:9 AUX s3:9.SEQ condemn.APPL.PFT 1man 14theft
'The king condemned the man for theft'

c. *Kgosi e ne ya atlholela monna loso*
9king s3:9 AUX s3:9.SEQ condemn.APPL.PFT 1man 11death
'The king condemned the man to death'

The non-canonical uses of the applicative have in common with the canonical use that they imply a modification of the valency of the verb that leaves unchanged the semantic role assigned to the subject, but that cannot be described as the introduction of an additional direct object. In particular, with motion verbs that, in their non-derived form, imply a locative argument to which they assign the role of source, the applicative form has the same formal valency as the non-derived form (it governs a locative expression with the syntactic status of oblique argument), but assigns to its locative argument the role of destination, as illustrated in ex. (12a–b) by the Tswana verb *huduga* 'change one's residence'. Note that, in order to express 'move from A to B', Tswana combines the non-derived form of *huduga* that introduces the locative expression referring to

4. Some observations also show the use of applicative derivation to indicate that a locative complement is assigned the semantic role of source – see for example Mous (2003) on Mbugu.

the source of the motion with the applicative form of the same verb that introduces the locative expression referring to the destination – ex. (12c).

(12) *Tswana*

a. *Ke tlaa huduga ko Kanye*
s1s FUT move LOC Kanye
'I am going to move from Kanye'

b. *Ke tlaa hudugela ko Gaborone*
s1s FUT move.APPL LOC Gaborone
'I am going to move to Gaborone'

c. *Ke tlaa huduga ko Kanye ke hudugele ko Gaborone*
s1s FUT move LOC Kanye s1s move.APPL.SEQ LOC Gaborone
'I am going to move from Kanye to Gaborone'

Another particularity of African languages that follow this pattern is that place names used as locative arguments or adjuncts generally do not combine with the locative case affixes or adpositions that are obligatory for common nouns fulfilling the same functions.

For example, in Tswana place names with a locative function may combine with locative prepositions that specify the configuration, as in ex. (12), but locative prepositions are always optional, and place names can occur in locative function devoid of any locative marking – ex. (13a–b). Common nouns combine with locative prepositions in the same conditions as place names, but most of them, when used in locative function, must take a locative affix, irrespective of the presence or absence of a locative preposition – ex. (13c–f).

(13) *Tswana*

a. *Ke tlaa huduga ko Kanye*
s1s FUT move LOC Kanye
'I am going to move from Kanye'

b. *Ke tlaa huduga Kanye*
s1s FUT move Kanye
idem

c. *Ke tlaa huduga ko motse-ng*
s1s FUT move LOC village-LOC
'I am going to move from the village'

d. *Ke tlaa huduga motse-ng*
s1s FUT move village-LOC
idem

e. **Ke tlaa huduga ko motse*

f. **Ke tlaa huduga motse*

A possible explanation is that, generally speaking, locative markers may carry three types of information:

– they indicate that an entity is viewed as a locative landmark,
– they indicate that a locative landmark marks the localization of an entity, the source of motion or the destination of motion,
– they specify a spatial configuration,

and consequently, in languages whose locative markers never participate in the encoding of the distinction between localization, source of motion, and destination of motion, the addition of locative markers to place names in locative function is really motivated only if there is some need to specify a particular configuration, since their very meaning predisposes them to be interpreted as referring to a locative landmark.

5. Conclusion

As indicated above, Subsaharan Africa shows a particular concentration of languages in which locative adpositions or case affixes never participate in the encoding of the distinction between localization, source of motion, and destination of motion. This particularity may not be restricted to African languages. A similar situation has been observed for example in Nahuatl. However, the absence of any distinction between localization, source of motion, and destination of motion at the level of adpositions or case affixes does not necessarily imply that the valency of motion verbs is organized in the same way as in African languages. Other strategies can be used to retrieve the distinction between source and destination of motion, as illustrated by Nahuatl.

It has been mentioned in Section 4 that, in African languages whose locative adpositions or case affixes give no clue to the distinction between source and destination of motion, each motion verb unambiguously assigns to its locative argument either the role of source or that of destination; in particular, the deictic verbs glossed as 'come' in bilingual dictionaries unambiguously assign the role of destination to the locative expressions with which they combine. By contrast, motion verbs in Nahuatl may leave open the interpretation of their locative argument as source or destination of motion. This is in particular true of the verb *huītz* 'come', and the only way of avoiding the ambiguity is to add a deictic adverb to the locative expression – ex. (14).

(14) *Nahuatl* (Launey 1981)
  a. *Ōmpa câ*
     there be.s3s
     'He is there'
  b. *Nicān câ*
     here be.s3s
     'He is here'
  c. *Ōmpa Mexìco huītz*
     there Mexico come.s3s
     'He is coming from Mexico'

d. *Nicān Mexìco huītz*
here Mexico come.s3s
'He is coming to Mexico'

Moreover, Nahuatl has applicative verb forms whose canonical uses are very similar to those of Bantu applicatives. However, contrary to what is observed in Tswana (see ex. (12) above), Nahuatl applicative derivation is not used to modify the roles assigned by verbs of motion to their locative arguments.

Abbreviations

ABL	ablative
ALL	allative
APPL	applicative
AUX	auxiliary
DEF	definite
ESS	essive
F	feminine
LOC	locative
M	masculine
O3PL	object marker, 3rd person plural
PFT	perfect
PL	plural
S1SG	subject marker, 1st person singular
S2SG	subject marker, 2nd person singular, etc.
S3:1	subject marker, 3rd person, class 1, etc.*
S3:2	subject marker, 3rd person, class 2, etc.*
SEQ	sequential

* In the glosses of the Tswana examples numbers indicate the noun classes to which the nominal forms belong.

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CHAPTER 2

The expression of static location in a typological perspective

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This functional-typological study of the crosslinguistic variation of locative predicates advocates situating them in the context of the other elements of Basic Locative Constructions and of their use in the grammar beyond this construction. It proposes a multidimentional typology that takes into account the inventory, semantics, conventional, and grammaticalized usages of these predicates. It offers examples from different Amerindian languages to illustrate variations in systems of posture verbs and directional satellites. It contrasts in particular the strategic choices of two Mayan languages sharing the same morphological inventory: Tzeltal emphasizes the contour of the figure through its positionals and Jakaltek Popti' the path of the locative configuration through its directionals.

1. Goal and outline[1]

The purpose of this paper is to consider the crosslinguistic variation of the predicative element of a Basic Locative Construction in order to open up the scope of the discussion concerning this construction in two directions. One is to situate the contribution of the locative predicate to the Basic Locative Construction and to take into account its relation to other elements of the construction, going beyond the usual focus on either prepositions alone or locative verbs alone. The other direction is to look beyond the locative construction itself in order to consider where else the elements of the locative predicate can be found in the grammar of the language and for what use. Although this chapter describes the variety of locative predicates on the basis of examples from Amerindian languages, its aim is to argue broadly for the development of descriptive strategies that would invite more comprehensive descriptions of this construction in

1. This chapter has benefited from discussions with linguists working on native languages of America (in particular on the occasion of two seminars on the topic at the INAH of Mexico), and with other fellow linguists, among whom I would like to thank in particular Anetta Kopecka for fruitful interchanges.

the widest variety of languages possible. This is done with a double aim in mind: first to facilitate the discussion of such constructions for those faced with the description of still under- or un-described languages, most of which being by and large seriously endangered today, and ultimately to contribute to the on-going discussion of what Slobin has called "thinking for speaking" (1991) by contributing interesting new data from very diverse languages.

The chapter will proceed as follows: Section 2 sets the framework for this discussion of the predicative element of the Basic Locative Constructions; Section 3 then illustrates the variety of such elements across Amerindian languages in terms of lexico-grammatical systems of locative verbs (posture, locative stems and positionals), while Section 4 does so in terms of the variety of possible satellites (such as directionals). The last Section 5 looks beyond the Basic Locative Construction at the omnipresence of these same elements, or of elements that share similar spatial semantics, across the languages considered earlier.

2. The framework

The framework within which the discussion evolves is at the crossroads of two general bodies of literature. One stems from a functional-typological approach to linguistics that has been very productive in the last decades in responding to the challenge of describing the kind of new phenomena that can be found in yet under-described of languages, such as Amerindian languages. The other is a cognitive semantics approach that has grown precisely out of the concern to account for particularities of the expression of space found in Amerindian languages, such as Atsugewi (Talmy 2000), and Tzeltal (Brown 1994).[2]

2.1 About functional typological linguistics

The functional-typological framework of linguistic analysis espoused here is outlined in Givón (2001) and is reflected in several ways in this paper:

a. through the exploration of the typological variety found in the expression of a particular functional domain, here that of the expression of static location, a sub-domain of the omnipresent domain of spatial expression;
b. by considering strategies of linguistic expression, taken in the context of constructions and placed in their discourse context;

2. My immersion in functional-typological grammar is connected to a first career under the name of Craig at the University of Oregon, as colleague of Givón and DeLancey, among others. My interest in space in Mayan languages has been sparked early on by association with the fellow Mayanists that initiated the research program on space at the Max Planck Institute for Psycholinguistics of Nijmegen (in particular Haviland and de León, Levinson and Brown).

c. by opting for an approach to categorization that appeals to the concepts of prototypes and continua, rather than to discrete categories;
d. by attending to the dynamic aspects of grammar building, directly through grammaticalization, and indirectly through lexicalization.

2.2 Some notions from the literature on space

As the subsection title indicates, only notions essential to the subsequent discussion have been selected here.

2.2.1 *From Talmy (1985, 2000)*

From the pioneer work of Talmy two major concepts will be used: the distinction between "verb-framed" vs. "satellite-framed" languages and the notion of "conflation" of semantic information in the lexical motion verb (where the general category of MOTION includes motion and non-motion, ie. static location).

The contrast between verb-framed and satellite-framed languages deals with the structural dimension of the construction and identifies the distribution of the spatial information of PATH between lexical and morpho-syntactic elements, as illustrated in (1):

(1) Spanish
  a. the bottle floated **out** Satellite-framed [PATH in particle]
  b. la botella **salió** flotando Verb-framed [PATH in verb]

Note that one should perhaps rather talk of "strategies" than of "languages", considering that some languages may exhibit both patterns, as shown by Kopecka (2004) for French, for instance.

The other concept taken from Talmy's work is that of "conflation", used for the analysis of verbal semantics and meant to distinguish between verbs expressing motion and at the same time either MANNER or PATH, as shown in (2):

(2) a. English
  the bottle **floated** out *conflation in verb of* [MOTION+MANNER]
  b. Spanish
  la botella **salió** flotando *conflation in verb of* [MOTION+PATH]

2.2.2 *From Sinha and Kuteva (1995)*

Sinha and Kuteva (1995) discuss the concept of "distributedness of spatial semantics" while considering the variable of overt/covert expression. It is an approach that takes the whole construction into consideration and examines where and how the spatial information is expressed or recoverable. The examples in (3) show, on the one hand, how some path information may be optionally expressed (3a), and on the other hand, how it may be doubled in verbal prefix and preposition (3b):

(3) a. the boy jumped (over) the fence
b. **in**sert the plug **in**to the socket

These notions were originally considered for the expression of motion, but will be applied here in the context of Basic Locative Constructions.

2.3 Basic Locative Constructions

After identifying Basic Locative Constructions, the notion of a working typology of locative predicates will be entertained, followed by a presentation of a set of variables considered useful for a comprehensive typological study of such predicates.

2.3.1 *About Basic Locative Constructions*

A Basic Locative Construction is the construction used in answer to the question "where is X?", in which X is a known "spatial entity"[3] (hence definite) and its location the unknown information being sought. In English, the Basic Locative Construction follows the usual word order and uses the spatially neutral existential copula, with the spatial information found in the choice of preposition. This is not to be confused with the existential and/or presentational construction, which in English follows the pattern: "there is an x AT y". In this construction the spatial entity/figure X is an indefinite the existence of which is being predicated, while the additional spatial information concerning its location is optional. Languages vary as to whether they use the same verbal predicate for both constructions. English does, for instance, while French does not (it uses the verb "avoir" for the existential/presentational construction: "il y a un x. . .").

2.3.2 *A typology of locative predicates*

A typology of locative predicates was originally proposed by researchers from the Max Planck Institute (see Annual Report 2001) who identify four types of situations as follows (cf. Table 1).

The typology to be proposed here introduces two changes. First, it groups the languages that do not provide any predicative element in Basic Locative Constructions with those that provide an existential copula, to the extent that neither type has a verbal element carrying spatial information. Second, it introduces the possibility of intermediate systems between prototypical posture verb systems with few elements (three or four usually) and the positional system that is rather specific to the Mayan family of languages (with several hundreds). This is in line with the approach taken here, that appeals to the idea that categories are not discrete and allows for continua.

3. The expression "spatial entities" used for concrete entities and objects with spatial dimensions and contours is taken from Aurnague's writings (see Aurnague 1996, 2001; Aurnague, Hickmann, & Vieu to appear).

Table 1. Early MPI typology of locative predicates (cf. MPI Annual Report 2001:63–66)

Type		Predicate	Languages
Type 0		No verb in	*Saliba*
Type I	Ia.	Copula (i.e., dummy verbs used in many other constructions	*English, Tamil, Chukchi, Tiriyó*
	Ib.	Locative (+ Existential) verb	*Japanese, Ewe, Yukatek, Lavukaleve*
Type II		Postural verbs (i.e. small set of posture verbs, 3–6 verbs)	*Arrernte, Dutch, Goemai*

Table 2. Proposed typology of locative predicates

Type	Predicate
Type 0	no locative information (zero or existential copula)
Type I	one locative verb (distinct from existential copula)
Type II	prototypical posture verb system, European style
Type III	locative stems of some Amerindian languages
Type IV	positionals of Mayan languages

The result is a different distribution of the cases in Type I above and the addition of a layer of a possible new Type III, as shown in Table 2.

Standard examples of those different types are the case of Turkish for Type O, Spanish for Type I, with the spatial copula "estar",[4] Slavic and Germanic languages for Type II.[5] The existence of positionals in Tzeltal Mayan was in fact at the origin of the interest in locative predicates and the motivation for proposing a typology that establishes a new type of locative predicates, Type IV here, distinct from posture verbs.

In this paper the European style of posture verb systems and the Mayan positionals are considered more as extremes of a continuum than as the only two existing types of verbal predicate systems (of more than one element), and the idea of intermediate types of systems (as unknown to European languages as the positionals were) is illustrated. In what follows, instances of posture verb systems typical of Amerindian languages of the lowlands of Latin America will be shown first. Then an example of an extended system of locative stems from North America will be introduced, in order to show the continuum rather than the discrete categorization of such systems. The situation of the Mayan positionals will be reviewed last, with an emphasis on its particular instantiations of complex semantic conflation.

Much remains to be done to produce the kind and quantity of extensive and comprehensive descriptions that would allow for better comparisons across systems. The

4. We exclude from consideration at this point pragmatically more marked uses of other verbs of location such as *encontrarse* 'to be found', *situarse* 'to be situated' or *ser* 'to be' with a locative expression in some essentially non-localizing context.

5. See for instance recent work by Lemmens (2002) on Dutch posture verbs.

kind of typological framework conceived here would require addressing a wide variety of descriptive issues, such as inventory, semantics, degree of grammaticalization, discourse use and metaphoric lexicalization processes.[6] And once these questions are more thoroughly answered, the evidence will probably be that there is no way of reaching a simple categorizing typology, and that it might be better to identify how clusters of features distribute themselves in a multidimensional space.

2.3.3 *Variables to be considered for a study of locative verbs*

Before presenting data of locative predicates from Amerindian languages, this section will list the major variables that will be taken up in the description of each system below. This section is partly inspired by a recent collection of articles (Newman 2002) that considers posture verbs mostly in European languages, but includes also cases from the Pacific region and from the American continent, such as the case of Dene (Chipeweyan from Canada, Rice 2002) and Trumai (an isolate from the Xingu of Brazil, Guirardello-Damian 2002).

a. Inventory, lexical density and conflation

The inventory of the elements of the system is a first indicator of contrast between systems: the systems of verbs of posture are generally limited to some cardinal positions, while those of dispositionals have larger inventories, reaching into the hundreds. The phenomenon of lexical density corresponds to the possibility of multiple verbal roots to describe certain postures/positions in great detail, such as for instance the many ways of being seated. The phenomenon of conflation is a matter of the complexity of the semantic decomposition of the verbal roots, which can include, beyond basic postural or dimensional information, additional features indicating orientation, number, manner, or activity at the origin of the position (a possibility that is very developed in the case of positionals).

b. Conventionalized usage

In the case of semantic extension of postures onto animals and inanimate objects, the use of posture verbs becomes conventionalized; this means that the choice of posture assigned to such entities is then largely a matter of cultural norms or established conventions that must be accounted for. This is the case, for instance, of boats that could

6. More crucially, Grinevald (2003) and Grinevald and Seifart (2004) pay closer attention to the many variables that must be taken into account to fully describe such systems (those of vitality, productivity, age and specifically the level of grammaticalization of the system). This completely points away from the hope of a simple categorical typology and towards a characterization of the specifics of particular systems in a multidimensional approach that shows the interweaving of such variables, as well as allows for astonishing variation across close languages and dialects of the same language. Aikhenvald (2000) is a mine of information on classifying systems of the world, with its own way of organizing such data that only partially overlaps with that of the references given above.

be said to be either suspended or sitting/lying on the surface of the water, or of cups said to be either standing or sitting on a table.

c. Grammaticalized usage

The notion of grammaticalization covers several situations. One is the degree of systematicity of such paradigms for a certain function, such as the expression of static location which concerns us here. As a matter of fact, while all languages have an inventory of verbs that correspond to the semantic category of posture verbs (in the same way that all languages have expressions of measure), only in certain languages have some of these lexical elements constituted themselves into morpho-syntactic paradigms that are obligatorily used in Basic Locative Constructions. And to the extent that the process of grammaticalization is progressive, one can easily anticipate that different systems correspond to different stages of the evolution from a purely discursive usage to an established grammatical usage, to the point of obligatory usage. The systematic use of certain posture verbs in Basic Locative Constructions can also be grammaticalized before that of others, of course.[7]

The process of grammaticalization can progress further. After certain lexical systems of locative predicates have already constituted a grammaticalized system of posture verbs used in the context of Basic Locative Constructions, those systems can further enter processes of grammaticalization. They may be used in complex verbal forms to express complex events, where they specify the position or the posture coextensive with the action itself, such as to read-sitting, to talk-standing, to sleep-suspended (in a hammock). The posture verbs can be found at different stages of grammaticalization, first as elements of serial constructions, but in some languages they have fully developed into systems of satellites (in the sense of Talmy) of verbs of action and constitute then a new morpho-syntactic category easily identifiable in the language. The use of these posture satellites can further extend to the expression of more abstract notions, such as aspectual values; the posture verb of sitting can become for instance the marker of the progressive.

The criteria listed above (inventory, lexical density and semantic conflation, conventionalized and grammaticalized usages) are all essential to a descriptive strategy of the Basic Locative Construction. What is generally available, in the case of Amerindian languages, is very incomplete and un-systematic information. If there are inventories, they remain incomplete. If there is some discussion of their semantics, it remains a matter of interpretations offered by non native linguists, while the descriptions of the grammatical functioning of these systems is often barely mentioned, if at all. In addition, the illustrative examples are limited to isolated words or to sentences isolated from discursive context.

7. One can note that in French, for instance, some verbs of attachment with pseudo-postural meaning (such as *attaché à* 'attached to', *collé à* 'glued to') are much more frequently used (particularly in written mode) than standard postural ones.

2.4 Looking beyond

A last dimension of a productive descriptive strategy would be to evaluate in what way a particular system seems to be central in a given language, through its own extensions in the grammar and through its formal or semantic links to other systems with spatial semantics in the language (such as its coexistence with certain types of nominal classification systems). Only studies that reach this level of comprehensiveness and detail could contribute to a well-informed comparative study of the phenomenon in general and would allow us to construct well-articulated and reliable typologies (based on reliable and usable data or analyses). Exploring and describing the place of the elements in the Basic Locative Construction and beyond it in the grammar is often the way to capture the particular genius of some languages in which spatial information is sprinkled throughout all forms of discourse, with a pervasive and detailed attention uncommon in European languages.

3. About locative predicates in Amerindian languages

This section will first propose an inventory of all the forms that may participate in the Basic Locative Constructions, to situate the phenomenon of locative predicates in its proper context. It will then survey different types of locative predicates that can be found in Amerindian languages, with examples of two fairly prototypical small posture verb systems (in Sikuani and Teribe), followed by a case of a less prototypical and larger system (in Kwakwala), intermediate between clearly posture verb systems and much larger positional systems of Mayan languages (as Tzeltal) which are shown last.

3.1 Inventory of forms found in Basic Locative Constructions

This inventory covers the morpho-syntactic elements of spatial semantics that can be found in Basic Locative Constructions. It puts in full view the various systems that may co-exist in a language, to invite a more comprehensive approach to the study of locative predicates in the context of all the possible elements of Basic Locative Constructions, including those that are linked to the expression of figure and ground spatial entities. The SVOX constituent order in which the inventory is organized in Table 3 is of no particular relevance.

Table 3 is organized in stages corresponding roughly to those that can be found in various discussions of Basic Locative Constructions: original discussions concentrating on the semantics of adpositions; a later interest in the variety of locative predicates, including at the bottom nominal classification systems found in the expression of figure and ground in some languages, because of their semantic and sometimes morphological links to locative predicates in such constructions. The evolution of the themes covered in the discussion of static location is sketched out in Grinevald (in press).

Table 3. Inventory of morpho-syntactic elements of basic locative constructions

Figure	Spatial relations		Ground
np	locative predicate	(a) adpositions	np
	(b) simple locative predicates locative verbs **posture verbs** **positionals**		
	(c) satellite preverbs verbal particules **directionals**		
	(d) bi-partite stems		
	(e) Nominal classification		
noun classes num. classifiers dem. classifiers	verbal classifiers	locative classifiers	

This paper concentrates on a selection of the elements of locative predicates (posture verbs, positionals, directionals as in (b) and (c) in Table 3 above), although the other systems must always be kept in view when describing Basic Locative Constructions. They include:

(a) ADPOSITIONS: under this label are subsumed the prepositional/postpositional systems, as well as relational noun systems and case systems. The earlier studies of static location concentrated on the semantics of prepositions (see Vandeloise 1986 on the semantics of French prepositions for instance). The more recent studies demonstrate the difficulty in establishing the existence of a basic set of universal spatial adpositions (see Levinson & Meira 2003).

(d) BIPARTITE systems of locative predicates are made of two elements of equal standing, one specifying the shape of the entity and the other its posture, in a combination of classifier and posture semantics. Although they are not treated here for lack of space, they are typologically very interesting (as well as rare) and very foreign to European modes of expression. They are found in languages such as Klamath (DeLancey 2003), for instance.

(e) NOMINAL CLASSIFICATION systems: efforts at outlining a typology of nominal classification systems can be found in Craig (1987) and Grinevald (2000, 2001, 2002a). Of the several types that have been identified, only those with possible spatial semantics applying to spatial entities are mentioned here. They are interesting in that some share spatial features with co-existing locative predicate systems and others are even morphologically related to locative predicates (as in Tzeltal). The issue of the spatial

semantics of nominal classification systems is specifically treated elsewhere (Grinevald to appear a). Classifier systems will only be mentioned in passing here.

In the survey of locative predicates from Amerindian languages below, the lexico-grammatical phenomenon of posture verbs and positionals will be taken up first, followed by that of a type of satellite, the directionals. It is worth noting again that, while this paper concentrates on locative predicates, the next step in the analysis would be to enlarge the discussion of Basic Locative Constructions to the two phenomena of relator/relational nouns and nominal classification systems.

3.2 Posture verbs

As morpho-syntactic posture verbs are characterized as having a small closed inventory and obligatory use in Basic Locative Constructions, following the template.

3.2.1 *Inventory and semantics*

The semantics of posture verbs corresponds minimally to the basic three human body postures, to which many Amerindian languages add the posture of hanging, giving the following inventory: 3 × standing/sitting/lying + 1x hanging. The two systems presented below are representative of numerous systems of lowland Latin America in that they share the fourth posture of hanging, basically associated to the omnipresence and frequent use of the hammock.[8] It is common in those languages to have conventionalized postures extended to animals and inanimates. When the inventory is larger than those four basic posture verbs, postures combine with a variety of features, some of which are spatial, while others are more aspectual and some even encode the notion of plural.

3.2.2 *The case of Sikuani: Underspecified localization*

Sikuani, a Guahibo language of Colombia, has the four posture verbs typical of the Amazonian region:

(4) Sikuani (Queixalos 1998:235)
e- 'sitting'
nu- 'standing'
bo- 'lying'
ru- 'suspended'

8. In addition to humans in hammocks, this posture applies to objects and animals hanging, in particular to all objects of daily use, such as tools, instruments, clothes, and food, all hung on the walls of the shelters to store them and to put them out of reach of animals. Tables, chairs, beds, shelves are not found in traditional houses of the Amazonian region.

In line with Brown's report about Tzeltal (Mayan) (see 3.4 below), Queixalos states that in Sikuani the localization of the referent/figure is less a matter of locating it in space with respect to a ground than of representing its perceived spatial features.

(5) Sikuani (Queixalos 1998: 245)
ika Phouna ? hota raha nuka
where Phouna ? here assertive standing
'where is Phouna ? he is (standing) here'

The localization of a spatial entity is therefore negotiated through an indication of its posture, leaving the information of its actual localization implicit or underspecified. However, Queixalos notes that in many cases the choice of a particular posture verb for a given entity provides more information about its localization than might appear at first.

> To say of a vulture that it is standing is to say that it is on the ground, while to say that it is sitting indicates that it is on a branch. If one says while walking through the rainforest that a caterpillar is suspended, the listener will look for a smaller branch or a twig, but if one says that it is lying/extended then the listener will look for a big branch. Therefore while talking of the posture of the figure, one describes in fact the ground (1998: 247).

3.2.3 *The Case of Teribe: A larger inventory*

Teribe is a Chibchan language of Panama. It is described in Quesada (2000) as having eight posture verbs, that have been organized here in two subsets according to the complexity of their semantics.

(6) Teribe (Quesada 2000)
a. sök 'sit, live'
buk 'lie'
shäng 'stand'
pang 'hang'
b. *conflation of posture+TIME/MANNER/NUMBER*
jong 'stand permanently'
teng 'be in possession'
löng 'be plural in a state/place'
lok 'be firmly in a place'

The semantic features being conflated with posture are familiar ones: number, manner or permanence. The crossing of location and possession has also been noted in languages across the world. The same features will be found again in larger sets of locative verbs throughout the Americas, as will be shown with examples of Kwakwala and Tzeltal later on.

3.3 The case of Kwakwala: Larger set of "stems of location"

Kwakwala is a Wakashan language of British Columbia, Canada. The choice of this particular example is meant to make two points. First, it offers additional examples of conflation of posture semantics with other semantic features, some also spatial (such as verticality and dimensionality) and others more familiar from other grammatical systems (such as animacy and number).[9] Second, the semantics of this system are reminiscent of the semantics of numeral classifiers in many languages, particularly in its attention to dimensions (1D, 2D, 3D) and to concave shape(s), a common feature of Amazonian nominal classification systems. The set of 14 stems for Basic Locative Constructions is given below:

(7) Kwakwala stems of location (Berman 1990: 52–56, cited in Mithun 2000: 110)

λɑx^{w}-	'vertical human is somewhere'
k^{w}əl-	'horizontal human is somewhere'
q́^{w}ɑ-	'vertical humans or long objects are somewhere'
λɑ-	'vertical long object is somewhere'
kɑt-	'horizontal long object is somewhere'
ḱuk^{w}-	'vertical flat object is somewhere'
xək^{w}-	'vertical flat objects are somewhere'
pəlq-	'horizontal flat object is somewhere on its front'
ńəλ-	'horizontal flat object is somewhere on its back'
ḿak^{w}-	'bulky object is somewhere'
hən-	'hollow object is somewhere rightside up'
məx-	'hollow objects are somewhere rightside up'
qəp-	'hollow. object is somewhere upside down'
k^{w}ɑx^{w}-	'hole is somewhere'

One can easily identify the semantic features involved and their patterns of conflation. There is a basic contrast between human and non human entities, and different combinations of vertical vs. horizontal axes of 1D (long) and 2D (flat) dimensions, with an additional concern with position (object on its front or back, right side up or down), plus two variants of 3D entities (bulky/solid or hollow), the whole cast with a concern for number. In the end, the features are all easily identifiable, but the patterns of con-

9. The inventory includes also an interesting concave feature that is reminiscent of the shape of the suspended (in a hammock) posture. Translations for certain elements of Amerindian languages must always be taken with some caution, as they are often reinterpretable; this can happen with the translation of some of the posture verbs, particularly the fourth one labelled here "hanging" but often labelled otherwise in descriptions. See for instance the case of the inventory of Trumai according to Guirardello-Damian (2002: 142) who talks of "stand", "sit", "lie", plus a fourth term that could be "hang", but for which she gives the translation "lie/be lying in a place that is not the floor/ground (earth)". Interestingly, this language has two more postures, that she labels 'be in a closed place' and 'be in a liquid medium'.

flation are original. In addition, this set of locative predicates is also said to be used with verbs of handling[10] (or caused motion).

It is interesting to note in passing the existence in Kwakwala of another morpho-syntactic system, that is morphologically independent but involves very similar spatial semantics. It is a system of 20 numeral classifiers, of varying productivity. Berman (1990) calls them "suffixes of numerals" and lists the following six as the most common ones:

(8) Kwakwala numeral classifiers (Berman 1990: 38, 40 cited in Mithun 2000: 109)

-uk^{w}	'human'
-sgəm	'bulky'
-ć*a*q	'long"
-x̣λ*a*	'hollow'
-x̣s*a*	'flat'
-z*a*q	'hole'

To be noticed are the parallels between the spatial semantics of these classifiers and of those of stems of location, such as the various dimensions: 1D (long), 2D (flat), and 3D (bulky, hollow, hole).

The Kwakwala system of locative predicates is therefore more complex and larger than the preceding cases of posture verbs considered. The system seems to have developed around characteristics of inanimate objects, identifying only two of the basic human postures (vertical=standing, horizontal=lying). In that sense, this system is reminiscent of numeral classifier systems that attend to basic dimensions (1D, 2D, 3D) and secondary features of these dimensions (solid vs. concave). This Kwakwala system represents therefore a type intermediate between the simpler posture verb systems presented above and the yet more complex positional system to be presented below.

3.4 Positionals

The case to be considered now is well known in the linguistic literature on space. It constituted an early response to universal claims about adpositions being the locus of spatial information (Landau & Jackendoff 1993). In this often cited paper entitled "*What* and *where* in spatial language and spatial cognition", *what* refers to the spatial entity about which it is said that no spatial characteristics are explicitly given, and *where* to the spatial information that is said to be encapsulated uniquely in the adpositions. In this context, Brown's study (1994) was offered as a case study of a language with no spatial prepositions but an elaborate system of positionals. In this system the location of the figure must commonly be inferred from the description of its posture

10. This set of locative predicates therefore belongs to the wider phenomenon discussed in the North Amerindian literature under the label of "classificatory" verbs, encountered in locative, possessive and caused motion constructions.

and position, in a more elaborate type of distribution of spatial information, already seen in the Sikuani case earlier.

3.4.1 *The basics of Tzeltal (Mayan)*

Tzeltal is a language of the Tzeltalan branch of the Mayan family of languages. It shares with all Mayan languages a verb-initial syntax, an ergative system of person marking indexed on the predicate (Erg=ergative, Abs =absolutive), and a propensity for relational nouns (possessed nouns in adpositional function) in contrast to few prepositions, and hundreds of special lexical roots constituting a category of their own, known as "positional roots".

Tzeltal has a VOS word order, a unique semantically vacuous preposition (*ta*), and positionals in Basic Locative Constructions that are actively used, following the template shown below:

(9) Tzeltal Basic Locative Constructions template

a. locative predicate oblique/NP 'subject'/**NP**
POSITIONAL-Abs PREP ground figure

b. waxal-Ø ta ti'-k'jk' p'in
vertical-Abs3p PREP mouth-fire pot
'the pot is (standing vertical) by the fire'

3.4.2 *Positionals: Explicit information about the figure*

The semantics of the positionals is characterized by the extensive conflation of different types of information about the figure, such as its shape, texture, size, disposition and manner in which it was put in that position, while the topological relation is left implicit. Some examples showing the variation in the expression of what appear in European languages to be the simple concepts of support 'on' are given in (10) and illustrated in Figure 1:

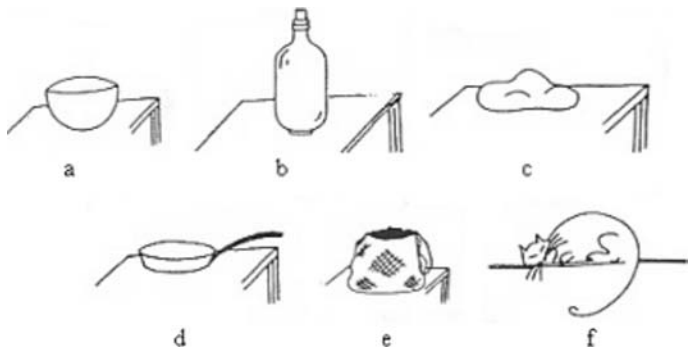

Figure 1.

(10) 'ON' in Tzeltal

a.	pachal	– of wide-mouthed container canonically 'sitting'
b.	waxal	– of tall oblong-shaped container or solid object canonically 'standing'
c.	pakal	– of blob with distinguishably flat surface lying 'face down'
d.	lechel	– of flat bottomed object lying on its flat surface
e.	chepel	– of a filled bag held from underneath
f.	mochol	– of an animate object lying in a ball on its side

The claim is that, for a simple localization, the speaker must choose from a very large inventory of hundreds of positional roots, that are learned early and used frequently, in their multiple derived forms (locative predicates being only one of them), as will be discussed later. The particular derivation of positionals as locative predicates is by affixation of a -Vl suffix to the root, with accompanying vowel harmony, as in *pach-al* and *xij-il* above.

3.4.3 *Positionals: Examples of semantic granularity in another Mayan language*

The semantics of Mayan positionals has long attracted the attention of Mayan linguists. In what follows, examples from another closely related Mayan language illustrates the notion of semantic granularity, with samples of positionals with posture semantics. The positionals of Tzotzil, a sister language of Tzeltal, given by Haviland (1992) from a search through data from Laughlin (1975), shows that out of an inventory of about 50 postural positionals, there are 16 positionals for the sitting position, with conflation of (a) configuration of legs, (b) permanence of the position, (c) detail of position with respect to ground, (d) spatial configuration of ground.

(11) sitting positionals of Tzotzil (Haviland 1992: 558)

a.	chot	'seated, sitting on bottom'
	jetz	'cross-legged, sitting with legs tucked under, flat to the ground'
	kej	'kneeling'
	xok'	'sitting on one's haunches, hunkered'
b.	tzub	'crouching (cat, rabbit, person), immobile'
	tzurn	'sitting huddled, idle'
	ju'	'seated on ground and unable to stand, sitting idly or feebly'
	juch'	'sitting unwilling to stand'
c.	koy	'sitting close to ground with legs spread apart, up'
	tiv	'squatting (person), crouching (cat, rabbit), standing with bent limbs sticking upwards'
	lub	'sitting (hen) crouched (cat, rabbit, person), low to the ground, flattened'
	len	'seated with "bottom" on the ground'
	petz	'sitting cross-legged or with legs tucked under, anchored or rooted to the ground'

d. lep ‘seated on something elevated above the ground’
luch ‘perched, protuberant (blister), on something elevated’
nak ‘residing, dwelling, at home, seated permanently’

3.5 Conclusion

This quick tour of the variety of locative predicate systems in Amerindian languages focused on their inventories and their semantics to show interesting cases of semantic granularity and conflation of spatial features with other features common to many languages, such as animacy and number. It was meant to point out the fact that languages may put emphasis on characteristics of the figure rather than be explicit and concise about its actual location, leaving location information to be inferred from the semantic and pragmatic context. This sample of data raises as many questions as it answers, pointing to interesting lines of inquiry to follow up, about the exact inventory of such systems, about the semantic analysis of those elements, the number of existing system types, the criteria used to determine these types, and the place of such systems in the overall functioning of the language, in some rare cases alluded to and a topic to be considered in Section 5 below. The purpose of this section was mainly an extension and a reworking of a typology of locative predicates originally proposed by members of the space project of the MPI.

4. Satellites in Basic Locative Constructions

The previous section considered the variety of lexical locative verbs constituted into morpho-syntactic systems of locative predicates in Basic Locative Constructions. This section will open up the question of constructions with locative satellites, based on the case study of yet another Mayan language. For this language, it will describe the extensive use of directionals suffixed to an existential copula, in contrast to the extensive use of positionals in the neighboring Tzeltalan languages considered above.

4.1 A field study of Basic Locative Constructions in Jakaltek Popti’ (Mayan)

Considering the attention given to the use of positionals in Basic Locative Constructions in Tzeltalan languages, fieldwork was planned to duplicate the results with data from Jakaltek Popti’, another neighboring Mayan language, but of the Q’anjob’alan branch of the family.[11] Data were collected through a picture description task based on elicitation materials from the MPI-Nijmegen space project (Bowerman 1996). Data

11. Fieldwork took place in the summer of 2002 and was financed by the Research Group “Language diversity and evolution: cognitive implications” (CNRS GDR 1955) that is at the origin of this publication.

collection took place during a special workshop at the local language academy and included the production of written descriptions by 18 native speakers, subsequently amplified by extensive (and at times very intense) discussions among and with those speakers.[12] The study produced overwhelming evidence concerning the actually very limited use of positionals as locative predicates in the Jakaltek Popti' language (of the order of the pragmatically marked use of their equivalent in French, for instance) and the omnipresence of an alternative strategy, a construction involving the use of directionals as satellites of an existential copula.

4.2 The existential copula

Jakaltek Popti' has an existential copula 'ay', used in different constructions, such as the existential, possessive and locative ones, as illustrated below. The examples of the copula 'ay' are taken from Craig (1977: 19–21), but have been re-transcribed in today's official Mayan orthography:

(12) existential 'ay'[13]

a. ay anma yul konhob' mach skuy yuninal yinh ab'xub'al
exist people in town NEG teach their children in language
'there are people in town that do not teach their children the language'

b. kaw ay q'a'
much exist heat
'it is very hot'

(13) existential in possessive constructions

a. ay no' hin txitam
exist CL POSS1 pig
'I have a pig'

b. ay ha melyu?
Exist POSS2 money
'do you have money?'

(14) existential in locative constructions

a. ay-k'oj no' wakaxh pet san marcos
exist-DIR CL cow in San Marcos
'the cows are (across) in San Marcos'

---

12. The Jakaltek Popti' language academy is one of 21 Mayan language academies involved in efforts at language maintenance and language standardization, as part of a vast Mayan movement in Guatemala today (see Grinevald 2002b). Discussions therefore went beyond a simple collection of data (data riddled, of course, with variation) and involved the speakers' own concern for defining the kind of "norm" they might propose in the pedagogically oriented materials they plan to produce themselves.

13. The copula is tense/aspectless and inflects for its subject with an absolutive marker, which happens to be Ø for third person.

b. ay-ik-toj no' mis yul te' kaxha
exist-DIR-DIR CL cat in CL chest
'the cat is (inside away) in the chest'

The use of the existential in exactly these three constructions is not particularly typologically noteworthy, as it is found in languages around the world. Its significance lies in a comparison of languages of the same Mayan family, sharing the same categories of positionals and directionals, but opting for different strategies for their Basic Locative Constructions.

4.3 Inventory of Jakaltek-Popti' directionals

One of the characteristics of Jakaltek-Popti' is an elaborate system of directionals that includes three mutually exclusive sets of directionals suffixed to the predicate in the schema: PRED-DIR1-DIR2-DIR3. Craig (1994) gives a description of the basic functioning of these directionals and of their use in discourse.

The lexical sources of these directionals are identifiable as motion verbs (for all directionals but one). Each set has distinct semantics:

– DIR3 is the most commonly used and has deictic semantics ('away/toward') determined by a chosen point of reference.
– DIR2 specifies one of two types of path information: either direction ('up/down') or boundary crossing ('in/out').
– DIR1 as a set tends toward aspectual meaning in most of its uses (from return ('again'); from stay ('once and for all'); from unidentified verbal source ('suddenly')).

Table 4. Inventory of Jakaltek Popti' directionals

Directionals			Motion verbs	
DIR3				
	-toj*	'away'	toyi	'to go'
	-tij	'toward'	tita	'come!' (defective IMP)
DIR2				
	-(a)h-	'up'	ahi	'to go up'
	-(a)y-	'down'	ayi	'to go down'
	(o/e/i)k-	'inward'	oki	'to enter'
	-(e/i)l-	'outward'	eli	'to exit'
	-(e/i)k'-	'across'	ek'i	'to cross'
DIR1				
	-pax-	'back, again'	paxi	'to return'
	-kan-	'still, for good'	kani	'to stay'
	-kanh-	'upward, suddenly'	?	?

* The forms -toj and -tij are in fact bi-morphemic, composed of the directional and an intransitive verb final suffix -oj. By regular morphophonemic rules, -to+oj > -toj and -ti+oj > -tij.

4.4 Basic Locative Constructions in Jakaltek Popti'

The situations considered here correspond to cases of support (ON) and containment (IN) of the kind mentioned in the section on Tzeltal above.

Of the various possibilities to express the equivalent of ON in Jakaltek Popti', the examples below illustrate common combinations of the existential and either the directional *-(i)k* to express situations of contact or the directionals ah+toj for situations of support:

(15) "ON" in Jakaltek Popti'

a. aykoj — 'contact'
<ay + (i)k +oj — exist+inward+intr
– said of: shoe on foot / ring on finger / snail on wall

b. ahatoj — 'support'
<ay +ah +to-oj — exist+up+away-intr
(with irregular morphophonemics)
– said of: spider on the ceiling / man on the roof /cup on the table

For situations of containment, the language is sensitive to the axis of insertion and distinguishes between objects inserted horizontally (*-ik*) or vertically downward (*-ay*), specifying in addition that the insertion is being considered has having placed the figure away (*-toj*):

(16) "IN" in Jakaltek Popti'

a. ayiktoj — '(horizontal) insertion'
<ay +ik+to-oj — exist+in+away-intr
– said of: rabbit in cage / cigarette in mouth / earring in earlobe

b. ahaytoj — '(vertical)insertion'
<ay +ay +to-oj — exist+down+away-intr
(with dissimilation morphophonemics)
– said of: apple in the bowl

In all the situations considered above, the deictic directional *-toj*, 'away' indicated that the scene was considered from afar, looking at the figure being located. However, interesting cases of reverse orientation occurred, with the directional *-tij* 'toward' pointing toward the viewer, as in the following situations:

(17) ORIENTATION TOWARD in Jakaltek Popti'

a. ayiltij
<ay +il +ti-oj exist+out+ toward-intr
– said of: dog in doghouse looking out
cat under the table looking out

b. ahaytij
<ay +ay +ti-oj exist+down+toward-intr
(with dissimilation morphophonemics)
– said of: lamp hanging from the ceiling

Through the marked choice of the deictic directional *-tij*, 'toward' as satellite in a Basic Locative Construction, Jakaltek Popti' expresses, beyond the usual spatial notions involved in such constructions, a particular notion of force, such as the notion of an intentional look imputed by the viewer/speaker to the animals or that of the functional use of a lamp meant to project light. Such notion of force was introduced in the analysis of certain prepositions by Vandeloise (1986) and Herskovitz (1986).

4.5 Same morphological material, different Basic Locative Constructions

The case of Basic Locative Constructions in Jakaltek Popti' was introduced for two reasons. One was to extend the study of locative predicates so as to include cases of directionals, which constitute a particular type of locative satellites, akin to English verbal particles but of distinct lexical origins and more grammaticalized use in such constructions. This Jakaltek Popti' system of directionals happens to be particularly developed and grammaticalized in comparison to similar systems of other Mayan languages (such as Tzeltal or Tzotzil). The other point was to underline how languages of the same family may share morphological material, in this case the categories of positionals (specific to the Mayan family of languages and which Jakaltek certainly possesses) and of directionals (developed in both Tzeltalan and Q'anjob'alan languages), but may appeal to one or the other material to build their Basic Locative Constructions. The phenomenon of positionals in the Tzeltalan branch of the family (Tzeltal, Tzotzil) with its emphasis on the characteristics of the spatial entity-figure is therefore to be contrasted to the alternative use in the Q'anjob'alan languages of directional satellites, tracing lines of path in space from a standpoint to a point in space of a neutral figure.[14] How to contextualize such different choices made by otherwise close languages is partly what the next section is about.

5. Beyond Basic Locative Construction

A comprehensive description of the make-up of Basic Locative Constructions should include situating this type of construction in the grammar of the language in general, by exploring where else the same morphological material is found and for what purpose. This section will therefore reconsider the systems presented earlier to situate

14. The very limited use of positionals in that particular Mayan language was widely shared among speakers: the only unanimous use of a positional in the set of situations considered was that of the ladder said to be "leaning" on the wall.

them in their respective grammars. It will first consider, briefly, the common extension of posture verbs into the grammar of Chibchan languages such as Teribe and Kuna. It will then explore the place of positionals and directionals in the Tzeltalan and Q'anjob'alan Mayan languages.

5.1 Posture verbs in grammar and discourse

Beyond Basic Locative Constructions, which are after all rather infrequent in natural discourse as such, posture verbs happen to be in fact much more frequently used in discourse in other constructions. They can appear in the expression of motion events, for instance in serialized constructions or as satellites of motion verbs, at different stages of grammaticalization. They can also further undergo metaphorical extensions and be used beyond motion events, to mark aspectual notions, such as the relatively well-documented cases of posture morphemes expressing progressive or habitual.[15] Cases of grammaticalization of posture verbs will be illustrated with examples from two Chibchan languages of Central America, Teribe and Kuna.

5.1.1 *Serialized posture verbs in Teribe (Chibcha)*

Posture verbs are serialized in constructions for complex events in this Chibchan language (Quesada 2000) in which verbs of action combine with posture verbs expressing associated or resultative positions of the figure, as shown below:

(18) a. bor kégue Toño jem shäng bebi
1poss uncle Toño go.up standing too
'my uncle Toño was going(standing) too'

b. domer jem tye pang jeklo go shko
man go.up climb hanging ladder with of
'the man is climbing up(hanging) with the ladder'

c. tawa shwlin zrö-no buk/*shäng
1pl.exc deer kill-PERF lying/*standing
'we killed the deer lying'

5.1.2 *Posture satellites of Kuna (Chibcha)*

The data come from one of the earlier extensive studies of native Amerindian discourse by Sherzer (1990, 1995), in which he emphasizes how some aspects of the grammar express some specific traits of the Kuna culture. One of his areas of demonstration of such a link between culture and grammar is precisely that of the extensive use of posture verbs as verbal suffixes. The Kuna language has four posture verbs (with an

15. Examples of the extension of posture verbs to progressive and habitual aspects markers from languages of Africa, Australia, and America are given in Newman's introduction (2002).

inventory reminiscent of the Sikuani system seen in Section 3.2.2 above), two of which interestingly involve positions in hammocks:

(19) -kwici 'standing'
-sii 'sitting'
-mai 'lying, in a horizontal position, as in a hammock'
-nai 'in a perched or hanging position, when in a hammock the feet are barely touching the ground)

These posture verbs have given rise to four posture verbal suffixes extensively used in discourse. There is a routine association of actions with posture, such as the action of speaking that can be performed in any of the four body postures, but with different cultural connotations. As described by Sherzer (1990: 71):

> Kuna chiefs perform chants from a perched or hanging position in their hammocks, located in the center of the public gathering house. Only chiefs are permitted to sit or lie in these hammocks and in fact being in a hammock is both a symbolic and a literal expression and manifestation of being a chief. When a chief speaks (rather than chants) he may do so either from the hammock or standing. When standing, he assumes the same position as the chiefs' spokesman, who always stands when speaking.

Such associations are illustrated by the following examples gleaned from texts:

(20) a. sucu tulakan se pattemai
the butterfly people land on it
'[literally: land in horizontal position on it]'
b. akkwaser namaynai
the spider is chanting
'[literally: chanting-in a hanging, perched position]'
c. we sayla pialit sunmakkwici we?
that chief speaking, where is he from?
'[literally: speaking-standing]'
d. emit an ittosii
now he is listening to me
'[literally: listening-sitting]'

The use of posture suffixes pervades Kuna discourse and is involved in metaphorical extensions, of the kind discussed further by Sherzer. In the course of analyzing the narrative style of a text recorded from one of the native Kuna orators, Sherzer explains how in Kuna

> the captain of a boat is like a chief, trying to keep the boat moving along, always in danger of bumping into something. A boat is a conventional Kuna metaphor for hammock which in turn represents the role of chief. [The narrator] thus relates boats, hammocks, and chiefs in his various narratives.

Recalling how two of the suffixes, *-mai* 'lying' and *-nai* 'hanging', refer to positions in the hammock and by association to the positions of chiefs in their hammocks at the center of the gathering house, Sherzer further notes:

> the positionals, which all by themselves can be metaphors *-mai*, *-nai* (chiefs); *-kwici* (chiefs, chiefs' spokesmen); *-sii* (chiefs' spokesmen, ritual leaders, ordinary villagers), are furthermore associated with and sharpen other metaphors. When trees are -kwici 'standing', they are like chiefs or spokesmen speaking; when they are -sii 'sitting', they are like village leaders sitting on benches in the center of the gathering house. When animals are -nai 'hanging', they are like chiefs chanting in their hammocks. (Sherzer 1990: 79)

It is therefore essential when talking of posture verbs of Basic Locative Constructions in a language like Kuna to pay attention to their much more extensive discursive use as satellites in the expression of complex events and to recognize how they convey cultural specific norms.[16]

5.2 About positionals in Tzeltalan (Mayan) languages

The use of positionals as locative predicates of Tzeltalan Basic Locative Constructions is to be understood in the wider context of a pervasive use in this language of positional roots. The centrality of the phenomenon of positionals in the grammar of that language can be demonstrated from both a semantic and a morphological perspective.

5.2.1 *Very large inventory and rich semantics*

The positional roots are counted in the hundreds, and as illustrated with the few examples expressing support in examples (9) and (10) of Section 3.4.2 above, their semantics conflate detailed notions of posture, texture, orientation, dimension, etc. They are part of the core vocabulary of the language and turn out to be among the first types of words learned by children (de León 2001).

5.2.2 *Positionals as a distinct and very productive root class*

Positional roots are one of the characteristics of the family of Mayan languages. They constitute a category of roots of their own, distinct from those of nouns and verb (transitive and intransitive) roots, and are identified by their own derivational morphology, in a language very rich in derivational morphology. They are bound roots at the heart of extensive derivational possibilities, as illustrated with Tzeltal examples of derivations with the root of standing position, from Monod-Becquelin (1997):

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16. See Enfield's (2002) study of associated posture construction in Lao, for instance, for another example of traces of cultural norms in the grammar of a language.

(21) a. Positional root tek' in standing position
b. Adj. predicate tek'-el standing
c. Intransitive verb tek'-ah to stand up
d. transitive verb tek'-an to stand X up

(21b) is the form found in Basic Locative Constructions, as adjectival predicate, (21c) is an intransitive inchoative, while (21d) is a transitive causative verb.[17]

The existence of an extensive system of numeral classifiers in Tzeltal further multiplies the opportunities of using positional roots in discourse, since numeral classifiers can be derived from hundreds of positional roots. In a classic study of the Tzeltal numeral classifier system, Berlin (1968) provides detailed analysis of the semantics of the numeral classifiers with ample photographic illustrations, while Laughlin's dictionary of Tzotzil (1975) provides one of the largest Amerindian dictionaries still to date, which also contains an extensive inventory of positional roots and numeral classifiers derived from them.

5.2.3 *Omnipresence of positionals in Tzeltalan languages*

The point is that the Tzeltalan languages have maximized the use of their positional roots. These roots are indeed found in the locative predicates of Basic Locative Constructions, but they are in fact extensively used in the language, through a very productive derivational system, that includes numeral classifiers and verbs, intransitive and transitive. Such frequent use of positional roots therefore systematically directs the attention in that language to spatial and other physical characteristics of the entities talked about, such as the figure of a Basic Locative Construction. Interestingly, as will be seen next, although neighboring Mayan languages such as Jakaltek Popti' possess the same positional roots, they do not exploit them as extensively and give preference to spatial information about path and trajectory instead.

5.3 About directionals in Q'anjob'alan (Mayan) languages

In contrast to the omnipresence of position roots in the Tzeltalan languages just noted, the Q'anjob'alan Jakaltek Popti' language seems to have intensively exploited its motion verbs by grammaticalizing them into directionals. In fact, the use of directionals noted in Basic Locative Constructions in this language seems to result from a secondary development in a chain whereby motion verbs have been grammaticalized in the language. From an earlier stage in which motion verbs were serialized, not evidenced in Jakaltek Popti' but present in other Q'anjob'alan languages (as demonstrated in Zavala 1993), Jakaltek Popti' has further developed an extensive system of direc-

17. Brown (1994) actually regroups various types of roots into a larger category of DISPOSITIONALS. They include the positional roots (-Vl) themselves, the bivalent roots positional/transitive (-VL or *-b'il* 'resultative') and transitive roots or transitive stems derived from positionals.

tional verbal suffixes used pervasively in the language, with the semantics of abstract path not linked any more to any notion of movement.

5.3.1 *ABC of Jakaltek Popti' grammar*

Two of the main characteristics of the Jakaltek Popti' language are its directional system and its noun classifier system. The inventory and lexical origin of the system of directionals already introduced in Table 4 above has been described in Craig (1994) and will be considered further below. The noun classifier system has been described for its semantics (essentially material rather than shape or function) in Craig (1986) and for its high degree of grammaticalization (its use as determiner of referentiality and as proform) in Craig (1987). The language makes very little use of the type of numeral classifier system that has developed in other branches of the family, such as the Tzeltalan one just considered, and uses instead a very small and very grammaticalized number system (akin to a gender system, with only three suffixes for human, animal and inanimate). Positionals are used relatively sparingly, in pragmatically marked circumstances.

The characteristics of Jakaltek Popti' (VSO word order, directionals, noun classifiers and number classes) are all found in the following example:

(22) a. xsmuj-kan-ay-toj heb' naj naj 'they buried him'
VERB SUBJECT OBJECT

b. x-Ø-s-muj-kan-ay-to-oj heb' naj naj
Asp-A3-E3-bury-DIR1-DIR2-DIR3-suff# PL/human CL/man CL/man
'they buried him (once and for all+down+away)'

5.3.2 *Jakaltek-Popti' directional basics*

As already shown, these directionals are grammaticalized motion verbs of clear lexical origin organized in three sets (DIR1, DIR2, DIR3), which are semantically distinct and arranged in fixed order (which is not the case of directionals in Tzeltalan languages, for instance). Their high frequency of use in natural discourse is reminiscent of the frequent use of posture suffixes in Kuna, with clear cases of lexicalized directionals in dictionary citations, and extensive use in metaphors of cultural relevance. Jakaltek Popti' directionals can also be shown to have evolved to express an abstract notion of trajectory traced in space, in the absence of any movement of spatial entities, as evidenced in their use with non-motion verbs, such as perception or locution verbs, as illustrated below:

(23) a. xil-ah-toj naj tet ix
saw-DIR2-DIR3 CL/he to CL/her
'he saw her (up) (away)'

b. xil-ay-tij ix
saw-DIR2-DIR3 CL/she
'she saw him (down) (toward)'

(24) a. xtiyoxhli-ah-tij naj tet ix
saluted-DIR2-DIR3 CL/he to CL/her
'he said hello (up+towards) to her'
b. xta'wi-ay-toj ix tet naj
responded-DIR2-DIR3. CL/she to CL/him
'she answered him (down+away)'

Note in these examples the perspectivizing use of the last directional, *-toj* 'away' or *-tij* 'toward' indicating the point of reference from which the scene is to be conceived, like a camera point of view. In (23a) the scene is viewed from the man down in the street looking ('away' *-toj*) at his lady friend up at the window, who in (23b) looks back down at him, seen from his standpoint (hence, *-tij*). In (24a) the scene is viewed from behind the woman, so that the man addresses the woman 'toward' her (*-tij*) and she answers back to him 'away' (*-toj*). It is precisely the same mental calculation of path that was found in the use of the directionals in Basic Locative Constructions in Section 4.4 above, including the interesting use of *-tij* commented upon with example (17) of the cat looking out from under the table, with the path of vision being conceived from the point of view of the viewer. The use of directionals in Basic Locative Constructions in Q'anjob'alan Jakaltek Popti' needs therefore to be contextualized and recognized as one of the many uses of the omnipresent directionals, underlining the saliency of path information in that language. It is therefore to be put in contrast with the strategic choice of spatial positional semantics made instead by the neighboring Tzeltalan languages.

5.3.3 *On the distributedness of spatial information: Path directionals and static relational nouns*

The discussion of directionals in Jakaltek Popti' could extend further to the question of how spatial information is distributed across constructions in this language. As was already mentioned, Mayan languages have few spatial prepositions (none actually in the case of Tzeltal) and a few relational nouns functioning as complex adpositions.[18]

It is interesting to note therefore how in a language like Jakaltek Popti' the precise use of several directionals to specify path information contrasts with the permanently static semantics of the adpositional (relational noun) element, which indicates either the end point position of the motion or its point of origin, as considered in Grinevald (to appear b). Such an interesting distribution of spatial semantics, between path directionals and static relation nouns is illustrated in the examples below:

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18. They tend to have sets of so-called "relational nouns" instead, which are like complex prepositions of clear lexical origin and at different grammaticalized stages. De León (1992) proposes a detailed study of the grammaticalization process of relational nouns in Tzotzil, another Mayan language (sister language of Tzeltal). The expression "relational nouns" may further be a misnomer, since the lexical origin of some of these adpositional elements can actually be verbal.

(25) a. xkin hateniktoj yul karo
xk-in ha-ten-ik-toj y-ul karo
Asp-me you-move-DIR2-DIR3 its-in truck
Lit: you moved me in+away in the truck
'You pushed me into the truck'

b. xkin hateniltij yul karo
xk-in ha-ten-il-tij y-ul karo
Asp-me you move-DIR2-DIR3 its-in truck
Lit: you moved me out +toward in the truck
'You pulled me out of the truck'

The distribution of space information in English is between a conflation of directionality with motion in a contrastive pair of verbs 'push/pull' and complex prepositions expressing boundary crossing and either goal or starting point of the motion (INTO/OUT OF). In contrast, Jakaltek-Popti' has a spatially neutral verb 'move', with all the path information concentrated in the sets of directionals. In addition, the relational noun serving as adposition uniquely indicates the functional spatial relation between a figure and a ground, independent of whether this relation is found at the origin or the end point of the displacement, leaving the directionals to provide all the motion information. Directionals are therefore salient in that language, by their information load and their omnipresence in discourse, and their presence in Basic Locative Constructions is but one instance of their frequent use.

6. Conclusions

This paper has considered the variety of locative predicates of Basic Locative Constructions on the basis of data from Amerindian languages. It has introduced the idea of a continuum to replace strictly categorial distinctions of locative predicate types, allowing for intermediate types of systems between a simple posture verb system and a very large positional system. It has extended the study of Basic Locative Constructions from locative verbs to the possibility of locative satellites, taking the directionals of verbal origin of some Mayan language as a case in point and always keeping in view the process of grammaticalization that can produce such systems. Finally, it has argued for the value of looking beyond the Basic Locative Construction to explore the links between the morphological material used in such a construction with the rest of the grammar in the language, considering, on one hand, the issue of posture verbs turning into satellites of event verbs and, on the other, the origins of directional satellites of Basic Locative Construction.

It has emphasized at every step how languages make specific choices of strategies, even with shared basic morphological material, and how this leads to the language-specific highlighting of one type of spatial information or another, by specifying either the contour or position of the figure through posture verbs and positionals or path

information through directionals. Such contrastive choices of saliency of one aspect or another of spatial information are probably good candidates for testing how the structure of language can induce different ways of thinking for speaking (Slobin 1991). And although nothing much was said here of the interweaving of locative predicates with nominal classification systems through the grammar of some of the languages considered, this should also be a rich area to explore further.

The closing remark will be that much remains to be done to describe adequately this type of construction in all the dimensions suggested here, as well as to place the study of its components in their proper grammar and discourse context, in particular for the majority of the languages of the Americas. Those languages have certainly already proven to be very informative for typological discussions as a whole, but it is probably worth saying once again how most of them stand to disappear in the near future and how their description and documentation is urgent. It is from a certain sense of urgency and from the familiarity with the enormous descriptive task that remains to be done that the approach taken here talks of a descriptive strategy to handle such systems, as an invitation to more comprehensive descriptions of the linguistics of Basic Locative Constructions that will enrich a typology of such constructions.

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CHAPTER 3

What makes manner of motion salient?

Explorations in linguistic typology, discourse, and cognition

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Languages differ considerably in the attention that they pay to manner as a dimension of motion events. One factor that seems to influence attention to manner is a language's lexicalization pattern. Following Talmy's well-known dichotomy of verb-framed and satellite-framed languages, the latter type provides more readily accessible constructions that include path and manner in compact form. In this chapter it is proposed that the dichotomy be expanded to included an "equipollent" type, in which both path and manner receive equal weight. Furthermore, other factors also contribute to the degree of "manner salience" of a particular language. In particular, language-specific morphosyntax, the availability of ideophones, and the availability of motion-related lexical categories (such as posture verbs) are three sorts of factors that interact with lexicalization patterns in influencing manner salience. It is proposed that linguistically-expressed manner salience can influence attention to details of experienced motion events as well as mental imagery formed on the basis of reception of motion event descriptions in speech or writing.

For the past decade or so, I've been obsessed with linguistic descriptions of motion events and possible crosslinguistic differences in cognition (Berman & Slobin 1994; Slobin & Hoiting 1994; Özçalışkan & Slobin 1999, 2000a, b, 2003; Slobin 1996, 1997, 2000, 2003, 2004, 2005a, b, c). The dimension of *manner of motion* is particularly rich for exploring effects of typological characteristics of languages on discourse and cognition. Why, for example, is the following sign quite normal (albeit amusing) in the San Diego Zoo, whereas it would be inconceivable in Le Parc Zoologique de Paris?

(1) DO NOT TREAD, MOSEY, HOP, TRAMPLE, STEP, PLOT, TIPTOE, TROT, TRAIPSE, MEANDER, CREEP, PRANCE, AMBLE, JOB, TRUDGE, MARCH, STOMP, TODDLE, JUMP, STUMBLE, TROD, SPRING, OR WALK ON THE PLANTS.[1]

Or why does the German motion event presented in (2) lose its manner in the French translation in (3)?

(2) *Eine Stunde schlich ich noch um das Haus herum* . . . [For another hour I crept around the house] (Zweig 1998: 106)

(3) *Une heure durant, je fis le tour de la maison* . . . [For an hour, I made a circuit of the house] (Zweig 1998: 107)

Or, to take two other languages, why does the same news event from Iraq, reported in (3) and (4), have a manner-of-motion verb in Dutch but a simple path verb in Spanish?

(4) *Johnson . . . zag hoe een terreinwagen kwam aanscheuren naar het kruispunt* . . . [Johnson . . . saw a landcruiser come tearing up to the intersection . . .] (*NRC Handelsblad*, April 1, 2003]

(5) *Johnson había visto . . . la llegada del vehículo a una intersección* . . . [Johnson had seen the approach of the vehicle to an intersection . . .] (*El Universal*, April 1, 2003)

Examples such as these have long been familiar to scholars of comparative stylistics. For example, sixty years ago (in occupied Paris), Malblanc (1944) noted, in comparing German with French: ". . .il apparaît que le verbe allemand dans son allure générale est plus lourd de perceptions sensibles et de relations exprimées que le verbe français [. . .it would seem that, in general, German verbs are more weighted with the expression of sensory perceptions and relations than are French verbs]." The task of this chapter is to account systematically for such differences. Malblanc appealed to some inherent character of individual languages: "En règle générale, le français s'en tient volontiers à l'idée abstraite, tandis que l'allemand aime à descendre à l'image du concret" [As a general rule, French holds readily to abstract ideas, while German is fond of descending to concrete images]. In a comparative stylistics of French and English published in Québec, Vinay and Darbelnet (1958) discuss problems of translating the large and detailed lexicon of English manner-of-motion verbs into French. They explicitly invoke the "spirit of the language" as a determinant: "Mais il serait contraire au génie de la langue française d'entrer dans ce genre de détail. . ." [But it would be contrary to the spirit of the French language to enter into this sort of detail. . .].

The tools of typological and cognitive linguistics allow us to develop more precise explanations. I want to propose that several quite different kind of factors, linguistic

1. Thanks to Jelena Jovanović for her photograph of the original sign in the Wild Animal Park of the San Diego Zoo.

and psychological, interact to shape what earlier generations of scholars characterized as "the spirit of a language."

Manner expression and typologies of lexicalization patterns

One might simply assume, from the examples given above, that Germanic languages are more concerned with manner of motion than are Romance languages. However, as I have reported in the papers cited above, the patterns reflected in examples (1) through (5) are far more general. In fact, it seems possible to place all the languages of the world in a typological categorization of preferred means of encoding motion events, with consequences for the relative salience of manner of motion. A useful analysis has been provided by Talmy (1985, 1991, 2000), who has devoted extensive attention to *lexicalization patterns*. In his terms, "lexicalization is involved where a particular meaning component is found to be in regular association with a particular morpheme" (1985: 59); in this instance, what is at issue is lexicalization of location and displacement of an entity. A *typology* can be proposed in those instances in which "languages exhibit a comparatively small number of patterns" (p. 57). Talmy has proposed a universal typology of motion event encoding, based on a definition of an "event that consists of one object (the 'Figure') moving or located with respect to another object (the reference-object or 'Ground')" (p. 61).

As an example of the typology, consider a particular motion event that is described in a collection of elicited oral narratives. In order to hold content constant across languages, a picture storybook, *Frog, where are you?* (Mayer 1969), has been used in extensive crosslinguistic research (Berman & Slobin 1994; Strömqvist & Verhoeven 2004).[2] In one picture, a little boy is looking into a hole in a tree and an owl emerges, wings outspread. Schematically, the *path component* of the event – that is, the physical displacement of the owl in space – can be described in two ways: (1) a path verb, such as 'exit', can encode the owl's trajectory, or (2) an element associated with a verb can encode the trajectory, such as Germanic verb particles (e.g., 'come out') or Slavic verb prefixes. Talmy calls such associated elements "satellites." On the basis of this analysis, he offers a binary typology. There are: (1) *verb-framed languages*, in which location or movement is encoded by the main verb of a clause, and (2) *satellite-framed languages*, in which location or movement is encoded by an element associated with the verb. Romance languages are verb-framed and Germanic languages are satellite-framed, but the typology is much broader, as suggested by the following partial crosslinguistic summary:

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2. Strömqvist and Verhoeven (2004) provide documentation of "frog story" research on 72 languages, belonging to 13 major language families and 26 language groups within those families.

Verb-framed languages	Satellite-framed languages
– Romance	– Germanic
– Greek	– Slavic
– Semitic	– Celtic
– Turkic	– Finno-Ugric
– Basque	
– Korean	
– Japanese	

The encoding of manner, however, raises interesting issues of both typology and language use. Talmy provides no clear definition of manner, nor is there one to be offered here.[3] "Manner" is a cover term for a number of dimensions, including motor pattern (e.g., *hop, jump, skip*), often combined with rate of motion (e.g., *walk, run, sprint*) or force dynamics (e.g., *step, tread, tramp*) or attitude (e.g., *amble, saunter, stroll*), and sometimes encoding instrument (e.g., *sled, ski, skateboard*), and so forth. These subtypes of manner do not seem to influence the broad patterns described in this chapter, so a single category of manner is sufficient to the task. At first glance, the binary typology seems to be neutral with regard to the expression of manner, which is optional in both types of languages. In a verb-framed language, where the main verb in a clause is committed to path description, manner can be added in various ways. For example, in the scene of the owl's emergence, one could say either 'exit' or 'exit flying'. In a satellite-framed language one could say either 'come out' or 'fly out'. But note that encoding of manner is dependent, in interesting ways, on the option for encoding path. In verb-framed languages, manner must be expressed in some kind of subordinate element, such as a gerund or other adverbial expression ('exit flying'), whereas in satellite-framed languages the main verb of a clause is available for the expression of manner ('fly out' in Germanic, 'out-fly' in Slavic, etc.), providing a "low cost" alternative to adjunct expressions of manner such as 'exit flying' or 'exit with a flap of the wings'. I will suggest that this apparently trivial processing factor of relative "cost" of encoding manner has widespread consequences for both the lexicon and discourse patterns of a language, with probable effects on cognition.

A revised typology

Using Talmy's typology to examine the role of manner in motion events raises a question about the typology itself. So far, the examples have been drawn from languages with a single finite verb in a clause, either a path verb or a manner verb. Consider the following examples – again returning to the emergence of the owl in the frog

3. It remains to be determined if manner of action is a coherent semantic category for various linguistic analyses. Talmy has succeeded in relating manner to a wide range of morphosyntactic patterns, using the definition: "Manner refers to a subsidiary action or state that a Patient manifests concurrently with its main action or state" (Talmy 1985: 128).

story. Example (6), from Spanish, is equally applicable to a large range of verb-framed languages that have been studied (all of the Romance languages except Romanian; Turkish, Hebrew, Arabic). There is a clause with a single verb, encoding path, and no information about manner:

(6) *sale un buho*
exits an owl

The next two examples present two types of satellite-framing, using an element to encode path that is associated with a main verb of manner – a Germanic separable verb in English in (7) and a Slavic prefix in (8):

(7) *an owl flew out*

(8) *vy- letela sova*
out- flew owl

However, serial-verb languages without grammatical marking of finiteness pose a problem to a typology that depends on identifying the "main verb" in a clause. Consider Mandarin Chinese, in (9):

(9) *fei*1 *chu*1 *lai*2 *yi*1 *zhi*1 *mao*1*tou*2*ying*1
fly exit come one only owl

Talmy classifies Mandarin as satellite-framed, because there is a small set of path verbs, like *chu*1 'exit', that can regularly occur with manner verbs. He considers these to be satellites. But note that *chu*1 can also stand alone as the sole verb in a clause. Indeed, in such languages there are typically three verbs in such constructions, with a final deictic verb ('come'/'go'); there is no finite marking at all; and each of the three verbs can stand alone in a clause. I have proposed that there is a third type of lexicalization pattern (Slobin 2004); a similar conclusion has been reached by Zlatev and Yangklang (2004), working on Thai, a serial-verb language from a different group (Tai-Kadai), and by Ameka and Essegbey (in press), with regard to West African serial-verb languages.[4] In their words:

4. Talmy (1991) suggests that path verbs in serial-verb languages often show evidence of grammaticizing into path satellites – that is, losing some features of independent verbs. This is certainly an important diachronic path that can lead from one language type to another. But the data do not make it possible to unequivocally categorize languages like Mandarin and Thai as either satellite- or verb-framed languages. A Chinese linguist also points out that path verbs are not strictly comparable to English verb particles: "However, different from English, these satellites in Chinese can also function as independent verbs themselves. When such a verb is connected to another verb, a verbal construction called *lián dòng shi* 'serial verb construction' is formed" (Gao 2001:62). However, it has also been noted that the path verb in such constructions may show phonetic weakening in Mandarin, but not in Cantonese or Thai (Lamarre 2005a, b), suggesting ongoing grammaticization processes in some serial-verb languages.

> When the properties are tallied, we find that serialising languages share more properties with S-languages [satellite-framed] than with … V-languages [verb-framed] … while still possessing a unique property. What this shows is that they cannot be said to belong to either type. Instead, they appear to belong to a class of their own.

This third class of lexicalization patterns can be designated as *equipollently-framed* – that is, a kind of framing in which both path and manner have roughly equal morphosyntactic status. There are at least three subtypes of equipollently-framed languages, based on morphological criteria:

- **serial-verb languages** in which it is not always evident which verb in a series, if any, is the "main" verb: Niger-Congo, Hmong-Mien, Sino-Tibetan, Tai-Kadai, Mon-Khmer, (some) Austronesian.
- **bipartite verb languages**, such as the Hokan and Penutian languages described by DeLancey (1989, 1996), in which the verb consists of two morphemes of equal status, one expressing manner and the other path. Talmy (2000: 113) provides a similar description of Nez Perce manner prefixes, such as *quqú· -láhsa* 'gallop-ascend' (Aoki 1970). Richard Rhodes (personal communication 2003) reports that such constructions are typical of Algonquian, Athabaskan, Hokan, and Klamath-Takelman. Huang and Tanangkingsing (2004) report that at least one Austronesian language, Tsou, has apparently developed bipartite manner-path verbs from serial-verb constructions.
- **generic verb languages**, such as the Australian language Jaminjung (Schultze-Berndt 2000), with a very small verb lexicon of about 24 "function verbs". For encoding motion events, one of five verbs is used, expressing a deictic or aspectual function: 'go', 'come', 'fall', 'hit', 'do'. These verbs are combined with satellite-like elements, "coverbs", that encode both path and manner in the same fashion. In such a language, neither path nor manner is unequivocally the "main" element in a clause.

Table 1 summarizes the revised tripartite typology (after Slobin 2004: 249).

Typology and manner salience

These seemingly trivial differences in lexicalization patterns have widespread consequences for what I will call *manner salience* – that is, the level of attention paid to manner in describing events. Languages differ in this regard, as has already been noted. The degree of manner salience of a particular language can be assessed by a variety of measures of language *use*, comparing descriptions of motion events across languages and genres (narrative fiction, oral narrative, news reporting, conversation, and so forth), as well as translations of motion event descriptions between languages. Another measure of manner salience is lexical, as reflected in the size and diversity

Table 1. Tripartite typology of motion-event constructions

Language type	Preferred means of expression	Typical construction type	Examples
verb-framed	path expressed by finite verb, with subordinate manner expression	$\text{verb}_{\text{PATH}}$ + subordinate $\text{verb}_{\text{MANNER}}$	Romance, Semitic, Turkic, Basque, Japanese, Korean
satellite-framed	path expressed by non-verb element associated with verb	$\text{verb}_{\text{MANNER}}$ + $\text{satellite}_{\text{PATH}}$	Germanic, Slavic, Finno-Ugric
equipollently-framed	path and manner expressed by equivalent grammatical forms	*serial verb:* $\text{verb}_{\text{MANNER}}$ + $\text{verb}_{\text{PATH}}$	Niger-Congo, Hmong-Mien, Sino-Tibetan, Tai-Kadai, Mon-Khmer, Austronesian
		bipartite verb: $[\text{manner} + \text{path}]_{\text{VERB}}$	Algonquian, Athabaskan, Hokan, Klamath-Takelman
		generic verb: $\text{coverb}_{\text{MANNER}}$ + $\text{coverb}_{\text{PATH}}$ + $\text{verb}_{\text{GENERIC}}$	Jaminjungan

of manner expressions in a language (e.g., English *hop, jump, leap, spring, bound* vs. French *bondir* or Spanish *saltar* for the same range of manners of motion). It is striking that measures of language use across genres, as well as lexical diversity and specificity, present congruent assessments of a language's manner salience (Slobin 2000). I return to these measures after closer examination of typology and manner salience.

The "owl exit scene" provides a useful starting point for more detailed analysis.[5] Frog stories in verb-framed languages virtually never include mention of the owl's

5. The data reported here come from a range of published and unpublished studies carried out at the Institute of Human Development, University of California, Berkeley and in collaboration with other institutions, as well as data reported in this volume. Narratives were gathered from preschoolers (age 3–5), school-age children (age 6–11), and adults, with 10–20 stories per age group. Only data from adult narratives are reported in this chapter. The following collaborators have been involved, along with many Berkeley students: *Basque*: I. Ibarretxe-Antuñano; *Dutch*: J. Aarssen, P. Bos, L. Verhoeven; *English*: V. Marchman, T. Renner, G. Wigglesworth; *French*: H. Jisa, S. Kern; *German*: M. Bamberg, M. Carroll, C. von-Stutterheim; *Hebrew*: R. A. Berman, Y. Ne'eman; *Icelandic*: H. Ragnarsdóttir; *Italian*: P. Cipriani, M. Orsolini; *Mandarin*: J. Guo, A. Hsiao; *Polish*: M. Smoczyńska; *Portuguese*: I. Hub Faria; *Russian*: Y. Anilovich, N. V. Durova, M. Smoczyńska, N. M. Yureva; *Serbo-Croatian:* S. Savić; *Spanish*: A. Bocaz, J. Covey, E. Sebastián; *Swedish:* Å. Nordqvist, S. Strömqvist; *Thai*: J. Zlatev, P. Yangklang; *Tsou*: S. Huang and M. Tanangkingsing; *Turkish*: J. Aarssen, A. A. Aksu-Koç, A. Küntay, Ş. Özçalışkan. L. Verhoeven.

manner of emergence, simply using a clause with a path verb meaning 'exit', as in (6). By contrast, narratives in satellite- and equipollently-framed languages frequently encode manner with a special verb, adding an additional element for path information, as in (7), (8), and (9). Figure 1 presents data from hundreds of frog stories, showing the percentage of narrators who used a manner-of-motion verb such as 'fly', 'jump', 'hop', and the like in describing this event. (Note that the data represent all narrators who chose to mention this event, regardless of language, and regardless of morpholexical choice.) The five verb-framed languages pay virtually no attention to manner: three Romance languages (Spanish, French, Italian), a Turkic language (Turkish), and a Semitic language (Hebrew). By contrast, Figure 1 shows six languages that pay varying amounts of attention, ranging from an average of 23% for Germanic (Dutch, German, English), to 34% for two types of East Asian serial-verb languages (Sino-Tibetan: Mandarin, Tai-Kadai: Thai), to 34% for an Austronesian bipartite-verb language (Tsou), and 100% for a Slavic language (Russian). This cline is interesting, in that it separates Germanic from Slavic. In order to account for such differences in manner salience between languages that encode manner in a main, rather than subordinate expression, factors of both morphosyntax and psycholinguistic processing load must be considered.

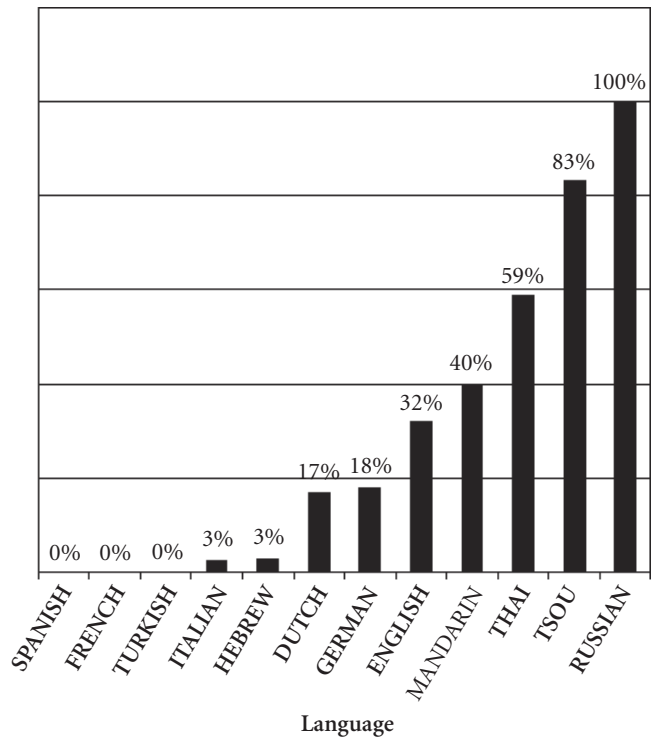

Figure 1. Owl's exit: Percentage of narrators using a manner-of-motion verb

Semantic constraints and processing load

All of the languages in this sample have frequent manner verbs that are applicable to this scene – in particular, versions of 'fly'. Why isn't 'fly' used in the sample of verb-framed languages? The answer probably lies in what Slobin and Hoiting (1994) have called the "boundary-crossing constraint," building on Aske's (1989) identification of the role of telicity in the use of manner verbs in Spanish. It appears that verb-framed languages only license the use of a manner verb as a main verb in a path expression if no boundary crossing is predicated. Thus it is possible, across a range of verb-framed languages, to say the equivalent of 'fly to/from the tree' but not 'fly into/out of the hole'. One of the most salient characteristics of verb-framed languages is the preference to mark a *change of state* with a verb, rather than by some other device. With regard to motion events, changes of state are boundary-crossing events, and therefore the main verb must encode the change of state: enter, exit, cross. In order to add manner to such events, some sort of subordinate construction is required – equivalents of 'exit flying'. Although this option is available in the five verb-framed languages considered here, it was not taken by any narrator, at any age (from 3 to adulthood). There are at least two sorts of explanations for this avoidance: (1) the construction unnecessarily foregrounds the owl's manner of movement (see Talmy 2000: 128, on foregrounding and backgrounding); (2) it is "heavy" in terms of processing (production/comprehension).

Typically, in verb-framed languages, a neutral verb of motion is used to designate a creature's normal manner of movement: owls 'go', fish 'go', people 'go', cats 'go', and so forth. Manner verbs are used when manner is foregrounded – and then owls can 'soar' or 'flap' (but apparently not across boundaries). The only exception seems to be verbs that encode particular force dynamics – high energy motor patterns that are more like punctual acts than activities, such as equivalents of 'throw oneself' and 'plunge'. Such verbs occur with boundary crossing in verb-framed languages. This may be because a sudden boundary crossing can be conceptualized as a change of state, and, as noted, what is apparently most characteristic of verb-framed languages is the use of *verbs* to encode change of state. What seems to be blocked is the conceptualization of manner of motion as an activity that is extended in time/space while crossing a boundary (Kita 1999). For example, one cannot say the equivalent of something like 'the phone rang as I entered the house', because entering has no duration; it is an instantaneous change of state. Because boundary-crossing is a change of state, and manner verbs are generally activity verbs, most manner descriptions are excluded from boundary-crossing descriptions. The only manner verbs that can occur in boundary-crossing situations are those that are not readily conceived of as activities, but, rather, as "instantaneous" acts. Thus one can 'throw oneself into a room' but one generally can't 'crawl into a room' in verb-framed languages.

In the frog story data, all of the verb-framed language narrators focused on the owl's emergence or appearance, with an occasional adverbial indication of suddenness, rather than focus on the activities of flying or flapping out. In the entire corpus, there are only two instances of manner verbs in this scene (the 3% for Italian and

Hebrew in Figure 1), and, interestingly, neither of them is a boundary-crossing construction. An Italian 5-year-old said, *il gufo volò, il bambino cascò* 'the owl flew, the boy fell'; and an Israeli adult said, *yanšuf kofec meha'ec* 'owl jumps from:the:tree'. Note that these are both simple clauses, in which the manner verb is the main verb and no boundary crossing is expressed. There is no compact construction that allows for simultaneous attention to the owl's sudden appearance, its emergence across a boundary, and its manner of movement; and adverbial constructions are heavy to process. As a consequence, it seems that verb-framed language speakers opt to encode only change of state, i.e., in/out or nonvisible/visible.

With regard to processing load – although detailed psycholinguistic experimentation remains to be done – I suggest that several factors may facilitate regular and frequent encoding of a semantic domain in a language:

– *expression by a finite rather than nonfinite verb form*: Because every main clause has a finite verb, no greater syntactic effort is required to produce a satellite-framed construction such as 'go out' vs. 'fly out', whereas a variety of verb-framed options require access to lower-frequency nonfinite forms such as gerunds, participles, and converbs with meanings equivalent to 'exit flying'. Motion event descriptions in satellite- and equipollently-framed languages do not require nonfinite verbs in order to include information about manner.
– *expression by an uninflected coverbal element rather than an inflected coverbal form*: It presumably takes additional effort to add inflectional material in producing an utterance. Many manner-path expressions in verb-framed languages consist of an inflected motion converb, such as Turkish *uç-arak çık* 'fly-CONVERB exit'. By contrast, manner elements in equipollently-framed languages are not inflected.
– *expression by a single morpheme rather than a phrase or clause*: It is presumably less demanding to access a single lexical item, such as 'tiptoe', than expressions such as 'on the tips of the toes', 'moving quietly and carefully', etc. Again, satellite- and equipollently-framed languages seem to provide more monomorphemic manner expressions than verb-framed languages.

Regular and frequent encoding of a domain, I suggest, acts to heighten attention to that domain in general – as reflected in synchronic usage patterns and diachronic expansion of the language's resources.

Lexical and morphemic availability

Satellite-framed languages, by contrast with the verb-framed languages discussed earlier, do provide compact expressions of path and manner, as shown in (7) for English and (8) for Russian. Examples for other Germanic languages are verb-satellite constructions such as *uit-vliegen* 'out-fly' in Dutch and *raus-flattern* 'out-flap' for German. Why, then, is the manner option used relatively infrequently in the Germanic languages (Dutch 17%, German 18%, English 32%), but used by every narrator in Russian? I suggest that a focus on the owl's emergence predominates in all of these lan-

guages as well. The most common expression in the three Germanic languages is 'come out', thus taking the viewer's perspective and predicating appearance using a readily available expression. In order to add manner to the perspective, speakers of Dutch, German, and English face the same processing problem as speakers of verb-framed languages: they would require a heavier construction, such as 'come flying out'. Instead, there is a tendency to pick one of two options: 'fly/pop/jump out' or 'come out'. Note that these two options are equally processible: Each has a main verb plus a path particle and are apparently easily accessible.

Russian presents a different lexicalization pattern. There is no independent verb that is the equivalent of 'come'; rather, a deictic prefix on a motion verb is needed for the expression of motion towards the speaker's perspective. All path particles (satellites) are also verb prefixes in Slavic languages, and prefixes can't be stacked; so there is no way to combine 'come' and 'out' with one verb, as in Germanic. One has to choose between *pri-letet*' 'come-fly' and *vy-letet*' 'out-fly'. The deictic option (*pri-letet*') was taken by 11% of the Russian narrators of the owl scene; the remaining 89% focused on the owl's emergence, using *vy-* with verbs meaning 'fly' (*vy-letet*'), 'jump' (*vy-skočit*'), and 'crawl' (*vy-lezit*'). Again, narrators chose a simple construction with a single verb. Note, however, that both options use a manner verb – hence the 100% of Russian manner verb choices in Figure 1. Thus it is not satellite-framing alone that accounts for the rate of use of manner verbs; morphosyntactic structure and lexical availability also contribute to a language's "rhetorical style."

The three equipotentially-framed languages represented in Figure 1 – the serial-verb languages Mandarin and Thai, and the bipartite-verb language Tsou – make it easy to provide both manner and path information, generally with deictic information as well, as in (9): 'fly exit come'. Such constructions are easy to process and can probably be treated as quasi-lexical units in such languages.[6]

The entire frog story has an abundance of motion events. The languages present the same patterns when measuring manner salience across the story as a whole (i.e., proportion of motion events described with manner verbs): Romance = Turkish = Hebrew < English < Mandarin = Russian. (Data for Dutch, German, Thai, and Tsou have not yet been calculated for the entire story, but seem to fit the expected patterns.)

With this brief overview of typology and frog story narratives, the chapter continues with an overview of means of assessing manner salience. There are two sorts of criteria that one can make use of: the occurrence of manner descriptions in actual language use of various sorts, and the manner lexicon that a language provides to its users.

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6. Japanese is a verb-framed language that easily packages a manner verb and a path-verb into a quasi-lexical unit, such as *tobi-dete* 'fly-exit'. There is some evidence that Japanese may be more manner salient than other verb-framed languages (Ohara 2002, 2003; Sugiyama 2005).

Assessing manner salience

Language use

As mentioned above, various criteria are available for comparing languages in terms of frequency of mention of manner in motion event descriptions. A number of such assessments are provided in Slobin (2003) and I will only refer to them briefly here as "bullet points." They all point to the same typological patterns of manner salience, although they represent partial and overlapping collections of languages thus far.

- *Ease of lexical access*. When English- and French-speakers are asked to list motion verbs in one minute, English-speakers list more verbs overall, and many more manner verbs.
- *Imagery and understanding of manner verbs*. English adults readily act out a large range of manner verbs, and even 3-year-olds can appropriately demonstrate twenty or more manner verbs. In a small pilot test, by contrast, French graduate students in linguistics, in Lyon, could act out only a small number of French manner verbs, and had to consult dictionaries and each other in attempting to act out a large number of such verbs.
- *Conversational use*. In recordings of natural conversations, a great diversity of manner verbs occur in English, while manner verbs are virtually absent in Spanish and Turkish conversations, with the exception of rare uses of verbs simply meaning 'walk'.
- *Child language acquisition*. Preschool-aged children and their caretakers use more types and tokens of manner verbs in English, German, and Russian than in French, Spanish, and Turkish.
- *Use in elicited oral narratives*. In frog story research across a range of languages, a greater percentage of motion events receive manner descriptions in satellite- and equipotentially-framed languages than in verb-framed languages. Manner is more salient in the first two language groups in terms of both types and tokens of manner verbs, as well as in adverbial descriptions of manner of motion.
- *Use in creative fiction*. The same patterns are demonstrated in novels written in satellite-framed languages (English, German, Russian) in comparison with novels written in verb-framed languages (French, Spanish, Turkish). (See Mora Gutiérrez (1998) for comparable findings in a study of fifty Spanish novels.)
- *Translation of creative fiction*. In translations between the languages just mentioned, manner salience follows patterns of the target, rather than source language (Slobin 1996, 2005c). That is, translations into satellite-framed languages *add* manner information, whereas translations into verb-framed languages *remove* manner information. This is true both with regard to lexical items and more extended descriptions of manner of motion.
- *Metaphoric extensions of manner verbs*. Novels and newspaper articles written in English, in comparison with Turkish (Özçalışkan 2002, 2004, 2005), use more manner-of-motion verbs as conceptual metaphors in the domains of death, life,

sickness, body, and time. This is true although the metaphorical mappings themselves are highly similar in the two languages; the difference is that Turkish tends to use path verbs, whereas English prefers manner verbs. Similar patterns of conceptual metaphor are reported for Mandarin by Yu (1998).

Size and diversity of manner-verb lexicon

I have not yet undertaken a definitive count of manner-of-motion verbs across languages, but have attempted to arrive at complete listings for several languages by means of back translation, dictionary search, and corpora. The satellite-framed languages that I've examined – English, German, Dutch, Russian, and Hungarian – each have several hundred manner verbs; Mandarin has perhaps 150; Spanish, French, Turkish, and Hebrew have less than 100, and probably less than 60 in everyday use.

The psycholinguistic consequence of a semantic field that is saturated with a rich lexicon is that the language learner and language user must make a number of distinctions of manner of movement that might well be ignored by users of languages with less diverse vocabularies in the domain. For example, in Özçalışkan's (2002: 58) study of novels in English and Turkish, she finds 23 English verbs that are used in contexts where Turkish uses the single verb *yürümek* 'walk': *walk, drift, ebb, flounce, linger, lumber, march, meander, roam, rustle, stride, tread, worm one's way, hike, pace, ramble, snake, trample, trot, swarm, forge, hurry, rush.* Using another method, Slobin (2005a) compares translations of a single English text (a chapter of Tolkien's *Hobbit*) into a large collection of verb- and satellite-framed languages. For example, Table 2 shows how Tolkien's lexical diversity in English is matched in another satellite-framed language, Serbo-Croatian, but is reduced to single verbs in two verb-framed languages, French and Turkish. Overall, Tolkien uses 26 different types of manner verbs in the original English text. Translations into the four satellite-framed languages use an average of 25.6 types – that is, matching the original. (Russian actually surpasses the original, with 30 types.) However, the verb-framed translations use an average of 17.2 types. Translators using these target languages either don't have recourse to a large range of manner verbs, or an abundance of such expressive forms would not be compatible with the style of verb-framed discourse. (See Slobin 2005, for details.)

Melissa Bowerman (1985: 1283) has pointed out that the way in which a language structures a domain guides the child in attending to the relevant experiential dimensions that are inherent to the structuring of the domain:

> I argue that children are prepared from the beginning to accept linguistic guidance as to which distinctions – from among the set of distinctions that are salient to them – they should rely on in organizing particular domains of meaning.

In linguistic diachronic perspective, as a domain becomes more saturated in a language, speakers invent lexical items to mark distinctions that become important to them. A language with a rich manner lexicon tends to get richer over time. That is, learning and using the language engenders habitual attention to detailed analysis of

Table 2. Translations of English verbs from two domains of manner-of motion into Serbo-Croatian, French, and Turkish

English original	Serbo-Croatian	French	Turkish
run, scramble, scuttle	trčati, leteti, kaskati	courir	koşmak
climb, clamber, swarm	pentrati, peti se, koprčati	grimper	tırmanmak

Table 3. English manner verbs of goal-directed, human self-movement: Number of verbs added per century

Time period	Number of innovated manner verbs
> 1500	48
1500 – 1599	30
1600 – 1699	17
1700 – 1799	11
1800 – 1899	32

a domain, leading to further lexical innovation, and increasing attention to the domain over time. I've checked the *Oxford English Dictionary* for the first attested use of a manner verb in referring to goal-directed, non-aided movement of a human being. It is evident that there was already a large lexicon in this domain in Old English.[7] Table 3 presents summaries by century of verbs added to the intransitive, human manner-of-motion verb lexicon. (Note that the total manner-of-motion lexicon is considerably larger, including verbs of caused motion, such as *push, shove, squeeze,* etc., and verbs of assisted motion, such as *ride, drive, ski, sail,* etc.) The *OED* lists the following as nineteenth-century innovations (including both innovative forms and extensions of other verbs to designate goal-directed human self-movement): *barge, clomp, dawdle, dodder, drag oneself, drift, flop, gambol, goose-step, hike, hustle, leapfrog, lunge, lurch, meander, mosey, pounce, promenade, race, sashay, scurry, skedaddle, skitter, slither, slog, slosh, smash, sprint, stampede, tromp, twist, waltz, wiggle, worm, zip*. Clearly, this is a domain of continuing interest to English speakers.

7. A reviewer has appropriately pointed out that the OED is not a dictionary of Old English, and thus "this inventory of early attestations of Modern English manner verbs seems more a testament to the longevity of the forms than to the nature of Old English; i.e., a continued interest in manner verbs perhaps, but not as an indicator of the strength of that vocabulary relative to other non-manner vocabulary in Old English." Another reviewer notes that the diachronic pattern "demonstrates *renewal* of the lexical inventory for manner in English, but it does not demonstrate *increase* in the number of forms, since no doubt many older forms have disappeared simultaneously." It is difficult to assess the degree of manner salience of earlier forms of a language, because texts are limited in quantity and are restricted in genre for earlier periods. However, it is striking how many manner verbs from previous centuries are still current.

Cognitive consequences: Typological influences on mental imagery, memory, and attention

There is a growing body of theoretical discussion and empirical evidence relating to the enduring problem of linguistic relativity and determinism (see papers in Gentner & Goldin-Meadow 2003; Gumperz & Levinson 1996; Niemeier & Dirven 2000). A large range of studies point to effects of language on categorization, attention, mental imagery, memory, learning, and evaluation. I will only briefly mention several ongoing and recent studies in the domain of motion.

Mental imagery

My students and I are carrying out research that supports the impression that there are major differences in mental imagery between speakers of satellite- and verb-framed languages. We give English- and Spanish-speakers passages to read from novels, later asking them to report mental imagery for the narrated events. The examples are from Spanish novels, in which manner verbs are not used, but in which the author provides information about the nature of the terrain and the protagonist's inner state, allowing for inferences of manner. English speakers are given literal translations of the Spanish texts. For example, in a selection from Isabel Allende's *La casa de los espíritus* (*The house of the spirits*), the following information was provided as part of a longer passage that the subjects were asked to read to themselves:

> Spanish original: "*Tomó sus maletas y echó a* ***andar por el barrial y las piedras de un sendero*** *que conducía al pueblo.* ***Caminó*** *más de diez minutos, agradecido de que no lloviera, porque* ***a duras penas podía avanzar con sus pesadas maletas*** *por ese camino y comprendió que la lluvia lo habría convertido en pocos segundos en un lodazal intransitable."*
>
> English version: "He picked up his bags and started to ***walk through the mud and stones of a path*** that led to the town. He ***walked*** for more than ten minutes, grateful that it was not raining, because ***it was only with difficulty that he was able to advance along the path with his heavy suitcases***, and he realized that the rain would have converted it in a few seconds into an impassable mudhole."

Not surprisingly, almost all English speakers report mental imagery for the protagonist's manner of movement, using manner verbs such as *stagger, stumble, trudge*, as well as more elaborate descriptions, such as: "he dodges occasional hazards in the trail," "he rocks from side to side," and "slowly edges his way down the trail." One might expect that Spanish readers would form similar mental images on reading this passage, but surprisingly, only a handful of Spanish speakers from Mexico, Chile, Puerto Rico, and Spain provide such reports. The vast majority report little or no imagery of the manner of the protagonist's movement, although they report clear images of the muddy,

Table 4. Manner-of-motion verbs in bilingual mental imagery reports

Language	Low manner verbs		High manner verbs		Total number of manner verbs
	NUMBER OF TYPES	EXAMPLES OF VERBS	NUMBER OF TYPES	EXAMPLES OF VERBS	
English	5	*run, walk...*	12	*crawl, pace, stomp, roll, wander...*	17
Spanish	5	*correr, caminar...* [run, walk...]	2	*resbalar, rodar* [slip, roll]	7

stony path and the physical surroundings of the scene. They often report having seen a series of static images or still pictures ("more like photographs").

Bilinguals tested in both languages systematically report more mental imagery for manner of motion, and less for physical surroundings, when reading in English, in comparison with Spanish. Table 4 presents data from an ongoing study of Puerto Rican Spanish-English bilinguals (in collaboration with Lera Boroditsky and Ilia Diaz Santiago at MIT). When reporting mental imagery for passages in English, bilinguals used 17 different manner verbs, whereas when reporting imagery for the same passages in Spanish, they used only seven. Most striking is the difference between "low manner verbs" – everyday verbs like *run* and *walk* – which did not pattern differently under the two conditions, and "high manner verbs" – that is, more expressive verbs such as *crawl, stomp, roll*. Reports in Spanish had two such verbs (both from the same scene), in comparison with twelve in English (for various scenes).

Such findings suggest that the actual conceptualizations of motion events may differ for speakers of typologically different languages – at least when conceptualizations are evoked by the verbal experiencing of such events through narrative.[8]

Attention and memory

A recent Berkeley doctoral dissertation by a Korean psycholinguist, Kyung-ju Oh (Oh 2003) goes further, suggesting influences of linguistic habits on ongoing attention to visually experienced events. Oh presented Korean and English speakers with a series of videoclips in which an individual carried out various activities, including motion events in different manners (strolling out of a building, trudging along a path, etc.).

8. Clearly, more research is needed to track elusive inner states such as mental imagery. Ongoing studies of co-speech gesture in several languages of different types does not seem to contradict the ranking of languages on a cline of manner salience: Ibarretxe-Antuñano (2004): Basque; McNeill and Duncan (2000): English, Mandarin, Spanish; Özyürek and Kita (1999): English, Turkish; Taub, Piñar and Galvan (2002): ASL, English, Spanish.

Korean is a verb-framed language, with similar characteristics to other verb-framed languages discussed earlier. Subjects were monolinguals tested in their home countries. Later, the subjects were given surprise questions about their memory for details of the videoclips. The Koreans and Americans did not differ in memory for directionality of motion. This lack of difference provided a critical control: path is the core of motion events in all types of languages, therefore the salience of directionality should not be sensitive to typology. As a further control, the two groups did not differ in accuracy of memory for non-motion details such as the clothing and objects carried by the actor in the clips. But the Americans were significantly better at recalling details of manner of motion, such as length of arm swing, width of gait, and rate of motion. Note that these details are not explicitly encoded in verbs such as *stroll* and *trudge*; they constitute part of the sensorimotor image of such manners of motion. Oh suggests that English speakers – in the process of acquiring the lexically encoded distinctions of English verbs – come to attend to the relevant event components that distinguish the meanings of those verbs. Such attentional habits or predispositions can be revealed even when events are experienced nonverbally.

Attention and learning

Finally, recent experiments by Alan Kersten and collaborators (Kersten et al. 2003) show that covert attention to manner of motion can be revealed in learning tasks. Subjects viewed animated cartoons in which alien creatures moved along various non-nameable paths in various non-nameable manners (e.g., a six-legged creature moved toward another creature diagonally and then changed course, while alternately wiggling front and rear legs). Subjects were told that these aliens belong to four different species and they were to guess which species a creature belonged to by pushing one of four buttons. After each choice they were told if they had been correct or not. English- and Spanish-speakers did not differ in how long it took them to learn to distinguish the four species on the basis of type of path, but English-speakers were significantly better at learning to categorize on the basis of manner. Bilinguals performed more like English-speakers when trained in English, and more like Spanish-speakers when trained in Spanish (suggesting a sort of "biconceptualism"). Note that none of the dimensions was easily lexicalized in either Spanish or English. Yet English-speakers, and bilinguals using English, seemed to be more sensitive to fine differences in motor patterns of directional activity – even in alien, six-legged creatures. Kersten concludes that people learn to attend to the sorts of event attributes that are regularly and prominently encoded in their language.

Beyond typologies of lexicalization patterns

The phenomena discussed thus far have all been based on the availability of manner-of-motion verbs for the encoding of motion events. However, in broader cognitive terms, a domain of experience becomes salient if the language provides accessible means of expression for dimensions of that domain. There are other ways in which a domain is rendered codable, and the chapter concludes with a brief discussion of two of them: ideophones and posture verbs. These forms are available to verb-framed languages that otherwise might be expected to be low in manner salience. Such expansions of lexical resources make it clear that a full account of cognitive consequences of linguistic form will have to base itself on more than one typological characteristic.

Ideophones

Readers familiar with Japanese will probably have objected, early on, that manner can also be expressed in conventional psychoacoustic forms, using syllables that are designated as *ideophones* or *mimetics*. Japanese has a large and systematic lexicon of such onomatopoeic forms, with a privileged syntactic slot for their use. As demonstrated in a recent conference volume (Voeltz & Kilian-Hatz 2001), ideophones are widely distributed in languages around the globe. A cursory examination of forms in that volume, and elsewhere, makes it clear that ideophones can function to encode specific manners of movement in the same way as the specialized manner verb vocabularies of languages like English or Hungarian. Consider the following examples, from a diverse array of languages and geographical areas: *gulukudu* 'rush in headlong' (Zulu), *minyaminya* 'stealthily' (Ewe), *kítíkítí* 'at-a-stomp' (Emai), *widawid* 'swinging the arms while walking' (Ilocano), *badi badi* 'waddling' (Turkish), *dēngdēng* 'tramping' (Mandarin), *tyôko-maka* 'moving around in small steps' (Japanese).[9] Frequent use of ideophones in frog stories has been reported for Basque (Ibarretxe-Antuñano 2004), Korean (Oh 2004), and Japanese (Sugiyama 2000, 2005).

Posture verbs

Another way of conveying information about manner of movement is to describe the posture of a human being or animal in combination with a simple path or manner verb. The Mayan languages are rich in *positionals*, that is, "verbal roots which convey Position of animate or inanimate things (in stasis, or concurrent-with, or as-a-result-of motion)" (Brown 2004:39). Brown, in a paper on Tzeltal Mayan frog stories, reports that there are several hundred positionals in the language. Although Tzeltal is verb-

9. *Sources*: Zulu (Msimang & Poulos 2001), Ewe (Ameka 2001), Emai (Schaefer 2001), Ilocano (Rubino 2001), Turkish (Jendraschek 2002), Mandarin (Ying 1988), Japanese (Hamano 1998).

framed, the positionals make it possible to express specific manners of movement, as in example (10) from Brown's frog stories (p. 46):

(10) *xpejkunaj xben yilel*
'He [dog] looks like he's *low-crouching walking* [=he's limping]

Conclusion

This chapter reviews ongoing exploration of the complex conceptual and semantic domain of motion events, exploring one part of that domain – the linguistic expression of manner of self-motion across languages of different types. The basic claim is that if a domain is elaborated in linguistic expression, users of that language will continually attend to and elaborate that domain cognitively. Sometimes a fairly small feature of linguistic form can have widespread effects. In this particular subdomain, it appears that if a language ends up using main verbs to encode path, it will have limited lexical resources for encoding manner. The determining psycholinguistic forces are to be found in processing load, and the determining cognitive forces are to be found in habitual attention to the granularity of experience that is readily encoded in the language. These forces reinforce themselves over time, both in the diachronic and ontogenetic developments of the language.

With regard to typologies of lexicalization patterns – whether two-part or three-part – the psycholinguistic mechanisms begin to answer a question posed by Talmy with regard to some of the work reviewed here (Talmy 2000: 156):

> Slobin (1996) has further observed that verb-framed languages like Spanish not only express Manner less readily than satellite-framed languages like English, but that they also have fewer distinct lexical verbs for expressing distinctions of Manner. The ... principles posited here do not account for this phenomenon, so further explanation must be sought.

In addition, attention to forms such as ideophones and postural verbs indicates that a full account of the cognitive salience of an experiential domain cannot be found in an examination of lexicalization patterns alone. All of the resources of a language must be studied in order to approach the goal of the current volume – that is, to understand the linguistic systems and cognitive categories that are involved in "space in languages."

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CHAPTER 4

The semantic structure of motion verbs in French

Typological perspectives[1]

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This paper investigates the semantic structure of motion verbs in French and re-evaluates its place in the typology of Motion events (Talmy 1991, 2000). It illustrates how, contrary to its widely claimed tendency to be a verb-framed language that expresses Path of motion in the verb, French can also express Path in a prefix revealing a satellite-framed pattern attributed to Germanic and Slavic languages. It shows that the expression of Path in a prefix is associated with a great variety of lexicalization patterns regarding the verb stem, including some supposed to be rare in the languages of the world. Finally, it examines the morphological productivity and the semantic transparency of this pattern, pointing to the diachronic source of the typological complexity of contemporary French.

1. Introduction

This study addresses the question of the semantic structure of motion verbs in French, with a specific focus on prefixed verbs as opposed to morphologically simple verbs, and discusses the place of French in a by now very well-known linguistic typology of Motion events (Talmy 1991, 2000). According to this typology, French as a Romance language shows a preference for the lexicalization of Path of motion in the verb, in contrast to Germanic and Slavonic languages, which en-

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code Path in a satellite associated with the verb, such as a particle or a prefix. The study re-evaluates the place of French in the typology of Motion events, showing that French is a hybrid system that amalgamates characteristics of both types of language that can encode Path in either a verb or a verbal prefix. Furthermore, it shows that the latter encoding strategy is a remnant of its earlier typological system, which has evolved over the centuries.

Section 2 briefly presents the typology of Motion events and illustrates the type of encoding strategies existing in French to express Path. Focusing mainly on prefixed verbs, Section 3 provides a description of the prefixes encoding Path, examining their role in the expression of motion and the type of semantic elements that they allow to be expressed in the verb root. The productivity of this encoding strategy is discussed in Section 4 through an analysis of the morphological availability of the prefixation process and of the semantic transparency of prefixed verbs of motion in French. Pointing to the diachronic source of this strategy, Section 5 considers the typologically mixed nature of French and presents a typological cline for verbs of motion in Modern French.

2. The typological framework

The background of this study is the typology of Motion events proposed by Talmy (1991, 2000), which is based on a systematic analysis of the relation between the semantic elements associated with spatial events – Figure (moving entity), Ground (reference entity), Path (direction followed or site occupied by the Figure), Manner and/or Cause – and the linguistic surface structure. Depending on the morpho-syntactic device used by the language to encode Path and Manner, two semantic parameters of cross-linguistic variation, this typology divides languages into two main types. The first type, called *verb-framed languages*, expresses Path in the main verb and Manner periphrastically, and hence not obligatorily, in an adverbial clause (e.g., *enter* [*running*], *exit* [*running*]), as in Romance and Semitic languages. The second type, called *satellite-framed languages*, expresses Manner in the main verb and Path in a morpheme associated with the verb (a particle or a prefix, e.g., *run in*, *run out*), as in Germanic and Slavonic languages.

In this typology, French, like all the other Romance languages, is defined as a verb-framed language, with Path encoded in the verb and Manner in a gerund, as evidenced in the following examples:

(1) Verb-framed pattern
   a. *Pierre est entré dans l'école en courant.*
      (lit.) Pierre entered the school running.

b. *Pierre est sorti de l'école en courant.*
(lit.) Pierre exited the school running.

French has about fifteen verbs lexicalizing the notion of Path, including the verbs *arriver* 'arrive', *descendre* 'go down', *longer* 'go along', *monter* 'go up', *partir* 'leave', *passer* 'pass by', *traverser* 'cross', *venir* 'come', etc.

Nevertheless, although the fact of encoding Path in the verb is well attested, French (and possibly other Romance languages as well) can also express this notion in a prefix, leaving the slot of the verb root free to encode Manner, a characteristic typically assigned by the typology to Germanic and Slavonic languages, for example:

(2) Satellite-framed pattern
a. *Pierre s'est* ***en****fui de l'école.*
Pierre ran away (escaped) from school.
b. *Les abeilles se sont* ***en****volées de la ruche.*
The bees flew away from the hive.

At the cross-linguistic level, such structural differences have been shown to be responsible for the type of information provided in discourse. Much evidence has been provided by linguistic and psycholinguistic studies of the ways in which such language-specific patterns influence discourse patterns, drawing speakers' attention to different dimensions of motion events, Path or Manner, depending on what is obligatorily expressed in the language (e.g., Slobin 1996, 2004). In view of these cross-linguistic findings, the fact that French has two types of patterns in its system raises the intriguing question of what impact such a system has on the cognitive representation of motion in speakers of this language. Although it is crucial for a better understanding of motion representation, the issue of the discursive and cognitive implications of the typology is beyond the scope of the present study and will not be discussed in this paper. The following sections will focus instead on the linguistic analysis of the satellite-framed pattern, which has not been explored as yet in light of Talmy's typology and, more generally, which has been neglected by studies of the expression of motion in French.

3. The satellite-framed pattern in French

Before considering French prefixes, let us first clarify the notion of *satellite*, which can refer to various linguistic tools employed by languages to express the notion of Path and, in some cases, the notions of Manner or of Cause. Talmy defines this term in the following way:

> (...) satellite is a grammatical category of any constituent other than nominal complement that is in sister relation to the verb root. The satellite, which can be either a bound affix or a free word, is thus intended to encompass all of the following grammatical forms, which traditionally have been largely treated independently of each other: English particles, German separable and inseparable verb prefixes, Latin or Russian verb prefixes, Chinese verb complements, Lahu non-head versatile verbs, Caddo incorporated nouns, and Atsugewi polysynthetic affixes round the verb root. (Talmy 1991: 486)

Inherited from Latin, French satellites have the form of prefixes. The following sections will present these prefixes, outline their role in the expression of motion and examine the type of semantic elements which they can express in the verb.

3.1 French verbal prefixes as path satellites

French has about 60 prefixes, the majority of which are of Latin origin, with some from Greek. While most of these prefixes can be combined with nouns and/or adjectives, only 22 of them play a role in the derivation of verbs (cf. Béchade 1992). These verbal prefixes show a wide range of meanings from concrete to abstract and even to quite obscure or 'colorless'. Nevertheless, among these prefixes, 11 have the property of conveying a spatial meaning in general and the notion of Path in particular. Their form and meaning, and a few examples of their use, are given in Table 1. Note that some of these prefixes have two or more forms, depending either on (i) whether they are in a literary word based on Latin or in a popular word borrowed from Latin and Gallicized later (e.g., *é-*/*ex-* 'out of', *entre-*/ *inter-* 'be-

Table 1. Path prefixes in French

prefix	meaning	Examples
a(d)-	'to, toward'	*ac-courir* 'run to', *at-terir* 'land, touch down'
dé(s)-/dis-	'from, off, apart'	*dé-crocher* 'take off, unhook', *décoller* 'soak off'
é-/ex-	'out of'	*s'é-couler* 'flow out', *ex-traire* 'extract'
em-/en- (Lat. *inde*)	'away, off'	*s'en-voler* 'fly away', *s'en-fuir* 'run away'
em-/en- (Lat. *in*)	'in, into'	*en-fouir* 'bury in', *en-fermer* 'enclose'
entre-/inter-	'between, among'	*entre-poser* 'put in / between', *inter-caler* 'insert'
par-	'by, all over'	*par-courir* 'go all over', *par-semer* 'sprinkle all over'
ré-/r(e)-	'back, backwards'	*re-tourner* 'return, turn over', *re-venir* 'come back'
sou(s)-	'under'	*sou-tirer* 'extract, decant'
sur-	'on, over'	*sur-voler* 'fly over'
tra-/trans-/tre-	'across, through'	*trans-porter* 'transport', *trans-percer* 'pierce, go through'

tween, among'), or on (ii) the phonetic nature of the initial element of the lexical base (e.g., *em-/en-* 'in', *dé-/dés-* 'from, off').

All of these prefixes have their origin in locative or directional elements, developed mostly from adverbs (e.g., *em-/en-* 'away" < Lat. *inde*) and prepositions (*em-/en-* 'in'< Lat. *in*) through the well-known process of grammaticalization (cf. Darmesteter 1932; Nyrop 1936). It might be noted that at the stage of Old French some of these morphemes still had multiple functions in the language and could play the role of adverbs, prepositions, particles, and prefixes, as was the case for example with morphemes such as *par(-)*, *sous(-)* and *tres(-)* (cf. Marchello-Nizia 2002). In Modern French however, their multi-categorial functions are lost, and with few exceptions each category has its own set of morphemes.

3.2 The role of prefixes in the expression of motion

The question now arises as to the role played by prefixes in the verbal system of the language. In French, one can recognize their three functions as follows (cf. Amiot 2002; Boons 1991; Bourciez 1967; Corbin 1997; Gary-Prieur 1976; Martin 1971; Riegel et al. 1998):

i. *Aspect* – the prefix can modify the aspectual value of the verb root and present the process as having a terminal point (e.g., *croître* 'grow'/*accroître* 'increase'; *porter* 'carry'/*apporter* 'bring to');
ii. *Aktionsart* – the prefix can indicate a mode of action (intensive, quantitative, etc.) of the process designated by the verb root (e.g., *crier* 'cry'/*s'écrier* 'cry out'; *grandir* 'grow'/*agrandir* 'enlarge, expand');
iii. *Lexical derivation* – the prefix can modify the meaning of the verb and contribute to the expression of a significantly different process from that expressed by the verb root alone (e.g., *prendre* 'take'/*surprendre* 'surprise, amaze'; *chanter* 'sing'/*enchanter* 'enchant').

With respect to the specific role of prefixes associated with verbs of motion, they determine the spatio-temporal frame of the process expressed by the verb and indicate one of the three phases of motion on the axis of Path: initial (departure from the source), medial (course of the journey) or final (arrival at the goal). The examples in (3) below illustrate this semantic contribution of prefixes to the representation of motion events. As activity verbs, *voler* 'to fly', *courir* 'to run' and *fouir* 'to dig' express processes which have no intrinsic limits; that is, they have no goal or final point, and their termination does not result from the structure of the motion but provides merely a temporal boundary. It can be seen that the mere addition of a prefix to these verb roots introduces not only a temporal but also a spatial frame by indicating a change in the spatial relation between the Figure and the Ground: *en-* (Lat. *inde*) 'away' indicates the departure from the source (3a),

Table 2. Spatio-temporal semantics of French prefixes

initial phase or source	medial phase or journey	final phase or goal
em-/en- (Lat. *inde*) 'away, off'	tra-/trans- 'across, through'	a(d)- 'to, toward'
dé(s)- 'from, off, apart'	par- 'by'	entre-/inter- 'between, among'
é-/ex-'out of'	sous- 'under'	em-/en- (Lat. *in*) 'in, into'
		re- 'back'
		sur- 'on, on top of'

par- (*by, over*) indicates the course of a journey (3b) and *en-* (Lat. *in*) 'in' indicates the arrival at the goal (3c).

(3) a. *L'oiseau s'est **en**volé du nid.* [*initial phase*]
'The bird flew away from the nest.'

b. *Les enfants ont **par**couru le parc.* [*medial phase*]
'The children ran all over the park.'

c. *Oscar a **en**foui le trésor dans le sable.* [*final phase*]
'Oscar buried the treasure in the sand.'

As demonstrated by these examples, verbal prefixes therefore play an essential role in the conceptualization of motion, involving a change from one stage to another, in other words a resultant state. When looking at the underlying semantic features of different prefixes, one can recognize that each of them profiles a different spatio-temporal phase of the motion event: initial, median or final, as shown in Table 2.

Concerning the underlying semantics of these morphemes, it may furthermore be noticed that, as is more generally the case with satellites in the languages of the world (e.g., Germanic particles, Slavic prefixes, etc.), French prefixes can also incorporate, concomitantly with the notion of Path, other semantic nuances such as deixis (e.g., *em-/en* [Lat. *inde*] 'away'), geometric Ground properties (e.g., *tra-/trans-* 'through, across'), directionality (e.g. *re-* 'back, backward'), or relative position (e.g., *sous* 'under').

3.3 The variety of lexicalization patterns

The process of prefixation within the category of motion verbs in French is associated with a great variety of lexicalization patterns, including some supposed to be rare or even unattested in the languages of the world.

According to Talmy (1985, 2000), there are three main lexicalization patterns concerning the type of elements expressed in the verb: (i) Motion + Path (e.g., *to enter*, *to exit*) (ii) Motion + Manner and/or Cause (e.g., *to run*, *to blow*), and (iii) Motion + Figure (e.g., *to rain*, *to snow*). Talmy also observes that the first two types of lexicalization are the most prevalent in the languages of the world, while the

Table 3. [Motion + Manner] lexicalization pattern

V_{manner}		[**Pref–V_{manner}**]
courir 'run'	>	*ac-courir* 'run to'
tirer 'pull, draw'	>	*at-tirer* 'draw to / toward'
couler 'flow'	>	*s'é-couler* 'flow out'
crouler 'collapse'	>	*s'é-crouler* 'collapse, fall down'
fuir 'escape'	>	*s'en-fuir* 'escape, run away'
voler 'fly'	>	*s'en-voler* 'fly away'

third type is a less common process, mainly found in Amerindian languages. As for the potential fourth type, involving lexicalization of the Ground, it is said not to be attested or only attested with some rare exceptions in some languages (e.g., *to land*, *to shelve*). A possible explanation for this constraint is that the Ground is a stable entity which serves as a point of reference for the displacement of the Figure and is therefore typically encoded in a noun rather than in a verb with its associations of motion (Talmy 2000: 60–61).

Contrary to Talmy's claim, it will be shown that French does not seem to be sensitive to this constraint, inasmuch as its morphosyntactic tools – in this case the prefixation process – allow it to encode in the verb not only the Manner of motion, but also the Figure and even the Ground.

Table 3 shows the lexicalization of Manner of motion in the verb; that is, these verbs encode *how* the figure moves through space. It may be noticed that these verbs exist in the language in their simple form (with the activity meaning). When a prefix is added, it brings to the verb root the notion of Path (with the accomplishment meaning) that is not inherent in the verb root.

As for the other two semantic elements in the verb, Figure and Ground, they can be lexicalized through the derivational process of simultaneously adding a prefix and a verbal suffix to a nominal root, in the schema [Pref-N-er]:[2]

(4) a. $Pref_{path} - N_{figure} - er_{verbalizer}$
b. $Pref_{path} - N_{ground} - er_{verbalizer}$

As an illustration, Table 4 shows verbs derived from Figure-related nouns by means of the prefix *é-/ex-*, which denotes the notion of exit and/or extraction. The *é-/ex-* prefix has been particularly productive in this type of derivation and it has formed over 50 motion verbs by this morphological process.

Table 5 shows verbs derived from Ground-related nouns by means of the prefix *em-/en-* (Lat. *in*). This specific prefix conveys the meaning of inclusion and, much

2. These denominal verbs are mostly constructed with the prefixes *a(d)-* 'to', *dé(s)-* 'from, off', *é-/ex-* 'out of' and *em-/en-* 'in'.

Table 4. [Motion + Figure] lexicalization pattern

N_{figure}		[*é-*+N_{figure}+*er*]
crème 'cream'	>	*écrémer* 'skim'
goutte 'drop'	>	*égoutter* 'strain, drip'
grain 'grain'	>	*égrener* 'take grains out of'
pépin 'seed, stone'	>	*épépiner* 'take seeds out of'
tripe 'guts'	>	*étriper* 'take guts out of'

Table 5. [Motion + Ground] lexicalization pattern

N_{ground}		[*em-/en-*+N_{ground}+*er*]
bouteille 'bottle'	>	*embouteiller* 'put in bottles'
poing 'fist'	>	*empoigner* 'grasp'
pot 'pot'	>	*empoter* 'put in pots'
prison 'prison'	>	*emprisonner* 'put in prison'
cadre 'frame'	>	*encadrer* 'put in a frame'

like the prefix *é-/ex-* for Figure verbs, it has been very productive in this particular type of derivation, resulting in about 40 verbs of motion.

It may be noticed that this particular process, consisting in the simultaneous addition of a prefix and a verbal suffix to a noun, produces verbs expressing externally caused motion, which occur in transitive constructions. As schematized below, Figure-causative verbs call for an object representing the Ground, whereas Ground-causative verbs call for an object representing the Figure:

(5)

	Subject	$V_{caused\ motion}$	Object
a.	N_{agent}	V_{figure}	N_{ground}
b.	N_{agent}	V_{ground}	N_{figure}

As an illustration, in Figure-causative constructions such as (6) the entity encoded in the verb is seen as being dissociated from the Ground-entity, which is expressed by the object of the verb.[3] This particular process affects the Ground-entity and results in a change of its state.

(6) a. *écrémer le lait*
(lit.) 'take cream out of milk'/'skim milk'
b. *épépiner les raisins*
(lit.) 'take seeds out of grapes'

3. The prefix *é-/ex-* shown in these examples is intimately linked to the part-whole relation; that is, the entity encoded in the verb is seen as part of the entity designated by the object of the verb (cf. Aurnague & Plénat 1997).

c. *étriper le poisson*
(lit.) 'take the guts out of fish'

In contrast, in Ground-causative constructions such as (7) the entity expressed by the verb is conceived as a reference object with respect to which the Figure, expressed by the object of the verb, is displaced. This specific process affects the Figure-entity and results in a change of its location.

(7) a. *empoter une plante*
'pot a plant'
b. *encadrer un tableau*
'frame a picture'
c. *emprisonner l'assassin*
'imprison the assassin'

4. The productivity of the satellite-framed pattern in French

Now that we have seen the Path prefixes and the different types of lexicalization patterns existing in French, the following sections examine the morphological productivity and the semantic transparency of verbs belonging to the satellite-framed pattern, pointing out the diachronic source of the typological complexity in contemporary language.

4.1 The cline of morphological productivity

The notion of *productivity* is used here to mean *availability* of a morphological process to form new words in the present state of the language, through application to a variety of lexical roots resulting in a large number of derivatives (cf. Bauer 2001; Corbin 1987).[4] Such availability results in regular lexical innovation; in its absence new words are produced only in a sporadic way dependent on *creativity* (i.e., *non-productive innovation*, cf. Bauer 2001).[5]

4. The notion of *productivity* is frequently used with reference to the amplitude of the morphological family, that is, the quantity of words produced by a morphological process and confirmed at a given state of the language. However, this definition runs against the problems of distinguishing past productivity – that is, what a given morphological process has produced – and present productivity – that is, what a given process is capable of producing in the current state of the language.

5. It is not always easy to distinguish between *productivity* and *creativity*. However, while productivity implies creativity, the reverse is not true.

Table 6. Decrease in productivity of the prefix *a(d)-*. (from Dufresne et al. 2000: 135; see also Dufresne et al. 2001)

century	13th	14th	15th	16th	17th	18th	19th	20th
# of new V	312	24	18	12	1	3	2	2

It is crucial to observe that French verbal prefixation was to some extent a productive process in the Old and Middle periods of the language, that is, until the end of the 15th century (Bourciez 1967; Dufresne & Dupuis 1998; Dufresne et al. 2000; Dufresne et al. 2001; Martin 1971). As has been shown by various studies, the prefixes *a(d)-* 'to', *em-/en-* (Lat. *in*) 'in', *de(s)-* 'from, off', *e(x)-* 'out of', *par-* 'by, all over', and *re-* 'back' were among the most productive during this period. However, from Old to Modern French, the language progressively lost the productivity of these verbal prefixes.

Table 6 below shows the special case of the prefix *a(d)-*, which has been systematically studied by Dufresne and Dupuis (1998) and by Dufresne et al. (2000, 2001). It shows the decrease over the centuries in new verbs created by the addition of *a(d)-* and thus the progressive loss of its productivity. Indeed, whereas in the 14th century 24 new verbs were added to the 312 recorded in Old French (10th–13th centuries) and mostly inherited from Latin, the 15th and 16th centuries were characterized by a decrease in the productivity of *a(d)-*. Thus, this productivity was lost almost entirely over the period between the 17th and the 20th centuries.[6]

The particular case of the prefix *a(d)-* reflects a widespread general loss of productivity in French verbal prefixes, although this took place at different periods for different prefixes. That is, whereas the productivity of some prefixes was lost in Old French, some others retained their productivity for several centuries. Gosselin (1999) shows for example that the productivity of *re-* 'back' (except in its iterative meaning) weakened towards the end of the 12th century, that of *a(d)-* 'to' and *par-* 'by, all over' towards the end of the 15th century, and that of *de(s)-* 'from, off' (except in its meaning of change of state) towards the end of the 16th century. On the other hand, and as evidenced by dictionaries, the productivity of the prefixes *é-/ex-* 'out of' and *em-/en-* 'in' remained steady, specifically in the formation of denominal verbs, until the 20th century, when it began to decrease progressively. Thus, in Modern French, only two prefixes still seem to be productive: *dé(s)-* with the meaning of change of state and *ré-* with the meaning of iterativity (see neologisms listed in TLFI[7] and Sablayrolles 2000). All the other prefixes hardly produce

6. During the long period between the 17th and the 20th centuries only eight verbs were created: *amatir* (17th); *aménager*, *assainir*, *attendrir* (18th); *amocher*, *aveuilir* (19th); *alunir* and *apponter* (20th) (Dufresne et al. 2000: 135).

7. Trésor de la Langue Française Informatisé (http://atilf.atilf.fr/tlfv3.htm)

Table 7. Examples of the prefix-verb combination in French

Prefixes	*porter* 'to carry'	*mener* 'to lead'	*courir* 'to run'	*lever* 'to lift'	*voler* 'to fly'	*(se) rouler* 'to roll'
ré-/re-/r(a)-	✓	✓	✓	✓	✓	–
em-/en- (Lat. *inde*)	✓	✓	✓	✓	✓	–
a(d)-	✓	✓	✓	–	–	–
dé(s)- / dis-	✓	✓	–	–	–	✓
é-/ex-	✓	–	–	✓	–	–
sur-	–	✓	–	–	✓	–
em-/en- (Lat. *in*)	–	–	✓	–	–	✓
tra-/trans-/tre-	✓	–	–	–	–	–
par-	–	–	✓	–	–	–
sou(s)-	–	–	–	✓	–	–
entre-/inter-	–	–	–	–	–	–

any verbs in a consistent way except by analogy with other verbs, as is the case for *alunir* 'land on the moon' and *apponter* 'land on an aircraft carrier' created in the 20th century by analogy with *atterrir* 'land on the earth' (cf. DHLF[8] 2000).

The consequence of this loss for Modern French is that prefixed verbs survive in their remnant forms and new combinations between prefixes and verbal stems are not formed freely. That is, whereas certain verbs can still combine with a range of prefixes, most of them occur as fixed units with only one prefix. Table 7 above shows how 11 spatial prefixes may combine with 6 verbs of motion. If we look at these verbs and their combinability with various prefixes, we can observe that the verb *porter* 'to carry' is a fairly exceptional case in its ability to combine with 6 of the 11 prefixes. In contrast, the verb *(se) rouler* 'to roll', which combines with only 2 of the 11 prefixes, is much more typical of modern French verbs.

If we look at how the prefixes may combine with these verbs, we can see that none of the 11 prefixes can combine with all 6 verbs. Among the prefixes, only *re-* 'back' and *em-/en-* (Lat. *inde*) 'away' display general combinability in that they combine with 5 of the 6 verbs listed. The combinability of the other prefixes is not as great; this generalization holds not just for the verbs illustrated in this table but also for motion verbs in general.

To summarize this brief presentation, we can see that although Modern French possesses a wide variety of prefixes, they seem to form a cline going from those that maintain a certain vitality at one end, and those that no longer exhibit any productivity at the other end.

8. Dictionnaire Historique de la Langue Française

4.2 The cline of semantic transparency

The notion of *semantic transparency* will be used here with the meaning proposed by Dressler (1985), who defines it as a reciprocal relationship between form and meaning (or biuniqueness between form and meaning). Such a reciprocal relationship implies: (i) the phonological transparency of the morphological process, that is, to what extent a derived word preserves the segmental integrity of its constituent parts, and (ii) semantic transparency, that is, to what extent each constituent part of the derived word is semantically interpretable. A word which retains the composite character of form and meaning thus stands in contrast to a word which, being originally morphologically complex, does not really have a composite character in contemporary language. However, as emphasized by Dressler, this relation of reciprocity between form and meaning is a question of degree, so that transparency occurs on a cline and derived words are spread over a continuum ranging from more transparent to more opaque.

On the basis of the analysis of the morphological and semantic structures of prefixed verbs of motion in French, we can distinguish the following three degrees of transparency:

i. + *transparent*: the relation between form and meaning is perceptible and comprehensible;
ii. ± *transparent*: the relation between form and meaning is not clearly perceptible, despite the formal link between the simple form and the derived form;
iii. – *transparent*: the relation between form and meaning is lost.

Table 8 below shows this graduated transparency revealed by motion verbs in French, at the morphological (+ form) and semantic (+ meaning) levels.

1st case: + *transparent*
The first case concerns verbs whose constituent elements – prefix and lexical root – are discernable both in their form and in their meaning. The transparency of these verbs results from the lexical autonomy of the base from which they are derived, which makes the boundaries between the constituent elements distinct and thereby facilitates their semantic interpretation.

Among these verbs, we first note those constructed from verbal roots – *accourir* (*ac-courir*) 'run to', *dérouler* (*dé-rouler*) 'roll out', etc. – which exist independently in the language without a prefix and for which the relation between simple verb and derived verb is clearly perceptible at the formal and semantic levels. That is, the meaning conveyed by the prefix (notion of Path) and the meaning conveyed by the verb root (notion of Manner) are clearly distinct from each other.

In this category, we also find verbs formed from nominal roots by the simultaneous addition of a verbal prefix and a verbal suffix (*-er* or *-ir*). The category includes the great majority of verbs which code in their root either the Figure –

Table 8. Degrees of semantic transparency in prefixed motion verbs

	prefix/base relation	**pattern**	**examples**
+ transparent	+ form / + meaning	[pref+V]	*ac-courir* 'run to' *dé-rouler* 'roll out' *é-couler* 'flow out' *re-tourner* 'turn round / over'
		[pref+N+er]	*dé-givrer* 'de-ice' *dé-raill-er* 'derail' *é-crém-er* 'skim' *em-pot-er* 'put in pot'
± transparent	+ form / – meaning	[pref+V]	*ac-céder* 'get to' *tre-saillir* 'shiver, tremble'
		[pref+N+er]	*dé-ball-er* 'unpack' *(se) tré-mouss-er* 'wriggle'
– transparent	– form / – meaning	[V]	*affluer* 'flow to' *déferler* 'unfurl, break' *dégringoler* 'tumble down' *dégouliner* 'trickle' déployer 'spread out' *échapper* 'escape'

dégivrer 'de-ice' and *écrémer* 'skim' – or the Ground – *dérailler* 'derail' and *empoter* 'pot'. Although these verbs can only exist as verbs if they are prefixed, the nominal nature of the base (*givre* 'ice', *crème* 'cream', *rail* 'rail', *pot* 'pot') greatly helps in the interpretation of the elements composing the verbs.

2nd case: ± *transparent*

The second degree of transparency involves prefixed verbs which retain a formal link with the lexical root from which they were derived, but whose morphological structure is not informative. In this category we can distinguish verbs formed from verbal bases (e.g., *accéder* 'to get to' derived from *céder* 'to give up', and *tresaillir* 'to shiver, to tremble' derived from *saillir* 'to jut out') and verbs formed from nominal bases by the addition of a prefix and a suffix (e.g., *déballer* 'to unpack' derived from the noun *balle* 'ball', and *trémousser* 'to wriggle' derived from the noun *mousse* 'froth, mousse'). Despite the formal link that can be established between the lexical base and the prefixed verb, the meaning of these verbs is not predictable from the meaning of their parts, and so they are interpreted as a whole.

3rd case: – *transparent*

The third category includes verbs which are diachronically derived from either nominal or verbal roots, but in which the link between form and meaning is no longer transparent in Modern French. Table 9 gives three motion verbs which were derived from a nominal base by the addition of a prefix and verbal suffix, and

which have lost the compositionality of their meaning. The morphological and semantic opacity of these verbs is essentially due to the fact that the lexical roots from which they were constructed no longer exist in the lexicon of contemporary French, and thus the prefix and the lexical root have fused both morphologically and semantically.

The first two verbs – *dégringoler* 'tumble down', *dégouliner* 'trickle' – were derived by means of the prefix *dé(s)-* indicating the point of origin from the nouns *gringole* 'hill' and *goule* 'throat, gullet'. Now obsolete, these nouns can no longer be isolated morphologically, and their meaning has merged with that of the prefix *dé(s)-*. These verbs are therefore interpreted as single units and designate downward motion carried out in a certain manner: *dégouliner* means 'flow slowly' (of a glutinous or viscous liquid), and *dégringoler* means 'descend precipitously by little successive jumps'. As for the verb *échapper* 'escape, run away', it is diachronically composed of the prefix *é-*/*ex-* indicating the notion of 'go out' and of the noun *chape* 'cape' (present in the word *chapeau* 'hat'). Originally, the verb signified literally 'go out of the cape', suggesting 'leave one's cape in the hands of one's pursuers' (DHLF 2000). Nevertheless, the motivation between form and meaning has been lost and the verb *échapper* is nowadays understood in its general meaning of 'escape from a place, avoid'.

Table 10 provides some examples of verbs constructed from verbal bases: *affluer,* derived from *-fluer* with the prefix *a-* indicating the point of arrival, and *déferler* and *déployer,* derived from *-ferler* and *-ployer* with the prefix *dé-* indicating the point of departure.

Although they were autonomous verbs in Old French and are still attested in some contemporary dictionaries, the lexical bases from which these verbs were di-

Table 9. Opaque denominal verbs

Verb		Lexical base
dégringoler 'tumble down'	<	† gringole *'hill'*
dégouliner 'trickle'	<	† goule *'throat, gullet'*
échapper 'escape, run away'	<	† chape *'cape'*

Table 10. Opaque deverbal verbs

Verb		Lexical base
affluer 'flow to'	<	?fluer *'flow'**
déferler 'unfurl, break'	<	?ferler *'furl (a sail)'*
déployer 'spread out'	<	?ployer *'fold'*

*The lexical root *-fluer* is present in other prefixed verbs such as *confluer* 'flow together', *influer* 'flow in' and *refluer* 'flow in the opposite direction'.

achronically derived are no longer in use in their simple form in Modern French. The loss of the composite nature of these verbs has had an impact on their underlying semantic structure such that the meanings of their original morphemes have merged. As a result, these verbs are perceived as being semantically complex in that they conflate both Path (originally in the prefix) and Manner of motion (originally in the verb root): *affluer* means 'flow in abundance towards', *déferler* means 'set (spread) a sail' or 'break into spray' (referring to waves), and *déployer* means 'develop to its full extension'.[9]

5. The typological hybridization of French

The findings of this study show that French does not correspond to a consistent type within Talmy's typology and furthermore exhibits a greater variety of lexicalization patterns than had previously been recognized.

More precisely, the study confirms that French, as was initially established by the typology, displays properties of a verb-framed language, reflected notably in the encoding of Path of motion in the verb and of Manner of motion in a gerund. However, French also displays the properties of a satellite-framed language, by expressing Path in a prefix. Furthermore, the process of prefixation allows not only the Manner of motion but also the Figure and even the Ground to be expressed in the verb, through the formation of verbs encoding externally caused motion.

The diachronic sketch suggests that the satellite-framed pattern is the remnant of an earlier typological system, that was predominant in Old French. Due to the loss of productivity of verbal prefixes, some verbs have shifted over the centuries towards the verb-framed pattern, while others remain in the satellite-framed pattern in the contemporary language (cf. Kopecka 2004, in press). The synchronic consequence of this typological evolution is that French verbs of motion form a continuum that can be represented as shown in Table 11.

This distribution over the continuum accounts for the typological complexity of contemporary French. Verbs on the left represent the typologically predicted

9. Considering different aspects of prefix-verb relations, we might notice that the vitality of the prefixation process in French, and thus of the encoding strategy referred to as satellite-framed, is weaker than that of the same process in Germanic or Slavonic languages. Thus, in contrast to French, the same process is available in Germanic or Slavonic languages for productive and semantically transparent word formation, involving a wide range of combinations between satellites (particles or prefixes) and verbs of motion. It may be noticed, however, that in some Slavonic languages, such as Serbo-Croatian, some Path prefixes have also fused with the verbs of motion so that these verbs are perceived by speakers as monomorphemic (Dan Slobin, personal communication February 2003).

Table 11. Typological continuum of verbs of motion in French

Satellite-framed pattern		**Verb-framed pattern**
←		→
[PREF$_{path}$] – [V$_{manner}$] ac-courir dé-rouler é-couler ...	[V$_{path + manner}$] affluer déferler échapper ...	[V$_{path}$] arriver descendre entrer ...
[PREF$_{path}$] – [N$_{figure}$] – er é-crèm-er é-trip-er dé-peupl-er ...		
[PREF$_{path}$]– [N$_{ground}$] – er ac-croch-er em-pot-er dé-raill-er ...		

satellite-framed pattern with Path encoded in the prefix, while verbs on the right represent the verb-framed pattern, of which some (such as *arriver*, *descendre,* and *entrer*) are the result of the lexical fusion of prefixes and verbal roots. For certain verbs, this process occurred at a very early stage of the language, going back sometimes to Latin (cf. Nyrop 1936). In the middle of the continuum are the verbs which, through lexical fusion of their original morphemes, have merged two semantic elements, Path and Manner, in their root.

This typological heterogeneity invites a re-evaluatation of French, and possibly of other Romance languages, in the typology of Motion events proposed by Talmy. Indeed, while the typology classifies Romance languages as *verb-framed languages*, the study of French clearly shows that it still has properties of a *satellite-framed language*. Considering this intra-linguistic typological duality, rather than classifying languages as belonging to one or the other type, it may be more appropriate to establish a *typology of patterns* (or of encoding strategies) to classify the types of morphosyntactic devices employed by languages for the encoding of Path, which are responsible for the observed mappings of semantic elements of motion events (i.e., Manner, Figure, Ground) onto linguistic structure. A typological view of this sort would have the advantage of taking into consideration possible typological complexity within a particular language which, as is the case for French, can use one strategy or the other, depending on the tools available in the system. Furthermore, this view could consider, much more finely than has been done so far, the possible sources of such typological complexity in a language (e.g., evolution from one pattern to another, borrowings, language contact, etc.).

6. Conclusion

The study presented here has aimed at examining the structure of motion verbs in French in light of the Motion event typology proposed by Talmy (1991, 2000) and at exploring the intra-linguistic typological complexity of this language. It has demonstrated the existence of two patterns in French: one consisting of encoding the Path in the verb (and which generally characterizes all Romance languages) and another consisting of encoding the Path in satellites – prefixes – generally considered to be characteristic of the Germanic and Slavonic languages. Moreover, this study has suggested that the process of lexicalization patterns needs to be understood in the broader context of typological change and of the inner typological dynamics of the language.

Specifically, although French can use the satellite coding strategy, the low productivity of this pattern in contemporary French contrasts with the high productivity of this same pattern in the Germanic and Slavonic languages, and to some degree in Old French. In French, the satellite pattern is actually the remnant of an earlier system which was productive in Old French, but which has progressively lost its productivity over the centuries. This loss has had a decisive impact on the evolution of the French typological system, which has changed from a predominantly satellite-framed pattern to a predominantly verb-framed pattern, notably through the process of lexical fusion between prefixes and verbal roots. As a consequence of this diachronic shift, contemporary French is a typologically hybrid system in which motion verbs are spread over a continuum ranging from the satellite-framed pattern to the verb-framed pattern.

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CHAPTER 5

From personal deixis to spatial deixis

The semantic evolution of demonstratives from Latin to French

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Our aim in this chapter is to examine how the semantic content of demonstratives evolves over time. Demonstratives have diverse semantic values which can be found not only among the languages of the world, but also during the diachronic evolution within the same language. How does one semantic value evolve into another? We demonstrate that in French changes occurred in two stages, according to the following semantic chain: 'personal' (Latin) > 'subjective' (very Old French: 'speaker's sphere') > 'spatial' (13th century French).

1. The aim of this study

1.1 Evolution in the meaning of demonstratives

The diversity which can be found in the semantic of deictics (be they spatial, personal, subjective, or discursive) across the many languages of the world has recently been the subject of a number of studies (see in particular Morel & Danon-Boileau 1992; Himmelmann 1996; Laury 1997: Chapter 2; Diessel 1999; Dixon 2003). However, this diversity can also be observed from a diachronic point of view, within one and the same language. In fact, demonstratives often change their meanings over time. How does one semantic value evolve into another? What are the different stages of the process and what conditions are required? Can we isolate a 'semantic chain' of events? Our diachronic analysis below focuses on French and highlights how semantic features, particularly personal and spatial values, may

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become related over time. In the case of French demonstratives, it is shown that spatial values have indeed evolved from personal values.

1.2 The semantic and morphological evolution of French demonstratives from Latin to Modern French

It is well recognized that French demonstratives originated in Latin demonstratives, *via* a re-deictization process of the prefix *ecce-*, according to the following evolution: Lat. *illum* > spoken Lat. *ecce illum* > Old French *cel/celui* > Modern French *celui*. But although the chronology of such changes in form and category is now well known (Marchello-Nizia 1995), little is known about the semantic evolution of demonstratives between Latin and Modern French.

The semantic value of Latin demonstratives was not spatial as it is in Modern French (cf. Riegel, Pellat & Rioul 1994 among others), but rather 'personal' – *hic* referred to the first person, *iste* to the second, *ille* to the third. How did the personal meaning in Latin (*hic liber* 'the book which belongs to me, interests me, etc.') change into the spatial (or locative) meaning in Romance languages, and especially in French (*ce livre* 'the book which is present here in the speech situation, be it intra- or extra-textual')? There are hardly any studies which can explain this phenomenon.

Our aim is to examine how, when, and why such a change took place. We will demonstrate that this change occurred in two stages: first from the personal meaning to the subjective meaning, then from the subjective to the spatial meaning. Furthermore, we will show that it is in two particular types of context that this evolution must have arisen.

Until very recently, everyone agreed that demonstratives in Old French had a locative meaning – the deictic center being the speaker or the speech situation, or the demonstrative form itself, since these morphemes were at the time self-referential indexical expressions (Kleiber 1985). However, it has recently been shown (Marchello-Nizia 2003, 2005) that a description using purely spatial terms is not totally effective for the oldest period of French (9th–12th centuries), as discussed in Section 3.1. Such a description cannot account for several types of uses observed in this period, whereas a much more satisfactory account requires pragmatic terms relating them to the 'personal sphere' (Ch. Bally 1926 'sphère personnelle'; Laury 1997 'personal sphere'). In this account, the *pole of reference* (or mode of presentation) is the speaker and the deictic center is the speaker's sphere, which is constructed by the speaker and pragmatically defined through what he or she says (see Section 3.1 below).

This interpretation also makes the semantic evolution which occurred between Latin and Old French more plausible. The change from personal meaning to subjective-pragmatic meaning can be explained without appealing to any

catastrophic semantic break, whereas the distance between the personal value of demonstratives in Latin and their spatial value in French would constitute quite a gap to explain. If our interpretation is correct, then the change of forms between Latin and very Old French occurred with relatively smooth semantic continuity.

We will analyze how precisely the changes from personal to subjective values and then to the (contemporary) spatial value came about. This phenomenon probably occurred between Latin and the year 1200. Indeed, the uses and values of demonstrative determiners and pronouns seem to have changed during the 12th century, even though, as we will see and as we might expect, 13th century language retained traces of the old value. We will examine below how the following two changes occurred: 1) from the initial personal value in Latin (*hic liber* 'my book which is present here') to a second value in very Old French (*cest cheval* 'this horse which belongs to me' as compared to *cel cheval* 'this horse which is present here and which does not belong to me'); then 2) from this second to the third spatial self-referential deictic value, which has been used in French since the 13th century (*ce cheval* 'this horse which is present in the situational or textual context in which the demonstrative is used'). In conclusion, we will suggest a semantic chain of events which makes the change from one value to another possible.

1.3 The different stages of our demonstration

In order to describe demonstratives within the framework of semantic diachrony, we will use the distinction proposed in Diessel's (1999) fine synthesis of previous studies, namely between 1) the value of the demonstrative and 2) the deictic center. But we will narrow down each of these distinctions in two ways. First, we will distinguish between descriptive and procedural (or instructional) values, as do Kleiber (1985 etc.), Hanks (1992), and De Mulder (1997). Second, we will adopt a distinction between the *deictic pole* and the *deictic center*. In a pragmatic (rather than spatial) interpretation, such as the one we are suggesting for the oldest period of French, the second of these two concepts is insufficient as such. The *deictic center* is the real or symbolic space in relation to which the form is situated (in other words, the 'deictic sphere' inside which or outside of which the demonstrative form situates its referent), while the *deictic pole* (or *origo)* is the basis on which the sphere is constructed (which can be the speaker from a pragmatic/subjective point of view or the demonstrative form itself from a self-referential viewpoint).

Our research will take us through several stages. We will first look back at the value of Latin demonstratives. We will then identify the values inherent in different demonstrative forms in the oldest texts written in the French language (9th–12th centuries) and isolate the precise moment at which the transformation took place, i.e., utterances in which a new value appeared for the first time. We will then explain in which types of use and for which semantic values the trans-

formation occurred, and which syntactic contexts made this semantic evolution possible. We will also demonstrate that one of the uses which was the most 'susceptible' to destabilization and to semantic transformation also corresponds the most frequent use of demonstratives. The fact the form is frequently used is a necessary factor to ensure that the grammaticalization process or any other form of change is fully completed (Bybee & Hopper 2001).

This type of study is only possible within the theoretical frame of corpus linguistics. Starting with the pragmatic-subjective interpretation, we must follow three steps: 1) identify the moment at which uses that can no longer be explained within this interpretation start to appear; this stage requires us to explore the broadest possible corpus of texts and documents which have been conserved from the relevant periods; 2) identify the contexts in which this change occurred and the types of uses on the basis of which the semantic shift became possible; then 3) analyze the semantic and cognitive process through which the change must have occurred. These last two steps require a careful and detailed study of every single occurrence of some of the texts.

Following this procedure, we will demonstrate that the semantic change or the *deictic destabilization* of the demonstrative goes through a stage of semantic reinterpretation of two specific uses, which have become generators of ambiguity: 1) the use of the demonstrative CIST to refer back to an object which is both inside the 'speaker's sphere' *and* present in the situation of the utterance, and 2) the use of this same demonstrative to refer back to words the speaker himself or herself pronounced shortly beforehand.

2. The starting point: Latin

2.1 From the personal deictic to the anaphoric deictic in Latin

Grammatical tradition agrees on three points concerning Latin: 1) Contrary to what occurs in Modern French, Latin does not make any morphological distinction between pronouns and determiners: both categories are carried by the same forms;[2] 2) anaphoric uses are provided by the IS paradigm, deictic uses by the three paradigms HIC, ISTE and ILLE, which are semantically distinct; and 3) for deictics the fundamental semantic value is *personal*: HIC refers to the first person, ISTE to the second, ILLE to the third. This separation in meanings is adopted in particular by Ernout and Thomas in their *Latin Syntax* (1953: 187–188):

2. This lack of distinction between categories progressively disappears between the 11th and 16th centuries and eventually leads to two paradigms in Modern French which oppose pronouns (CELUI-CI/LA) to determiners (CE/CETTE, CES).

> "*Hic* is the object demonstrative which is the closest placed to the speaker, be it in terms of space, time or thought; it is thereby also that of the first person. *Iste* designates the hearer, and logically leads to it being the 2nd person demonstrative: *iste liber* 'the book you are holding'; often used in conjunction with *tuus* [...] *iste* easily took on a pejorative value which can be explained by the fact that, in the language of the law courts, it applied to the adverse party [...]. But the laudatory meaning was not necessarily excluded [...] *Ille* is the demonstrative for far away objects: *ille liber* 'the book which is over there', *illa tempora* 'those distant times'. *Ille* served as an 'emphatic' pronoun designating someone or something well-known, famous, and in a way also distant because of this fame. ..."

This interpretation can also be found in Leumann, Hofmann and Szantyr (1997: 179–185), Serbat (1964: 97–98) and Touratier (1994: 40–44).

What should be understood by the term 'personal'? Depending on the context, this term can signify: 1) something spatially 'close to the speaker', as in (1) below; something 'possessed by the speaker', and in this type of use the demonstrative is sometimes used with the possessive as in (2) (Leumann et al. 1997: 180);[3] in discourse the demonstrative can refer to the 'words I have just pronounced as speaker', as in (3):

(1) "Mi vir, unde *hoc ornatu* advenis?"
(Plaute, *Cas.*, 974: 'Husband, from whence do you come with such a crew?': quoted by P. De Carvalho 1991: 227)

(2) "Novi ego *hos pugnos meos*."
(Plaute, *Curculio*, 725: 'I know them well, my own two fists': quoted by P. De Carvalho 1991: 227)

(3) "Sed *hoc* commune *vitium*..."
(Cicero, *Fi*, 1, 18: 'This mistake (which I have just pointed out) is shared by them both'; quoted by Ernout & Thomas 1953: 188)

Even though the 'personal' interpretation has met with some opposition,[4] there is no doubt that it can account for most uses of Latin demonstratives in deic-

3. Note that in some languages the demonstrative can generate the use of a possessive or a genitive marker (see Diessel 1999: 127–128).

4. In particular, this interpretation has been contested by Monteil (1970: 234) according to whom the spatial value is fundamental and the 'personal' value derived from it: 'The assimilation of a nearby object to an object which is of interest to the first person, as well as the assimilation of a distant object to an object under the control of the third person etc. are nothing more than corollaries of the situational value of these pronouns' (quoted by De Carvalho 1991: 226). But this analysis represents a minority opinion and proves to be no more suitable than the traditional 'personal' analysis.

tic context. All linguists do indeed recognize that Latin demonstratives also have anaphoric or other comparable types of uses.

2.2 The 're-deictization' of Latin and Romance demonstratives

In the earliest of times (4 BC), Latin in its oral '*cotidianus*' register often contained examples of the reinforcement of demonstratives with deictic value through the use of the particle ECCE: as Plautus' work shows:

(4) "*eccillum* video"
(Plautus, *Mercator* 434: 'There he is, I see him')

These prefixed forms never fell out of oral use and in late Latin we can find examples in narrative texts, as for instance in the *Peregrinatio Aegeriae* (the tale of a trip to the Holy Land by a nun, written in around 400 AD):

(5) "*Ecce ista* fundamenta quae videtis…"
(*Peregrinatio Aegeriae,* 14, 2: 'These foundations which you see here…')

These prefixed forms are at the origin of most Romance demonstratives. For French, out of the three Latin paradigms with a deictic value HIC, ISTE and ILLE (IS being considered anaphoric), it is only the last two (ISTE[5] and ILLE, prefixed with ECCE-) which resulted in demonstrative forms that are both determiners and pronouns. Old French does have two paradigms for pronominal and determinant use, CIST and CIL, which are semantically opposed.

However, if the evolution of forms is clear, this is not the case for the evolution in meaning. How did we move from demonstratives with a personal value to demonstratives with a purely locative value, as is the case in Modern French?

3. Demonstratives in Old French

3.1 The speaker's sphere: a pragmatic interpretation of deixis (9th–12th century)

On the basis of the oldest texts written in French, it has been shown that the semantic opposition between the CIST and CIL paradigms is of a pragmatic (rather

5. As far back as Latin, the meaning of *iste* had moved closer to that of *hic* in many of its uses (Leumann et al. 1997: 184).

than spatial) nature.[6] CIST refers to what belongs to the 'speaker's sphere' and CIL to what falls outside of it (Marchello-Nizia 2003).

The 'speaker's sphere' includes anything about which the speaker claims that it belongs to him, concerns him, or is somehow linked to him. This sort of entity has the following properties: 1) it is hard to define precisely, as it cannot be reduced to the objects or elements present in the situation of discourse; 2) it is pragmatic, as *it is constructed through speech itself, through the speaker's choice* of using one form or another (the speaker's sphere includes what he/she *says* is included when using CIST and what is outside of this sphere is defined when he/she uses CIL); and 3) it is transitory, since the nature of the speaker's sphere can change from one speech event to the next.

The instructional value of the demonstrative CIST is not 'look around my surroundings to find the referent', but rather 'I qualify what I designate by defining it as belonging to my sphere'. The instructional value of CIL is complementary: through the use of this form, the speaker qualifies the referent designated as being *outside his sphere*.

An example of the transitory nature of CIST and CIL is to be found in a *chanson de geste* written in around 1200, *Ami et Amile*. A knight, talking about his wife, calls her *ceste meschinne* (e.g. (6) 'this young lady inside the speaker's sphere') when he talks about their happiness together, but designates this same wife using *celle* when she abandons him later on in the tale (e.g., (7)):

(6) "Li roi meïsmez qui France a a baillier / M'i ot donné Lubias a moillier, / *Ceste meschinne* au gent cors afaitié."
(*Ami et Amile*, 2200: 'The King of France himself gave me Lubias to be my wife, this beautiful young maid with her elegant, fine body': the woman is present in the speech situation.)

(7) "*Celle* me faut qui me deüst amer."
(*Ami et Amile*, 2444: 'She who should have loved me, let me down !': the woman is present in the speech situation)

This type of interpretation accounts for the use of demonstratives in the oldest French texts.[7] It allows for a satisfactory interpretation of the three demonstratives used in *Serments de Strasbourg*, the oldest text written in French (dated 842), all three from the CIST/IST paradigm: *cist meon fradre* ('this my brother' – used

6. CIST and CIL denote the two paradigms of demonstrative forms (pronouns and determiners) in Old French.

7. *Serments de Strasbourg* (842), *Séquence de sainte Eulalie* (written in around 880), *Sermon sur Jonas* (beginning of the 10th century), *Passion de Clermont* and *Vie de saint Léger* (both written in around 1000), and *Vie de saint Alexis* (written in the middle of the 11th century).

twice) and *d'ist di in avant* ('starting on this day'): the first two examples refer back to the speaker's brother, the third to the day on which the speaker is speaking. It also accounts for the two demonstratives used in *Séquence de sainte Eulalie*, both of which refer to real situations outside the speaker's sphere: *a cels dis* (v.12: 'in the old days') and *La domnizelle celle kose non contredist* (v. 23 'The young lady did not oppose this'); the expression *celle kose* designates the King's decision to have her head cut off, which was touched upon in the previous verse; it refers to the verse just pronounced by the narrator (in charge of the ceremony), the contents of which are summarized by the resumptive word par excellence, *kose* ('thing'), determined by *celle* as the author is referring to a time to which he does not belong (and which is therefore outside his 'sphere'), but which is that during which his tale unfolds and during which the martyrdom of Eulalie took place.

In the three 10th and 11th century texts which follow (*Sermon sur Jonas, Passion de Clermont, Vie de saint Léger)*, the interpretation put forward also seems to suit all the different uses of demonstratives. Likewise, it accounts for almost all types of demonstrative uses in the texts written before 1150 and for some uses until 1250 (see (9), (10) and (13) below).

3.2 Oppositions in meanings between CIST and CIL

The pragmatic and subjective interpretation put forward here grew out of the recognition that in some particular Old French contexts two paradigms of demonstratives were used in a comparable context, except for the fact that the demonstrative ending in – ST qualified one element as referring back to the 'speaker's sphere', whereas another element denoted with a demonstrative ending in – L was outside of this sphere. We will give a few examples to illustrate the value of demonstratives described in the early stages of the French language.

In one particular situation (*chansons de geste*), when the speaker wants to designate in direct speech the head or part of the body of the addressee, he/she systematically uses CIL and never CIST, although the addressee is clearly present. In this case, two knights are about to duel and one addresses the other using threatening expressions such as: *'I will cut off your head, run through your belly, chop off your nose'*. This is clearly direct speech. The object or the person qualified by the demonstrative is definitely present in the discourse situation and yet CIL is used, despite the fact that it should be the distal demonstrative. There are plenty of examples of this type of address preceding a fight between two heroes in epic texts or *chansons de geste:*[8]

8. Seven examples of this use can be found in *Ami et Amile*: *celle teste coper / tranchier, celle panse estroee.* This type of use is common in 12th century *chansons de geste*: examples can be

(8) "Ancui avréz *celle teste* tranchie / Et *celle pance* estroee et percie."
(*Ami et Amile,* v. 1348: 'Today you will have your head cut off and your stomach rent apart and pierced')

In this type of speech, the texts (1100–1250) never provide any examples of CIST. However, its 'contextual reference' is obvious.

The fact that examples of this type of CIST (expressions containing *teste, ventre*... referring to the body of an enemy) are impossible to find reveals that the speaker is qualifying these body parts as belonging to someone who is not part of his/her sphere and that he or she will therefore be able to rip them to pieces without any scruple.

In the same way, a speaker uses CIL + *cheval* when he is talking about a horse that is present but does not belong to him, for example the horse of the person he is speaking to or a horse he would like to obtain. And as soon as he is able to seize the animal, it is thenceforth designated by CIST:

(9) "Biax amis, fet Perceval, je te pri en toz servises et en toz guerredons...que tu *cel cheval* me prestes tant que je aie ateint un chevalier qui ci s'en vet."
(*Queste del saint Graal*, pub. Pauphilet, p. 88: 'Dear friend, said Percival, I ask you, in return for whichever favor or reward you desire... to lend me this horse so that I can catch up with a knight who has just fled.')

(10) "Deus, dist Guillelmes, com vos dei graciier / De *cest* cheval que j'ai ci guaaignié !"
(*Couronnement de Louis*, v. 1147: 'God, said William, how I must thank you for this horse which I have just won!')

The same applies to weapons: the speaker will use CIST if he designates a sword which is present and if this sword belongs to him, but he will use CIL if it does not belong to him. Likewise again, CIST is used to describe an object that can be offered as a gift (the object may be either present or absent, but is actively on the speaker's mind), while CIL is used for an object which the speaker desires and seeks to obtain. And CIST (never CIL) is always the demonstrative that is compatible with the first person possessive: we find CIST + MIEN + N as far back as the oldest text in French, the *Serments de Strasbourg* (842), which provides two cases in ten lines. Other examples can be found up to the 13th century:[9]

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seen in the *Couronnement de Louis*, le *Charroi de Nimes*, *Aliscans,* as well as in a parody, the *Roman de Renart*.

9. In our corpus (BFM: *Base de français médiéval*: http://bfm.ens-lsh.fr/), CIST can be found with MIEN in the masculine 23 times, or with MEIE in the feminine, but CIL is never used with the first person possessive.

(11) "si saluarai eo *cist meon fradre Karlo*"
(*Serments de* Strasbourg, ed. O. Collet: 'And I will protect my brother Charles (who is present here?)')

(12) "Moie est la ville et l'annors qu'i apent, / *Ceste terre* est a mon conmandement."
(*Ami et Amile*, 2135: 'Mine is the town and the stronghold beside it, this kingdom is under my command')

(13) "Par *ceste* ame quant ele istra. . .De *cest mien cors*, . . ."
(Jean Renart, *Escoufle,* pub. F. Sweetser, v.8187: 'By this soul of *mine*, when it leaves my body. . .')

CIL therefore designates anything that is symbolically rejected, refused, hated by the speaker, or that does not belong to him. CIST, on the other hand, designates friends, relatives, people who are close to the speaker, as well as things he or she appreciates or claims to be his or her. This allows us to explain a passage which had remained enigmatic up to now: in the aforementioned *chanson de geste*, *Ami et Amile*, the two demonstratives CIST and CIL can be found in the same sentence in direct speech, referring to two persons who are both present in front of the speaker:

(14) "Se voz de *ceste* ne voz poéz oster, / Je voz ferai *celle teste* coper."
(*Ami et Amile* 753: 'If you cannot clear yourself of blame where this woman is concerned, I will have that head cut off your shoulders')

The referents of CIL and CIST are human in the same measure, present and equally close to the speaker: what distinguishes *cest* from *celle* is neither presence nor absence, nor distance from the speaker, nor the fact the objects referred to are human beings. It is therefore another semantic feature which provides the point of difference. And what we have just seen throws light on the significance of this difference: it is the fact that *ceste* designates the young lady who is the speaker's (beloved) daughter, while *celle* describes the head of young Amile, who has been accused of having seduced the young lady. The instructional value of the demonstrative CIST is therefore: 'I designate what the speaker sets out as belonging to his sphere, I select what he makes a claim about', only later in French will it be: 'look around the demonstrative form itself to find what is referred to'.

The pragmatic-subjective interpretation in terms of the 'speaker's sphere' holds true as long as the speaker is the only deictic pole, i.e., for around four centuries. But as we said at the beginning (Section 1), things changed starting in around 1100.

3.3 Changes in Old French: The evolution of the 'subjective' value to the 'spatial' value (12th century)

A change appeared for the first time at the end of the 11th century. Although a great deal of the demonstratives in the CIL and CIST paradigms continued to be used in accordance with the pragmatic opposition between inclusion in the 'speaker's sphere' and exclusion from it, new uses in one text can no longer be accounted for by this opposition. The Oxford version of *La Chanson de Roland*, composed at the end of the 11th century in Anglo-Norman (a dialect which was used at that time in the West of France and in England), gives us proof of this situation. This text provides examples of:

(1) uses of CIST referring to the speaker's sphere, as is the case when the words *cest païs* ('this country') are spoken by an inhabitant of the kingdom; the demonstrative is sometimes accompanied by a possessive which makes this value explicit (*ceste meie barbe* ['this beard of mine']). In a complementary manner, CIL signifies exclusion from this sphere; in this way, Charlemagne is furious with his archbishop, who has just put forward a proposal which is unacceptable to him and orders him to go and sit on *cel palie blanc*, on a white carpet which is clearly present, but which the emperor wants to qualify as being outside his sphere; he also orders the archbishop to be silent:

(15) Li empereres respunt par maltalant: / "Alez sedeir desur *cel palie blanc* ! / N'en parlez mais, se jo nel vos cumant !"
(*Chanson de Roland* 272–3: 'The emperor answers angrily: "Go and be seated on that white carpet / Do not open your mouth again, unless I command it" ')

(2) new uses, where CIST is a situational deictic separate from the speaker's sphere, as is the case when the words *cest païs* (v. 134: 'this country') are spoken by the Franks to refer to Spain while they are in that country or when the words *cist glutun* ('these rogues') designate enemies; these types of usage would be incompatible with the subjective-pragmatic value of CIST, as is the case in this verse where *cist glutun* is used in opposition to *nos* ('us'):

(16) "Nos avum dreit, mais *cist glutun* unt tort"
(*Chanson de Roland* 1213: 'We are right and these rogues are wrong')

Type (2) uses can only be explained by a semantic displacement which has changed the nature of the deictic link that is expressed through the demonstrative morphemes: there has been a change from a strictly subjective value, the 'speaker's sphere', to a more abstract value, such as the 'element or object activated in the speaker's mind or standing out because it is present in the situation of utterance'.

After this period, between 1100 and 1200, the value of demonstratives changed progressively in French. The deictic pole was no longer the speaker alone and the

deictic center in relation to which the deixis found its meaning was no longer the 'speaker's sphere' alone: it could be the very occurrence of a demonstrative, as G. Kleiber (1985, 1987) and M. Perret (1988: 105–124) have demonstrated.

Throughout the 12th century, the system of demonstratives underwent a series of changes. It is rare to find texts which, like *Gormont et Isembart* (written at the beginning of the 12th century) or *Ami et Amile* (written in around 1200), consistently use the system with a pragmatic value, in which deixis uses the speaker as a pole and has as its center the speaker's sphere. However, numerous 12th century texts contain examples of the semantic variations in use which we noted in the *Chanson de Roland:* this is the case for the *Roman de Thèbes,* the *Roman d'Eracle* by Gautier d'Arras, Chrétien de Troyes' novels, the Tristan novels written by Béroul or by Thomas, etc.

What wins out in the end is the new status of the self-referential form. And in this period, during which a new system was gradually replacing the old one, the cases where CIL seemed to contradict its new 'distal' value and to adopt the CIST value with its contextual referent are in fact leftover from a situation in which CIL designated elements which were present but outside the 'speaker's sphere', as in (9).

But in which texts and contexts did such a semantic change begin and how did this change occur?

3.4 The oldest contexts favorable to change

We propose that the new spatial values developed in two specific contexts: when CIST refers back to an element that belongs to the speaker's sphere *and* is present in the situation of discourse; when CIST refers back to words just spoken by the speaker.

In the first of these cases (also see Section 3.2), a speaker used *cest païs* to designate the country he was in, not because he was in it, but because it was his country. Since the two features are frequently used together, this enabled a semantic reanalysis: the demonstrative CIST can be linked by the hearer not to the initial feature which the speaker attached to it ('belonging to the speaker's sphere'), but to the second feature ('presence at the time and the moment of speech'). In that way CIST can be used for example to designate the country where the speaker was found, although this country was not his own.

In the second case, which seems to be the first in which a change occurred, the demonstrative CIST referred to a preceding speech segment. Recall one of the uses of the demonstrative CIL in the *Séquence de sainte Eulalie* (discussed in Section 3.1): *La domnizelle celle kose non contredist* (v. 22 'The young lady did not oppose this'), where *celle kose*, used as a resumptive expression, referred to the King's decision expressed in a fragment of text which immediately preceded it in verse 21. We have analyzed *celle* (from the CIL series) as being a deictic referring back in terms

of memory to the content of the verse which was just spoken by the narrator; but since the episode recounted here is situated at a time which is far before the time at which the author was living, the latter designates *celle kose* as outside of his sphere.

In contrast, in the same situation involving reference to an adjacent fragment of text, when the author makes a claim on this fragment and integrates it into his personal sphere, then he uses the demonstrative CIST. In this way, in the *Passion de Clermont,* a text written in around the year 1000, we can find an example of the use of CIST, which at first seems to correspond to the usage of CIL we just examined in the *Séquence de sainte Eulalie:*

(17) "Nos *cestes pugnes* non avem, / Contra nos eps pugnar devem. "
(*Passion de Clermont,* pub. D'A.S. Avalle v. 501–2: 'These battles are not ours to lead: it is against ourselves that we must struggle')

The demonstrative *cestes* determines the noun *pugnes* ('battles'); this word summarizes the 'battles' just spoken about and it is thus a sort of resumptive 'tracking' anaphor comparable to *kose* in verse 22 of the *Séquence de sainte Eulalie*. But the linguistic context is different from that of *Eulalie*: in the *Passion* the subject is the pronoun *nos* – and the fact that it is expressed means that it is marked with a certain emphasis. The two verbs in the sentence are also in the first person plural (*avem, devem*), integrating the author-speaker and the onlookers into the same group of Christians. Verse 501 is situated almost at the end of this hagiographic poem. The author is beginning the concluding section of his speech (v. 501–516), addressing his peers in direct speech, as he exhorts them to take action and to pray for their salvation. Through the use of the morpheme *cestes*, as well as the use of the pronoun *nos,* he implicates himself in his own speech. Unlike what occurred with *celle kose*, here the author-speaker integrates himself into the situation of utterance as a protagonist and situates *cestes pugnes* in his own sphere. He implicates himself as a Christian in the obligation which he sets forth ('it is against ourselves that we must struggle'), laying a claim on the previous tale by accepting its values, and at the same time putting himself forward as its author.

We often find this type of use where a demonstrative determines a resumptive noun which summarizes the meaning of words just been spoken. And each time, we find CIST when the character or the author is responsible for the words referred to in this way, but CIL when this is not the case.

Thus, for example, in the *Chanson de Roland*, we often find this type of 'joiner' between a direct style speech and the return to the narrative. The expression *a cest/cel mot* punctuates the text, signifying that we are moving away from direct speech and back to the tale itself. In this case, the text gives us CIST if the subject of the sentence taking us back to the tale is either the person who has just spoken the words in question, as is the case in (18), or, if he is not the author of the words

in question, he is nevertheless implicated in them – for example in the case of an order, as in (19):

(18) "Quant tu es mor, dulur est que jo vif." A *icest mot* se pasmet li marchis. . .
(*Chanson de Roland*, éd. Moignet, v. 2030–31: ' "When you die, it will be unhappiness for me to live." At these words / As he spoke these words, the marquis fell into a swoon. . .')

(19) "L'enseigne Carle n'i devum ublier." A *icest mot* sunt Franceis escriet.
(*Chanson de Roland*, v. 1179–80: ' "We must not forget Charlemagne's war cry!" With these words, the French cried out')

In contrast, the text gives us CIL if the subject of the sentence which brings us back to the tale is neither the speaker, nor any other directly implicated protagonist:

(20) ". . .Sempres murrai, mais cher me sui vendut." A *icel mot* l'at Rollant entendut.
(*Chanson de Roland*, v. 2053–54: ' "I will soon die, but I have obtained a fair price for my head!" As he spoke these words, Roland heard him.')

However, from the middle of the 11th century onwards, a few cases appear that are difficult to interpret. These cases occur in the following type of context: in a dialogue between two speakers or groups of speakers, the second speaker uses CIST in an answer to refer back to the speech made just previously by the person he is speaking to. The two examples we have of this type of use can be found in the *Vie de saint Alexis* (written in the mid 11th century) and in the *Chanson de Roland:*

(21) Quant il ço veit quel volent onurer: / "Certes", dist il, "n' i ai mais ad ester, / *D'icest' honur* nem revoil ancumbrer".
(*Vie de saint Alexis*, v. 186–188: 'When he saw that they wanted to honour him: "Assuredly, he said, I do not wish to stay here, I do not wish to be burdened with this honour." ')

(22) (22) Alde respunt: "*Cest mot* mei est estrange."
(v. 3719: 'Aude responded: 'These words do not concern me.')

In both cases, the speakers (Alexis or Aude) make mention of a previous speech. *Cest honur* refers back to the ceremony Alexis' followers want to hold in his honour, and which he refuses. And *cest mot* describes the offer made by Charlemagne, who has just announced the death of Roland to Aude, who is in love with him: Charlemagne immediately goes on to offer to her his own son as a husband and replacement; Aude turns down this proposal before losing consciousness and dying.

In both cases, we can consider that CIST is used because the speaker responding is concerned with some previous speech, even though in the continuation of the sentence he/she refuses the proposal put forth in this speech; we must therefore assume that the speaker is placing *mot* or *honur* in his or her 'personal sphere'

at the start of his/her response – as a Topic – to then reject it as the phrase goes on – as a Comment. Otherwise, we must accept that in both cases CIST does not designate an element belonging to the speaker's sphere, but merely the previous utterance.

Subsequently, we find examples of the expression *A cest mot* or *A ceste parole* used to designate direct speech that immediately precedes ongoing discourse, even when the words of this speech were not spoken by the subject of the subsequent sentence:

(23) Li serpenz [. . .] dist a Adam et a sa moillier: "Se vos mengiez de cest fruit vos seroiz ausi come Dieu", et par *ceste parole* entra en aus covoitise.
(*Queste del saint Graal*, p. 103: 'The snake said to Adam and to his wife: "If you eat of this fruit, you will be equal to God", and through these words, covetousness entered into them.')

The reason why such uses constitute the locus for the first occurrence of a change in CIST value is that these contexts are potentially ambiguous: the referent is indexed both 'in the speaker's sphere' (the words having just been spoken by him) and 'in the immediate context'.

From this point on, CIST could to be attached to only the second of these features, following a new semantic analysis. And this change could occur all the more easily in cases where the speaker was not the author of the words referred to, but simply concerned by them, the link between the preceding words and the speaker thus being less clear. We can therefore assume the following three stages: we moved from 1) a strongly subjective value (the person who speaks the words *cest mot* is the author of what is referred to by *cest mot*); to 2) a much weaker subjective value (the person who speaks the words *cest mot* is concerned by what is referred to by *cest mot*); then to 3) a spatial value (*cest mot* designates speech that immediately precedes ongoing discourse in the context).

But this change also implies a change in the *deictic center*, which is no longer the personal sphere, but the context (textual, as is the case here, or situational) of the occurrence of the demonstrative (Kleiber 1985). And the *deictic pole* is no longer the speaker, but the CIST (or the CIL) form itself. The instructional value has changed and has become: 'CIST indicates that the referent of the noun which it qualifies (*honeur, mot, parole. . .*) is to be looked for in the immediate context of the demonstrative (be it situational or textual)'.

3.5 The birth of the 'discursive deictic' in French

The latter use of the demonstrative which we have just described – *cest mot, ceste parole*, designating speech which immediately precedes the demonstrative form CIST – corresponds to what Fillmore called 'text reference' and what N. Himmel-

mann recently suggested calling 'discourse deixis' (1996: 224–225). This establishes an adjacent speech segment as a referent in the speech as a whole.

When used as a determiner, this demonstrative, which points to speech immediately preceding it, is accompanied by a particular category of noun: a resumptive noun, which designates (*word, thing*) or summarizes (*counsel)* previous speech.[10] According to Himmelmann (1996) and Laury (1997), this type of use is one of the most common in direct speech. But even in the narrative register, it is a relatively common use of the demonstrative.[11]

4. Conclusion: A semantic chain of evolution from 'person' to 'space'? Or a diachronic semantic cycle?

The detailed diachronic analysis of the semantic changes undergone by demonstratives between Latin and Modern French has allowed us to highlight the various steps necessary to move from the personal meaning, which was dominant in Latin, to the spatial meaning which is used in French today.

We would like to propose a general rule explaining this type of evolution through a semantic chain of events (Heine, Claudi, & Hünnemeyer 1991: 35–37) in which the same grammatical markers (demonstratives) successively represent different mental representations:

> Person (Classical Latin) → speaker's sphere (Old French: 9th–12th centuries) → spatiality (13th century).

Discussion over the question of the fundamental or primary value of demonstratives has generated a great many studies for the last two centuries. Our aim in this study was not to support any particular hypothesis in this respect (namely as to whether the spatial value is primary or not), but rather to draw attention to the semantic and cognitive processes such a radical semantic transformation must have gone through over a dozen centuries, beween Latin and the 13th century approximately. Studying the evolution of the forms of morphemes often obscures our understanding of how their meanings evolve. In the case of demonstratives, the evolution process shows that, far from starting with a spatial meaning and moving further and further away from it, demonstratives seem to go through a cyclic change, as do some other morphemes, moving from spatial to personal and then to subjective-pragmatic meanings before returning to the spatial meaning – thereby perhaps starting the cycle all over again.

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10. cf. Céline Guillot-Barbance (2003), Chap. 13 in particular.

11. According to C. Guillot, this type of use accounts for 41% to 71% of demonstrative determiners in Middle French texts, depending on the text (2003: 67–368).

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CHAPTER 6

Motion events in Chinese

A diachronic study of directional complements

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This article examines the status of Mandarin Chinese in relation to the dichotomy proposed by Talmy and the trichotomy proposed by Slobin for classifying languages according to how they treat motion events. It is shown that Talmy was right when he suggested that Mandarin must be considered as a satellite-framed language. There is no reason to accept the hypothesis of Slobin who has argued that Chinese is an equipollently-framed language. Mandarin codes path by means of "satellites" known as directional complements in Chinese linguistics. These directional complements, after having undergone a process of grammaticalization, are functional words. A detailed analysis of the historical development of the directional constructions is also provided in the core of this analysis. It is shown that Chinese has undergone, some ten centuries ago, a typological shift from a verb-framed language to a satellite-framed language.

Introduction

The expression of a basic motion event in natural languages involves several semantic components. These are the following:

– Figure (or target): the object to be located
– Ground (or landmark): the reference object
– Path
– Manner
– Cause

Three of these are major components across languages: the manner of motion, the path of motion, and the ground (landmark). Let us first compare two examples from English and Mandarin Chinese:

(1) Greg (figure) climbed (manner of motion) down (path of motion) from the tree (ground-1) to the floor (ground-2).

(2) 他 跑 进 屋 里 来 了
ta paojin wu li lai le
he run+into room in come aspectual-marker
He ran into the room.
[ta = figure; pao = manner of motion; jin = path of motion; wu = ground]

In examining the nature and history of directional verbs and complements in Chinese, I will show that contemporary Mandarin codes path by means of "satellites" known as directional complements in Chinese linguistics. I will also describe the evolution of several main directional constructions in the core of this analysis and show that Chinese shifted from a verb-framed language to a satellite-framed language some ten centuries ago.

1. Talmy's dichotomy

Talmy (1985, 1991, 2000) suggested that languages can be divided into two groups in terms of the way in which they encode the core feature of a motion event, i.e. a motion along a path: verb-framed languages and satellite-framed languages. V-languages typically convey path information by encoding it in the main verb of the clause (the lexicalization of the path is in the main verb), while S-languages encode path using various particles, prefixes or prepositions, called satellites, associated to the main verb.

Examples:

Entrer, sortir, monter, descendre in French, which is a V-language.
Go in, go out, go up, go down in English, which is a S-language.
Romance languages (French, Spanish, Italian, Portuguese, etc.), but also Semitic languages (like Hebrew), Turkic languages (Turkish), Japanese or Korean are considered to be V-framed languages. Germanic languages (English, German, Dutch, Swedish, Icelandic, etc.), Slavic languages (Russian, Polish, Serbo-Croatian, etc.) are considered to be S-framed languages. Mandarin and many other Sino-Tibetan languages are also claimed to be S-framed languages. Here are some further examples in Mandarin:

(3) *Jinlai* 进 来 / *jinqu* 进 去 "come in, go in"; *chulai* 出 来 / *chuqu* 出 去 "come out, go out"; *shanglai* 上 来 / *shangqu* 上 去 "come up, go up"; *xialai* 下 来 / *xiaqu* 下 去 "come down, go down".

This dichotomy allows the main verb of the clause in S-languages to be available to encode other dimensions of motion events, for instance, the manner of motion. Thus, unlike V-languages, S-languages typically conflate motion information with manner information in the main verb of the clause. Compare the following two sets of verbs in English, French and Mandarin:

Run in, run out in English;
Entrer en courant, sortir en courant in French;
Paojinlai 跑进来 (run+into+come) / *paojinqu* 跑进去 (run+into+go) "run in"; *paochulai* 跑出来 (run+out+come) / *paochuqu* 跑出去 (run+out+go) "run out" in Chinese.

If one takes the manner of motion as a starting point, instead of its path, it also appears that languages vary considerably with regard to this dimension, with V-languages paying much less attention to manner than S-languages. This is evident in the following examples from Spanish and French, both V-languages:

Sale un hubo (Spanish); *D'un trou de l'arbre sort un hibou* (French).

By contrast, many S-languages use a manner verb together with a path satellite, as in Chinese:

(4) 飞出一只猫头鹰
Feichu yi zhi maotouying
Fly+out one classifier owl
An owl flew out.

According to Talmy (2000: 222–223), Chinese is clearly a S-framed language like most Indo-European languages apart from Romance. He noticed that Mandarin is a serial-verb language in which each verb in the series is morphologically unmarked. He then considers the manner verb to be the main verb and the path verb to be the satellite, because path verbs often do not function as full verbs and because there is a small closed set of path verbs. He also suggests that path verbs in serial-verb languages often show evidence of grammaticalizing into path satellites, that is, losing some features of independent verbs. There are some problems with this classification. The Chinese satellites *chu* or *chulai* are optional. Path can very well be expressed by the main verb. Moreover, those satellites are very different from English particles: for instance, they can still function as independent verbs.

2. Talmy's model revised: Slobin's trichotomy

Many studies have been undertaken to show that Talmy's dichotomy is not fully comprehensive.[1] Several revisions of Talmy's typological model have then been proposed,

1. According to Ibarretxe-Antuñano (2003), Basque is probably closer to S-languages than to those akin to its group (V-languages). Ohara (2003) showed that although Japanese is a V-language, it is indeed very rich in manner of motion information unlike Spanish and other Romance languages. Kopecka (2003) also noticed that there are different ways of talking about motion in French and that French should not be entirely considered as a verb-framed language. Dene (an Althapaskan language) shows a large range of conflation patterns and falls outside the

especially by Slobin (2000, 2003, 2004, also in this volume) who has shown that examining the manner of motion is probably more useful to rank languages along a cline of manner salience than allocating them to one or the other of Talmy's typological categories. Slobin has also observed that in Chinese and other serial-verb languages both path and manner receive equal weight. The proposal has then been made, first, to treat such languages as "complex verb-framed languages" (Slobin & Hoitin 1994). At present, Slobin holds that it may be appropriate to have a third typological category, following the suggestion of Zlatev and Yangklang (2004) who showed that languages like Thai cannot be labelled verb-framed or satellite-framed languages (see also Zlatev 2003). He then proposes a "equipollently-framed languages" category to include serial-verb languages (most of East Asian and Southeast Asian languages like Sino-Tibetan, Tai-Kadai, Austro-Asiatic, Hmong-Mien, Austronesian, but also some African and Amerindian languages) in which both manner and path are expressed by "equipollent" elements, that is elements that appear to be equal in force and significance (Slobin 2004).

Slobin concludes that the limitations of a binary typology have become evident and that it is necessary to revise the definitions of verb-framed and satellite-framed by adding a third type. The following trichotomy has thus been proposed:

(i) Verb-framed languages
The preferred means of expressing path is a verb, with subordinate expression of manner. The typical construction type is PATH VERB + SUBORDINATE MANNER VERB. Languages such as Romance, Semitic, Turkic, Japanese, Korean are V-languages.

(ii) Satellite-framed languages
The preferred means of expressing path is a nonverbal element associated with a verb. The typical construction is: MANNER VERB + PATH SATELLITE. Germanic, Slavic, Finno-Ugric languages are S-languages.

(iii) Equipollently-framed languages
Path and manner are expressed by equivalent grammatical forms. The typical construction types depend on the language:
– MANNER VERB + PATH VERB for serial-verb languages (Niger-Congo, Hmong-Mien, Sino-Tibetan, Tai-Kadai, Austronesian);
– [MANNER + PATH] VERB: bipartite languages (Algonquian, Althabaskan, Hokan, Klamath-Takelman);
– MANNER PREVERB + PATH PREVERB + VERB: Jaminjungan languages.

Is Chinese a satellite framed-language, a complex-verb framed-language, or an equipollently-framed language? To answer this question fully, it is necessary to have a

scope hypothesized by Talmy (see Rice 2003). A discussion on Chinese can be found in Lamarre (2003).

precise description of the Chinese directional complements in contemporary Chinese, but also a detailed analysis of the historical development of this construction.

3. Contemporary Chinese

Contemporary Chinese has two broad types of directional complements: simple and complex.

First, simple directional complements involve the two *directional* verbs: *lai* 来 "come, hither" and *qu* 去 "go, thither, away". They fill the V2 position in V1 + V2 compounds such as in *zoulai* 走来 (walk+come) "walk to my direction", *zouqu* (walk+go) 走去 "walk away", *nalai* 拿来 (take+come) "bring", *naqu* 拿去 (take+go) "take away". The V1 are "verbs of movement" (Va), other verbs signalling manner of motion ("walk", "run", "fly", etc.) or simple transitive verbs that inherently imply a change of location of their direct objects ("take", "send", "throw", etc.).

The verbs of movement (Va) belong to a closed list, limited to the following seven verbs: *shang* 上 "go up, ascend", *xia* 下 "go down, descend", *jin* 进 "enter, go in", *chu* 出 "exit, go out", *hui* 回 "return, come back", *guo* 过 "pass, go through", *qi* 起 "rise, go up".[2]

Second, complex directional complements are formed by a combination of a verb of movement (Va) followed by one of the two directional verbs, *lai* or *qu*. They are also involved in V1 + V2 compounds, filling in the V2 position. The V1 are still verbs of motion or simple transitive verbs implying motion of their objects, *but* not the verbs of movement Va, already present in the V2. The V2 of the complex directional constructions are: *shanglai, shangqu, xialai, xiaqu, jinlai, jinqu, chulai, chuqu, huilai, huiqu, guolai, guoqu, qilai* (interestingly there is no *qiqu* in contemporary Chinese). Some examples follow to illustrate this type:

(5) 爬上来 *pa-shanglai* (climb+go-up+come) "climb up"; 跑出去 *pao-chuqu* (run+go-out+go) "run away"; 走进来 *zou-jinlai* (walk+come-in+come) "walk in"; 拿回来 *na-huilai* (take+come-back+come) "take back, bring back".

Finally, there are "motion resultative constructions", formed by a V1 (the same verbs that fill the V1 position for the complex directional constructions) followed by a V2 which is one of the seven verbs of movement detailed above (Va). As there is no direc-

2. These verbs are all path-verbs, although *qi* "rise, go up" also includes information about posture change.

tional verb (*lai* or *qu*) in this construction, it is better not to consider it as a directional construction at all:[3]

(6) 走进 *zou-jin* (walk+go-in) "walk in"; 拿回 *na-hui* (take+come-back) "take back".

Is Contemporary Chinese a satellite-framed language, a verb-framed language, or an equipollently-framed language as Slobin claims? The answer to this question depends on the kind of analysis and interpretation that can be provided for the directional complement constructions.

The argumentation for each of these solutions would be as follows:

First, it is a verb-framed (or complex verb-framed) language if compounds like *paojin* (run+enter) or *paochulai* (run+exit+come) are understood as "enter in running" or "come running out". Such an interpretation is given, for instance, by Li and Thompson (1981:58). This means that the main verb is then the last one of the series, implying that there are no satellites in such sentences.

Second, it is a satellite-framed language if the same compounds *paojin* or *paochulai* are interpreted as "run in" or "run out", as suggested by Chao (1968:458–464). The manner of motion is then expressed by the main verb (*pao*) and the path by a satellite (*jin* or *chulai*).

Third, it is an equipollently-framed language if the compounds *paojin* and *paochulai* are interpreted as "run and enter" or "run and exit". Both the manner of motion and the path of motion are considered in this framework as verbs with their full lexical meaning, the manner verb being the first one, the path verb the second one.

I would like to suggest that the second hypothesis (Contemporary Chinese is a satellite-framed language) is the best one, following Talmy's suggestion. The main reasons are as follows:

The directional verbs *lai* and *qu* are still used as main verbs in Chinese, but besides being main verbs meaning "come" and "go", they only indicate, respectively, motion toward or away from the speaker when they are used in directional complement constructions.

The same is true for the seven verbs of movement (Va) when they are involved in directional constructions. They are no longer main verbs meaning "go up" (for *shang*), "go down" (for *xia*), "enter" (for *jin*), "exit" (for *chu*), "rise" (for *qi*), "return" (for *hui*), "pass" (for *guo*), but complements meaning respectively "up, on", "down", "in(to)", "out", "up", "back", "over".

These directional complements (either simple or complex) might still be considered as verbs, but it is obvious that they are no longer fully lexical words (with their original meanings). They have become function words or grammatical elements, after having undergone a process of grammaticalization.

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3. Hendriks (1998) made an interesting distinction between French motion verbs expressing a deictic path, such as "venir" (come) and "partir" (go), and motion verbs expressing a directional path, such as "monter" (go up) or "descendre" (go down).

The directional complements (simple or complex) form one lexical unit or one word with the preceding verb. This is because the Verb+Directional complement construction expresses only one action.

All these reasons tend to show that there is no real motivation for denying directional complements the status of satellites.

The process of grammaticalization has taken several centuries to be completed, but it can be considered now as final. This means of course that Chinese has not always been a satellite-framed language. It has undergone a typological shift from a verb-framed language to a satellite frame-language. A study of this historical shift will provide more arguments in favor of the hypothesis that Chinese is today a satellite-framed language. I set out to show this in Section 4.

4. Archaic Chinese (Classical Chinese)

The "NP-subject + Verb + Directional Verb" (NP-subject + V + Vd) structure can be traced back to Early Archaic Chinese (11th–6th c. BC) gaining currency in Late Archaic Chinese (the Classical Chinese *par excellence*, 5th–2nd c. BC). For example:

(7) 牛 羊 下 来 (诗 经)
niu yang xia lai (Shi jing, 8th to 6th c. BC)
cow sheep go down come
Cows and sheep are going down (and they) are coming.

In such a sentence, *xia* and *lai* are two separate lexical units, and the construction is typically a serial-verb construction V1 + V2. *Lai* has its full lexical meaning of "to come". As for *qu*, its meaning in Classical Chinese is "to leave", and not "to go", as in:

(8) 纪 侯 大 去 其 国 (战 国 策)
Ji hou da qu qi guo (Zhang guo ce, 2nd c. BC)
Ji marquis great leave his country
The marquis of Ji left his country in a great manner.

We also have two separate actions when the V2 of the V1 + V2 serial-verb construction is a verb of movement (Va) instead of a directional verb, as in:

(9) 走 出 门 (韩 非 子)
zou chu men (Han Feizi, 3rd c. BC)
run go-out gate
(He) ran (and) went out of the gate.

(10) 孔 子 趋 出 。 (荀 子)
Kongzi qu chu
Kongzi hurry-up go-out (Xunzi, 3rd c. BC)
Kongzi hurried up (and) went out.

The fact that a coordinate conjunction can be inserted in between the two verbs clearly shows that we are dealing with two separate actions:

(11) 子路趋而出。(荀子)
Zilu qu er chu (Xunzi)
Zilu hurry-up and go-out
Zilu hurried up and went out.

Finally, in Classical Chinese, there are very few instances where a Locative Phrase (LP) is used with a V1 + V2 serial-verb construction with V2 = *lai* or *qu*. We assume that the V + *lai/qu* 来 / 去 + LP construction is not a construction typical of Classical Chinese.

5. Late Han – Six Dynasties period (1st–6th c. AD)

Under the Late Han (1st–3rd c. AD) and the Six Dynasties period (3rd–6th c. AD), the following three structures A, B, and C are attested:

A. NP-subject + V + Vd and V + Vd + NP-subject

The second of these structures (V + Vd + NP-subject) appeared for the first time at the end of the Late Han period (2nd c. AD). It obviously evolved from the first one, after the NP-subject has been moved from a pre-verbal position to a post-verbal one: NP-subject + V + Vd > V + Vd + NP-subject.

The motivations for such a diachronic word order change are unclear. However, one can assume that they were mainly pragmatic: the change probably involved putting some emphasis on the NP-subject by placing it in a position which is not its normal one. For example:

(12) 生出此穀 (论衡)
sheng chu ci gu (Lun Heng, 2nd c. AD)
give-birth-to come-up this mulberry-tree
That mulberry-tree emerged.

In this sentence, the verb *chu* does not probably have its original prototypical meaning of "coming out". It already has the derived meaning of "generate".

Examples of this sort become widespread after the Six Dynasties period:

(13) 即便生出二甘蔗 (佛本行集经)
ji bian sheng chu er ganzhe (Fo ben xing ji jing, end of 6th century AD)
at-that-moment then give-birth-to come-up two sugarcane
At that moment, two sugarcanes then sprang up.

(14) 飞来双白鹄 (古辞)
fei lai shuang bai hu (Gu ci)
fly come two white swan
Two white swans flew in.

(15) 忽然自涌出二池水,一冷,一暖 (佛本行集经)
huran zi yong chu er chishui, yi leng yi nuan (Fo ben xing ji jing)
suddenly naturally surge come-out two pondwater one cold one warm
Suddenly two ponds surged up, one cold one warm.

In all these examples, we are still dealing with two separate lexical entities, one V and one Vd, but we can assume that this is just the beginning of the process of grammaticalization which will cause the two verbs to merge into one lexical unit, a directional complement (see Li Fengxiang 1997).

B. V + *lai/qu* 来/去 + LP and V + LP + *lai/qu*来/去

At the end of Pre-medieval (Han times), we find many instances of either V + *lai/qu* + LP or V + LP + *lai/qu*. At the beginning, the LPs follow *lai* or *qu*, but during the Six Dynasties period, most instances are with the LP inserted in between the two verbs. The historical derivation is as follows: V + *lai/qu* + LP > V + LP + *lai/qu*. Examples of V + LP + *qu* follow:

(16) 便出宫去 (生经)
bian chu gong qu (Sheng jing, end of 3rd c.)
then go-out palace leave
Then (he) went out from the palace (and) left.

(17) 此人上马去 (搜神后记)
ci ren shang ma qu (Sou shen hou ji, 10th c.)
that man go-up horse leave
That man mounted the horse (and) left.

(18) 弘于是便下床去 (志怪)
Hong yushi bian xia chuang qu (Zhi guai)
Hong that-moment then come-down bed leave
At that moment, Hong then came down from the bed (and) left.

Two separate actions are still probably involved in these sentences, as there are examples where a coordinative conjunction *er* 而 "and" can still be inserted between the two verbs, as in:

(19) 出国而去 (中本起经)
chu guo er qu (Zhong ben qi jing, beginning of 3rd c.)
go-out country and leave
He left the country.

Thus, *qu* cannot yet be considered as a directional complement.

However, in the following example, taken from a Buddhist vernacular text of the end of 6th century, *qu*去 has probably lost its syntactic autonomy and has already become a function word, a grammatical element.

(20) 移他处去 (佛本行集经)
yi ta chu qu (Fo ben xing ji jing, end of 6th century)
move he place go
(He) moved to his place.

How did the grammaticalization process of *qu* occur in the V + LP + *qu* pattern? Probably through a meaning shift. *Qu*去 has now acquired the meaning of *wang* 往 "go to" and no longer the original meaning of *li* 离 "to leave", as in (8) above.

In the following example *qu*去 also has the meaning of "to go":

(21) 汝何处去? (百喻经)
ru he chu qu (Bai yu jing, end of 5th c.)
you what place go
Where are you going?

In fact, *qu* acquired the meaning of "to go" when the LP was moved after the V + *qu* constituent. This meaning shift from "to leave" to "to go" is easily understandable as "to go" is "to leave" from a place, to depart from a place. (See Lakoff 1987; Zhang Min 1998; Peyraube, Wu, & Liang 2006.)

We also have many examples of both VP + *lai* 来 + LP and VP + LP + *lai* 来 :

(22) 入来洛阳 (志怪)
ru lai Luoyang (Zhi guai)
enter come Luoyang
We entered Luoyang.

(23) 还入城来 (杂宝藏经)
huan ru cheng lai (Za bao cang jing, end of 5th c.)
return enter city come
(He) returned and entered the city.

C. NP1 + Vt + NP2 + *lai* / *qu* > NP2 + NP1 + Vt + *lai* / *qu*

What is interesting to note about this construction is that under the Wei-Jin-Nan-Bei-Chao period (3rd–6th c. AD), the NP patient-object is between the two verbs, i.e. before *lai* or *qu*. It is rarely after *lai* or *qu*. It may also be moved before the NP subject-agent:

NP1+ Vt + NP2 + *lai*来 / *qu* 去 > NP2 + NP1 + Vt + *lai*来 / *qu* 去

where NP1 = agent, NP2 = patient, and Vt = transitive verb.

For example:

(24) 舍中财物,贼尽持去 (百喻经)
she zhong caiwu zei jin chi qu (Bai yu jing)
house in belongings thief all hold go
A thief has robbed all (our) belongings in the house.

(25) 好甜美者,汝当买来 (百喻经)
hao tian mei zhe ru dang mai lai (Bai yu jing)
good sweet beautiful the-one-that you must buy come
You must buy the ones that are good, sweet and beautiful.

In these last two examples, *lai* and *qu* seem to have lost their full lexical meaning and start to be grammaticalized, to become function words or grammatical elements (see Sun Xixin 1992). In both examples, the NP2-object is in a topic position.

In fact, as early as the Early Han (2nd c. BC – 1st c. AD), the "Verb(transitive) + V of movement (also transitive)" construction can be used in sentences with a patient topic. Example:

(26) 晋人也逐出之 (史记)
Jin ren ye zhu chu zhi (Shi ji 1st c. BC)
Jin people particle chase go-out they
(They) chased the people of Jin.

In this example, the NP *Jin ren* is the topic. The sentence should be understood as "As far as the people of Jin are concerned, they chased them", where "them" and "people of Jin" are co-referential.

What is new under the Six Dynasties period is that the Vi (intransitive verbs) *lai* and *qu* following Vt (Vt + *lai* or *qu*) can also co-occur in the patient-topic construction. This was probably triggered by analogy with the patient-topic sentences involving a Vt + V as in the movement construction.

In conclusion, three new structures appeared under the Six Dynasties period:

1. V + Vd + NP, derived from NP + V + Vd after the NP has been moved into the post-Vd position;
2. V + LP + Vd, derived from V + Vd + LP, after moving the LP between the verb and the Vd;
3. NP2 + NP1 + Vt + *lai* / *qu*, derived from NP1 + Vt + NP2 + *lai* / *qu*, after the NP2 has been moved into a topic position.

When all these NP movements were complete, a reanalysis of the serial-verb constructions V1 + V2 took effect and the V2 started to be grammaticalized and to become a function word or a grammatical element, more precisely a directional complement.

The condition for *lai* and *qu* to become real function morphemes were for the LP to express the resultative point of the action.

6. Late Medieval (Tang-Song times), 7th–13th c.

Beginning in the Late Medieval period, the simple directional complement construction that hesitantly appeared during the Early Medieval period consolidates and becomes quite widespread. New kinds of sentences involving directional complements

appear, including ones that were not attested before, such as subject-patient sentences (NP-subject-patient + Vt + *lai* or *qu*) or passives. For example:

(27) 米 送 来(大唐求法巡礼行记)
mi song lai (Da Tang qiu fa xun li xing ji, mid-9th c.)
rice send come
Rice has been sent in.

(28) 何不早说,恰被人借去了也?(五灯会元)
he bu zao shuo qia bei ren jie qu le ye (Wu deng hui yuan, 12th c.)
why not early say just by someone borrow away asp.-marker particle
Why you did not say it earlier, (it) has just been borrowed by someone?

In these examples, *lai* and *qu* are directional complements without a doubt and no longer act as full lexical verbs. The possibility for the Vt + *lai / qu* to take a subject-patient is in fact one of the main criteria to decide when we do have real directional complement constructions (see Liang Yinfeng 2003).

Such subject-patient sentences come from topic-patient sentences through a re-analysis of the compound Vt + *lai / qu*. In topic-patient sentences, a subject-agent can be inserted between the topic and the Vt. The Vd *lai* and *qu* can express the directional movement either of the topic-patient or of the subject-agent. Sentences may have two interpretations. In subject-patient sentences, it is impossible for a subject-agent to appear after the subject-patient. The Vd *lai* and *qu*, therefore, can only express the direction of the movement of the subject-patient.

The historical evolution has been as follows:

(29)

Han-times	WJNBC-period	Tang-times
T + Vt + Vdt	Sp + Vt + Vdt	Sp + Vt + *lai / qu*
	T + Vt + *lai / qu*	

[T = Topic; Vt = transitive verb; Vdt = transitive directional verb; Sp = subject-patient]

Yet another structure appears under the Tang: Vt + *lai / qu* + Object. Although this structure is attested during the Six Dynasties period, it is very rare. Beginning from the Tang, however, we do find many examples, such as:

(30) 差人送来绢一疋(大唐求法巡礼行记)
cha ren song lai juan yi pi (Da Tang qiu fa xun li xing ji)
send people offer come silk one classifier
(He) sent people to offer (us) one piece of silk.

(31) 我已取来三日香稻(白衣金幢二婆罗门缘起经)
wo yi qu lai san ri xiang dao (Bai yi jin chuang er po luo men yuan qi jing, beginning of 11th c.)
I already take come three day fragrant rice
I have already taken fragrant rice for three days.

Before the Tang-Song period, the object is between the Vt and *lai* and *qu*, as in the following example, also from a Buddhist text, but dated at the end of the 4th century:

(32) 我已并取明日米来 (中阿含经)
wo yi bing qu mingri mi lai (Zhong a han jing ca. 397–398)
I already at-the-same-time take to-morrow rice come
I have already taken at the same time the rice for to morrow.

The complex directional complements also appeared at the end of the Tang or during the Five Dynasties period (907–979). Several examples of V + Vd1 + Vd2 can already be found in the *Zu tang ji*, dated 952. The structure comes directly from the simple directional complement construction. Examples:

(33) 师便打出去 (祖堂集)
shi bian dachuqu (Zu tang ji, 10th c.)
Master then hit+out+go
The Master hit (it).

We also find instances of V + NP + Vd1 + Vd2 (derived from V + NP + Vd) or V + Vd1 + NP + Vd2 (also derived from V + NP + Vd) where a NP-object is inserted between V and Vd1 or between Vd1 et Vd2 (see Peyraube, Wu, & Liang 2006). For example:

(34) 我与你扶它起来。(张协状元)
wo yu ni fu ta qilai (Zhang Xie zhuan yuan, before 1310)
I with you straighten-up it get-up
With your (help), we will straighten it up.

Hence, by the 13th century, all the directional constructions used today in Contemporary Chinese are in existence.

7. Conclusion

The study of the historical development of the directional complement constructions allows us to propose the following three conclusions:

1. First, Archaic Chinese (Classical Chinese) encoded the path information of the motion events in the main verb of the clause. It was a verb-framed language.
2. Second, at the end of the Wei-Jin-Nan-Bei-Chao period, that is, around the 5th century AD, Chinese started to use directional complements and to undergo a shift from a verb-framed language to a satellite-framed language. Chinese became a mixed language using both strategies.
3. Third, some five centuries later, around the 10th century, the shift from a V-language to a S-language was achieved. Languages can move along a cline over time. The movement of Chinese from a V-language to S-language is not unique. It has been reported that the change for Italian, a V-framed language moving in

the direction of a S-framed language, may be stimulated by contact with German, especially in Northern Italy. A similar evolution is reported for Brussels French, under the influence of Dutch (see Slobin 2004).

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PART II

The nature and uses of space in language and discourse

CHAPTER 7

Are there spatial prepositions?

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Prepositions describing spatial relations are used in so many abstract domains that one may wonder whether they deserve to be called "spatial prepositions". The answer may be yes if space is not conceived as an abstract entity described by geometry or topology, but rather as an indispensable component of our experience. In this chapter, a classification of spatial prepositions is first set out which calls for a distinction among situations that do or do not involve *dynamic exchanges*. Both categories are then divided into *static* and *kinetic* relations. This classification limits itself to spatial uses of the words examined. This very partial approach corresponds to the uses of these prepositions by children acquiring their first language. If ontogeny is parallel to phylogeny, spatial uses might be considered as sources from which the whole distribution of prepositions flows. The last part of the chapter attempts to explain this evolution by means of concepts such as *complex primitives* and *logical impetus*. According to this hypothesis, spatial uses of prepositions are the impetus from which their whole distribution evolves according to systematic principles of development.

Introduction

According to those who believe that prepositions can be used in any domain and that the spatial domain has no priority over the other domains (Cadiot & Visetti 2001; Gilbert 2003), there are no spatial prepositions. My answer to this initial question depends on whether space is conceived as an abstract entity described by geometry or topology or as an indispensable host for our experience of the world. It will be shown that geometric tools such as Cartesian axes and topological notions such as contact or inclusion do not accurately explain the distribution of prepositions. However, if space is considered as a component of our concrete external experience, I believe that spatial uses of many prepositions play a determining role in accounting for their total distribution.

Geometry and topology describe essentially static situations. Spatial experience, in contrast, is made up of actions that involve movements caused by forces. The word *dynamic* is often used to describe both motion and force. I will discuss the connection of *dynamic* with *kinetic* and *static* in the first section of this article. In Section 2, I will

use motion and force to propose a typology of the spatial actions and situations we encounter in our spatial experience. There is a reasonable correspondence between these categories and spatial terms in French and in English. It is not perfect, however, and some words like *against* and *to touch* may be attached to more than one category. Of course, whereas each category of events may be described by a spatial word, these categories are far from accounting for all the uses of these words. I address this question in the last section of this article in which I introduce *logical impetus* from which the whole distribution of prepositions may develop.

1. Relationship between *dynamic, kinetic* and *static*

A painter who would like to paint a running antelope may wish it to be immobile in order to fix each detail. Linguists who use topological concepts such as inclusion or geometry also provide an immobilized picture of a moving world. Just like the painting of a running animal would look clumsy without any indication of motion, static descriptions of the world miss the important role of motion and force in spatial terms. As a matter of fact, even the quiet and still office that surrounds me is the theater of many struggles: the books would fall without the shelves below them and the coffee would spill all over the table if it were not contained in a cup. For this reason, immobility is always the result of an equilibrium between opposite forces. Just think of the two pans of a scale: immobility occurs when the two weights balance one another. This type of static/dynamic situation is not described by a preposition. It is even difficult to represent this spatial situation by a verb: one is more apt to say that *the apples weigh one kilo* rather than *a weight of one kilo balances the apples*. This is so because, in this case, we are more interested in the function of weighing than in the spatial configuration of equilibrium. However, as we will see below, the prepositions *in* and *on* are used in cases of *control*, that is in cases where a container or a bearer overpowers the potential movement of the content or of the burden. Containment and support are two essential static/dynamic relationships. Therefore, *static* situations should not be considered as the opposite of *dynamic* situations but rather as a subclass of this category.

Because *dynamic* is often considered as an antonym of *static*, it is also understood as a synonym of *kinetic*. To show that *kinetic* is not always equivalent to *dynamic*, physicists might oppose a falling stone in accelerated motion (submitted to the force of gravity) to a lead ball in rectilinear uniform motion. Indeed, if one disregards friction, the principle of inertia states that no external force is necessary to keep the movement of the ball alive. But the layman perfectly knows that he should worry if a lead ball rolls over his lettuces. Outside the textbooks of physics, it does not matter if the damage is to be blamed on the *force of inertia* of the ball or on its *kinetic energy*. In order to accommodate rectilinear uniform motion in my classification, I will oppose dynamic cases in which there is an exchange of force between two entities with cases in which there is no such exchange. There is no exchange of force when you walk in the street,

but there is such an exchange when you bump into the wall. Therefore, in Section 2 the first step in the classification will be *dynamic exchange* vs. *no dynamic exchange*.

In classical mechanics, the study of kinetics examines actual motion, whereas the study of dynamics is concerned with the connection between efforts and actual or virtual motion. Effort is a loose notion related to human effort and, since the publication of *Principes fondamentaux de l'équilibre et du mouvement* (Lagrange 1803, after Jammer 1957), physicists have tried to get rid of this notion, as well as to get rid of the notion of force; movements may be the effects of forces, but since only effects are observable, their causes should be considered as mystical notions unworthy of scientific attention. Occam's razor may have its virtue in physics, but this is not the case for language. In our view of the world, we consider that each movement has a cause of which we approve or disapprove, according to circumstances. As we will see in Section 2, the former type of transmission of energy is often conveyed in English by transitive constructions, whereas unwelcome causes of change in motion are introduced by the preposition *against*. We also distinguish between intentional and unintentional causes of motion, the former being more likely to be used as an agent in a transitive construction. Section 2, therefore, will use motion and force in order to classify the states and actions we encounter in our daily experience of the world.

2. Typology of states and actions in space

From the discussion in Section 1, it is clear that *dynamic exchanges* as well as *non dynamic exchanges* can be divided into *static* and *kinetic*. I will consider these four cases in turn.

2.1 No dynamic exchange/static situations

These situations may be described, notably, by *projective* prepositions, such as *above*, *in front* and *on the left* in sentences (1)–(3):

(1) The bird is above the tree.

(2) The bird is in front of the house.

(3) The tree is on the left of the house.

These prepositions are probably the best candidates for the names of *spatial prepositions* in the formal sense of *space* since they may be related to regions delimited by three axes. The prepositions *above/below* are related to the vertical axis, whereas *in front/behind* usually correspond to the frontal orientation of the speaker and *to the right*/*to the left* to its lateral orientation. Note that these two egocentric axes already introduce the speaker into the description of space in English. In recent years, the existence of absolute languages describing space in terms of geographic landmarks has been well documented (Haviland 1993; Levinson & Brown 1994; Ozanne-Rivierre

1997). These axes, however, determined by the slope of a hill or the direction of the winds, do not bear any more resemblance to abstract geometric axes than to the frontal and lateral orientations of the speaker. More importantly, if the function of projective prepositions were to formally describe space relative to Cartesian axes, one would expect converse prepositions *in front of* and *behind* to be symmetrical and *y is behind x* to be true any time *x is in front of y* is true. Such is the case in sentences (4) and (5), but sentence (6), which is the converse of sentence (2), looks very odd:

(4) The car is in front of the truck.

(5) The truck is behind the car.

(6) *The house is behind the bird.

This situation is so because projective prepositions are not devoted to a purposeless description of space, but rather serve as instructions that help the addressee locate a specific target he/she is looking for. In order to guide the addressee, the speaker uses the most conspicuous landmark possible. Whereas the house in sentence (2) may help someone to find a bird, the bird in sentence (6) cannot, under normal circumstances, help find the location of a house. This sentence looks odd because the best candidates for the formal description of space in English, projective prepositions, have a more important function than sheer description: the localization of a target by referring to a landmark.

2.2 No dynamic exchange/kinetic situations

Most kinetic situations without dynamic exchange are conveyed by verbs of motion (*to come, to go, ...*) or by verbs of manner of movement (*to walk, to drive, ...*). Self-moving entities certainly have energy but, as long as they do not bump against an obstacle, there is no dynamic exchange of forces. The description of these situations may be completed by projective prepositions:

(7) John walks in front of the house.

This means that, in English as in French, projective prepositions can localize both mobile and immobile targets. In contrast to English, which marks the contrast between a target *in* a container and a target moving *into* it, French uses *dans* in both cases.

2.3 Dynamic exchange/static situations

In my classification, I will first distinguish cases of *balance*, in which equilibrium is the result of two equivalent forces, from cases of *control* in which the controller overpowers the controlled. As we saw earlier, no preposition is devoted to the relationship of balance. Some symmetrical static exchanges of energy may however be conveyed by *against* or by the verb *to touch*. I will come back to these uses in Section 2.4.

Asymmetrical relationships of control account for the important prepositions *in*, *on,* as well as for *hanging from*. I have extensively studied these relations elsewhere (Vandeloise 1989, 1991, 1994, 1999). I argue against the topological definition of *a is in b* by the inclusion of *a* in *b* and against the definition of *a is on b* by the vertical contact of *a* with a plane determined by *b.* Instead, I propose to define *in* and *on* by the functional relationships of containment and support respectively and *hanging from* by the relationship of suspension. In each case, the landmark controls the target by preventing prospective movement of a fluid target or of a solid target submitted to gravity. In our classification, containment may be distinguished from support and suspension because the container controls the content in more than one direction. In support as in suspension, the controlling entity opposes itself to the weight of the controlled entity along the vertical axis. In suspension, however, control occurs from above, whereas in support the bearer controls the burden from below. The relationship of the prepositions *on* and *in* with force is clearly illustrated by the contrast between, on the one hand, Figures 1 and 3, which are described by sentences (8) and (10), and on the other hand Figures 2 and 4, which are described by sentences (9) and (11):

(8) A pear is on the table.

(9) A pear is touching the table.

(10) The pear is in the bowl.

(11) The pear is on (top of) the apple.

The preposition *on* may be used for Figure 1 in which the table controls the position of the pear. However, it is not normally used to describe Figure 2 because the position of the pear does not depend on the table but on the wire to which it is attached. Note that, because the relationship is asymmetrical, *touch* cannot normally be used to describe Figure 1, even though the pear is in contact with the table. In Figure 3, the pear is *in* the bowl because, even though it is not included in it, it will move if one moves the bowl. This not so in Figure 4, for which sentence (11) is preferred to sentence (10).[1]

Some asymmetrical static/dynamic relationships can also be described by the preposition *against* as in sentence (12):

(12) The broom is against the wall.

Because this preposition is mainly used in kinetic dynamic exchanges, I will come back to its asymmetrical static uses, as well as to its symmetrical uses, in the last section.

1. The interference of the concavity of the container and of suspended contents in the use of *in* has been extensively studied by Richards and Coventry (2004).

Figure 1.

Figure 2.

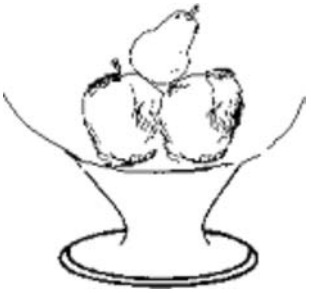


Figure 3.

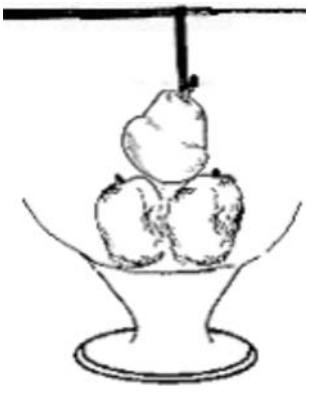


Figure 4.

2.4 Dynamic exchange/kinetic situations

Whereas kinetic situations without dynamic exchange are mainly described by intransitive verbs of motion, kinetic events with dynamic exchanges are actions conveyed by transitive verbs such as *to take*, *to break* and so forth:

(13) John takes the book.

(14) John breaks the wood.

In prototypical transitive constructions, force is flowing from the agent which is designated by the subject to the patient which is designated by the direct object. Some transitive verbs describe the communication of a movement onto the patient by the agent:

(15) John throws the ball.

(16) John pushes/pulls the table.

These actions have an important role in kinematics because no immobile inanimate entity can move for the first time or change its speed unless it receives some acceleration from an animate entity by throwing, pushing or pulling.

The verb *to touch* might be an excellent candidate for the formal description of space since it is clearly related to contact. However, as noted by Hayes (1985), the representation of physical contact by topology is a "very vexing question". Furthermore, even if contact is a necessary condition for using this verb, one quickly realizes that it is far from being a sufficient condition. Indeed, most of the transitive verbs of action such as *to take* or *to break* involve contact. If contact were a sufficient condition to use *to touch*, it should be possible to use sentence (17) when John is taking the glass:

(17) John touches the glass.

But it would be more than a euphemism to say that *John touches the glass* if he breaks it. One might object that *to take* and *to break* are preferred to *to touch* because they mean more than contact and therefore are more informative. However, general verbs in English such as *to make* can be used instead of more specific verbs such as *to cook* (to make a dinner), *to sew* (to make a dress), *to paint* (to do a painting), and so forth. If *to make* may be used as a substitute for fabrication verbs, why could not *to touch* be a substitute for action verbs? As a matter of fact, negative uses of *to touch* play such a role since *don't touch this key* means that any action on the key is forbidden, even touching.

Contact alone does not allow for a definition of *to touch* that distinguishes it from other action verbs. Furthermore, as illustrated by sentence (18), the use of this verb is incompatible with violent contact:

(18) *John touches the book forcefully.

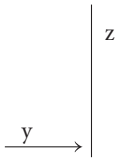
For this reason, I have chosen to describe *a touches b* by a minimal transfer of energy from *a* to *b*. According to naive physics, and disregarding magnets and blowers, contact is a necessary condition for this transfer. But *to touch* cannot describe actions because they involve more than a minimal transmission of energy. In this way, this verb is at the borderline between being an intransitive or a transitive verb: like intransitive verbs, it is used when there is no dynamic exchange yet, like action verbs that involve dynamic exchange, *to touch* is transitive. We will see below that it is also a borderline case that shares the properties of both kinetic and static verbs.

In most cases, the transfer of energy described by transitive sentences is deliberate and welcome by the agent, even though the patient may feel differently, as illustrated by sentence (19):

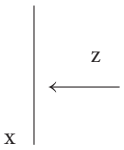
(19) The hunter eats the rabbit.

(20) The car bumps against the wall.

But the transfer of energy is not intentional in sentence (20), in which roles are inverted. Indeed, with the preposition *against*, control is not exerted by the entity designated by the grammatical subject but by the entity introduced by the preposition.



Schema 1.



Schema 2.

Whereas containment, support and suspension involve mainly the control of *natural forces* such as gravity and fluidity, the entities introduced by *against* control *impressed forces* (in the case of inanimate entities) or *auto-impressed* forces (in the case of moving animate entities). When the shock is deliberate or when the landmark is not likely to overpower the target, the French preposition *sur* is preferred to the preposition *contre*. Both prepositions are translated by *at* in English:

(21) L'enfant jette des pierres sur (*contre) le chat.
The child throws stones at the cat.

(22) L'enfant jette des pierres contre (*sur) le mur.
The child throws stones at the wall.

Furthermore, *contre* cannot be used with intransitive verbs of motion or of manner of motion:

(23) *L'enfant va contre le mur.
The child goes up against the wall.

(24) *L'enfant marche contre le mur.
The child walks up against the wall.

(25) Le forcené court contre le mur.
The madman runs up against the wall.

This may be explained because verbs of motion describe the will of the mover and one does not move deliberately into an obstacle, except in the case of a madman, as in sentence (25).

All the previous uses of *x V y against z* may be illustrated by Schema (1) in which the movement of *y* is controlled by *z*. Sentence (26), in contrast, corresponds to Schema (2), in which *x* is immobile and *z* is mobile:

(26) Le mur protège le jardin contre les voleurs.
The wall protects the garden from burglars.

There is a common point between the mobile argument behind *against* in sentence (26) and its immobile argument in sentence (20): both the burglars and the wall are detrimental to the garden or to the car. Even though all landmarks of the second type are not detrimental (cf. *the child curled up against her mother*), this commonality might point to a connection between the spatial uses of *against* and its adversative uses:

Figure 5.

Figure 6.

(27) The soldier is against the war.

As was noted in Section 2.3, the French preposition *contre*, like English *against,* has also symmetrical and asymmetrical static uses. Sentence (28) describing Figure 5, is an example of a symmetrical use:

(28) The pear is against the basket.

One may consider that sentence (28) describes a symmetrical static exchange of energy since there is action and reaction between the pear and the basket. This energetic exchange is minimal however and neither *in* nor *on* might be used in this case. In contrast, a static use of *to touch* is perfectly appropriate:

(29) The pear touches the basket.

Sentence (29) may also describe a ball that comes into contact with the basket at the end of its motion.

Sentence (12), repeated here, is an example of asymmetrical static/dynamic exchange since, in Figure 6, the wall overpowers the potential movement of the broom:

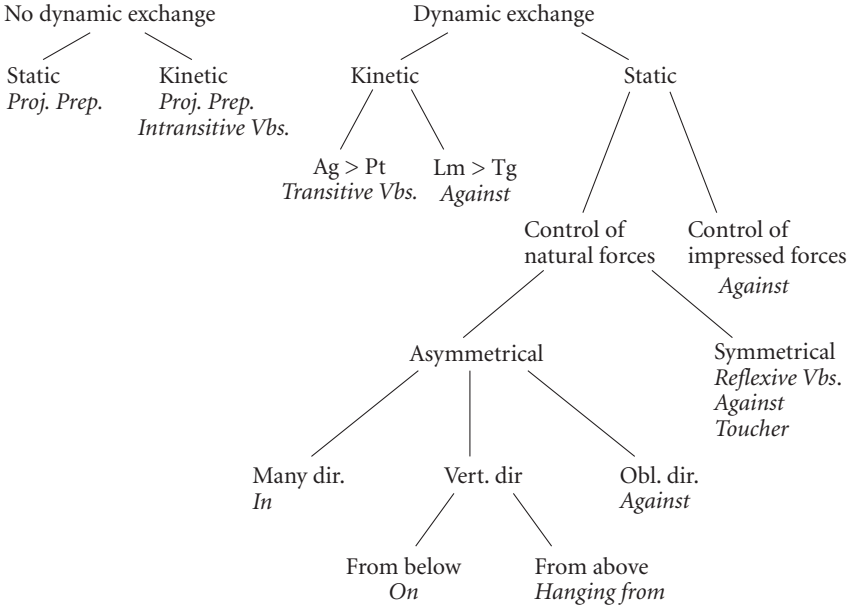
(30) The broom is against the wall.

In this way, *against* joins *in* and *on* in the representation of asymmetrical static/dynamic situations that involve only static forces. As is the case with *on,* the landmark controls the position of the target in only one direction. The relationship between these two prepositions is very intricate (Vandeloise 2003b). In contrast to the situations described by *a is on b*, the interaction is not vertical for the situations described by *a is against b*. Furthermore, with *against*, the landmark is not alone to control the target: the position of the broom depends on the floor as well as on the wall.

To conclude this discussion, the following classification of spatial situations and actions may be proposed in Table 1.

The verb *to touch* occupies an intermediary position in this chart because it may be kinetic as well as static. Furthermore, although it is a transitive verb, it conveys a

Table 1. Situations and actions in space



minimal dynamic exchange. The preposition *against* can represent kinetic dynamic exchanges as well as static symmetrical or asymmetrical relationships.

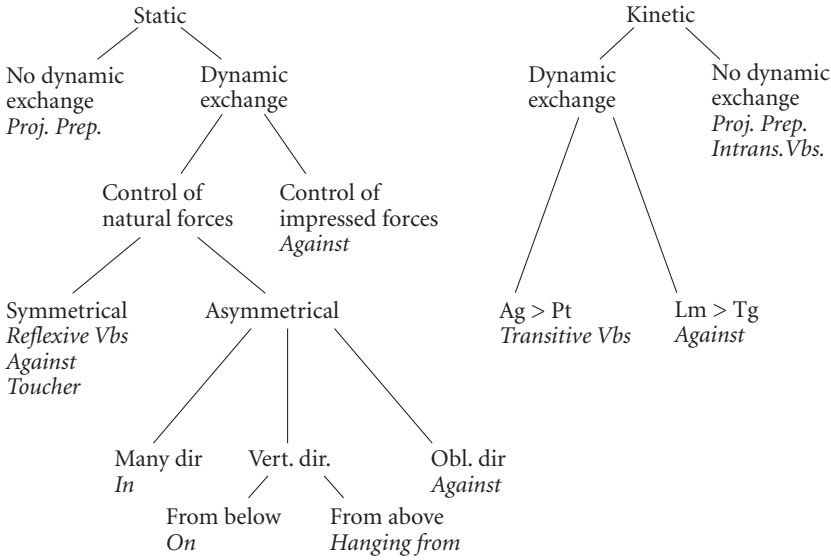
Static and *kinetic* appear twice on the second tier of the classification. This placement suggests the following alternative in which spatial actions are divided first into static and kinetic actions, and then into *no dynamic exchange* and *dynamic exchange* on the second tier in Table 2.

This classification has the disadvantage of separating projective prepositions.

3. From spatial uses of prepositions to their whole distribution

As they stand, the above classifications help to provide rules for the spatial uses of prepositions and other terms partly devoted to the linguistic representation of space. I believe that these classifications constitute an improvement in relation to static topological or geometric descriptions of spatial words. As far as the whole distribution of words is concerned, however, these dynamic classifications do not go much further than the former ones. Therefore, I have to either limit my ambitions to a partial description of the words examined or propose extensions of the spatial uses of prepositions explaining their other uses. Proceeding with a partial spatial description of prepositions might not be so bad since such a description roughly corresponds to their use by children acquiring their first language. Spatial analyses would then correspond to child language, whereas more abstract analyses would better fit with adult language. However, if ontogeny is parallel to phylogeny, a more ambitious goal may be to estab-

Table 2. Spatial situations and actions (alternative version)



lish spatial dynamic descriptions that may be considered as a source from which the whole distribution of prepositions flows. Whether or not this developmental approach works better than global abstract analyses is an empirical question. The more analyses are proposed from both points of view, the closer we will be to an answer.

The dynamic classification proposed in Section 2 is too rigid to allow an extension from spatial to abstract uses. In order to defend such an approach, I will first introduce the notion of *complex primitives,* for which the objective notions in the above classifications are only criteria. Then, I will sketch a more ambitious theory of *logical diachrony* in which the whole distribution of a word derives from its *impetus.*

3.1 Complex primitives

Complex primitives are *primitives* because they are pre-linguistic concepts and they are *complex* because, in contrast with the *sèmes* of structural linguistics or with the atomic *semantic primes* of Bierwisch (1967), several characteristics acting like *family resemblance features* are necessary in order to describe them. As an example, I will choose *general orientation* which is a complex primitive motivating many uses of the prepositional expressions *in front of/in back of*. General orientation may be considered as a pre-linguistic concept since, according to Levine and Carey (1982), infants asked to place animal toys, TV sets and chairs as if they walked in a parade arrange them as adults would. This practice cannot be explained only on the basis of perceptual abilities, since the front of a TV set is oriented in mirror, as if it were looking to the child, whereas the front of the chair is oriented in tandem, as if it were walking in the same direction as the child. Children who succeeded in this task failed in attributing *front* or

back to the same objects. For this reason, one may surmise that the acquisition of general orientation precedes the linguistic knowledge of *in front of* and *in back of,* which locates an object on the side of a general orientation, including the nose and the nape of the neck respectively. Because of its vital functional importance, we have a global understanding of our general orientation. However, this concept is complex because many propositions are necessary to describe it exhaustively. General orientation might be anatomically defined by an axis going from the back of the feet (in the back), to the eyes (in the front). But what if Bernadette turns her head to the left and sees Virgin Mary *in front of* her? Now, general orientation appears to correspond to the line of sight of the speaker. And if a crab is at risk of falling into a hole *in front of* it, general orientation coincides now with the direction of motion. As a matter of fact, in most cases, all of the features of general orientation coincide: anatomically defined frontal orientation, line of sight and direction of motion. This prototypical general orientation accounts for most uses of *in front of/in back of*. However, in marginal cases, some family resemblance features can single out and determine general orientation, if they occasionally correspond to the direction in which our most important vital abilities are working most efficiently. Complex primitives, then, are unified by their function in our survival in the world. Many factors conspire in the realization of this function but, in marginal cases, some of these characteristics can single out and determine marginal occurrences of the complex primitives.

Further paradigmatic complex primitives are the relationship container/content (relationship C/c) and the relationship bearer/burden (relationship B/b), involved respectively in the description of the prepositions *in* and *on*. The notions of *control in many directions* and of *control from below in the vertical axis*, which were used in the classifications in Section 2, are only some of the family resemblance features determining these complex primitives (Vandeloise 1991). *Concavity* is another feature of the relationship C/c and *horizontal plane* another feature of the relationship B/b. I consider the dynamic features more important because control in many directions can explain why concave objects fit this function better than planes (that can only control an object in one direction), whereas the reverse is not true. Because concavity is more easily perceptible than dynamic control, however, it can become a determining criterion in the use of *in*. Among the other family resemblance features of the relationship C/c is the protection of the content by the container, a feature actively involved in the motivation of *the gift is in the wrapping*. Different languages can use the characteristics of a complex primitive differently in order to extend the distribution of the word they use to convey this primitive. Furthermore, some situations in the world might be covered by extensions of different complex primitives. Consequently, languages have to make conventional choices that determine how their semantics adjust to reality. Finally, different languages can choose their complex primitives at different levels of abstraction. For example, whereas English distinguishes between control in many directions (*in*) and control on the vertical axis (*on*), Spanish associates a more general concept of control to the preposition *en* that roughly corresponds to the domains of *in* and *on* (Vandeloise 2003a). In contrast, the verb *kkita* in Korean is more specific than

in since it describes tight fit but not loose containment in which the content is not in contact with every part of the container. In these ways, complex primitives can account together for the commonality between languages and for their many differences.

3.2 Logical diachrony

Most words describing space are considered highly polysemic. Speakers' command of these words may be explained by memory helped by the many connections they may establish between different meanings. However, from a diachronic point of view, one may surmise that in the history of language, as well as in acquisition, the birth of each word begins with a single connection between its form and one corresponding meaning that I will call *impetus*. This ideal state might be found through etymology but the origins of language are too uncertain to provide much evidence.[2] However, the historical development of words is submitted to many accidental changes that do not interest general linguistics. Therefore, although *historical impetus* – the prospective state of a word when it was first coined – may be useful, it cannot provide a linguistically significant answer. Language acquisition is another domain in which the birth and the development of words may be observed. Here, a difference can be established between words like *dog*, for which the impetus may be triggered by animals as different as a beagle or a German shepherd, and words like *in* and *on,* for which there might be a common impetus. If such were the case, this impetus would certainly be linguistically significant. However, some care is necessary because at this point one cannot be sure that spatial words are acquired in the same way or even in a limited number of different ways. In addition, however different a beagle and a German shepherd may be as referents, they may still be conceptualized in similar ways as far as their linguistic categorization is concerned. Therefore, children's first contact with a word, which I will call *personal impetus*, can only provide indices toward what I am looking for, its *logical impetus*. The evolution of the lexicon in history, as well as the acquisition of language, can only provide models for this system.

I call *logical impetus* the use of a word from which the whole distribution of this word is easiest to derive in a systematic way. By *systematic* I mean that the principles of extension must hold true for more than one word. For example, in French a bottleneck may be called *le haut de la bouteille* ('the top of the bottle'), even though the bottle is occasionally upside down. I explain this extension by a *principle of fixation,* according to which the portions of an object may be named relative to their normal position in space, even if position is not normal at the moment of speech. This principle also holds true for the *back* of a cupboard that may be occasionally turned toward the speaker. In these cases, one may confidently say that *haut* or *back*, used when the object is in its normal position, are closer to the impetus of these words than when

2. The example of neologisms extending their first meaning to different uses might be more revealing.

they are used according to the principle of fixation. *Pragmatic bridges* are further connections whereby languages exploit regularities in the world to extend the meaning of a word. For example, in my analysis of *length* (Vandeloise 1988), I propose a use of this dimension along a direction that is parallel to the motion of the denoted object and a second use corresponding to its largest horizontal dimension. Now, for aerodynamic reasons, moving objects are normally larger in the direction that is parallel to motion than in the direction that is perpendicular to it. In this way, one may establish a link between the two uses of *length*. The role of this pragmatic connection between size and ease of motion in the meaning of *length* is confirmed by exceptions such as razors and plows for which maximal resistance with the skin or the earth is looked for. In these cases, *width*, the dimension that is transversal to movement, is the largest horizontal dimension. Obviously, this pragmatic bridge can only work from the first meaning, the direction parallel to motion, to the second, the largest horizontal dimension. Therefore, the former use precedes the latter and is closer to the logical impetus of *length* in logical diachrony.

The idea of *logical diachrony* should now be clear. Its purpose is to provide a set of uses providing *logical impetus* from which the distribution of words evolves according to systematic principles of development. Like the *radial categories* proposed by Lakoff (1987) for the description of *over*, logical diachrony represents words by a network of meanings. But, whereas in the former case the main meaning is a prototypical center (see Vandeloise 1991 for a criticism of this approach), impetus is the origin of logical prospective developments. In contrast to the prototypical centers of radial categories, it is not claimed that logical impetus has a synchronic salience. Its purpose is not so much to explain *how* languages are structured as to explain *how it happens* that they are structured in such a way. In a very simplified way, one might say that logical diachrony attempts to capture the motivated part of the lexicon. Actual languages are the results of historical diachrony that adds all of its conventions and accidents to the subjacent result of logical diachrony. In keeping with *localism*, I believe that space, the host of our daily experience, is an important provider of logical impetus from which ideal models of language develop. But this fact does not warrant a privileged status to these notions in the developed language of adults.

In the case of prepositions like *in* and *on*, complex primitives such as the relationship C/c and the relationship B/b are good candidates for impetus. The idea would be that children conceptualize these concepts globally. Therefore, whatever criteria characterize these relationships, they would be only sensitive to their main function. When the child grows, he/she becomes aware of the different aspects which characterize this relationship. This analysis provides the basis necessary for the extension in the use of the prepositions which convey complex primitives. But what happens in a language such as Spanish that has a single preposition *en* covering the domain of *in* and *on*? Do children access *en* through the relationship C/c, the relationship B/b, or through a more general concept of control? And what about Korean children learning *kkita*, a word that is more specific than *in* and conveys tight fit, at the exclusion of loose containment? Of course, logical diachrony does not need to be identical for all of

the languages in the world. However, the set of prelinguistic concepts anchoring language to the conceptualization of the world might be more universal. After all, *control* (corresponding to Spanish *en*), *control in many directions* (corresponding to English *in*) and *control in many directions with contact* (corresponding to Korean *kkita*) are only embedded concepts moving from the more general to the more specific (Vandeloise 2003a). Logical impetus is in language, not in the child's head. The child has pre-linguistic concepts at different level of generality that must be adjusted to each language. Should a Spanish child make a hypothesis about the meaning of *en* at the level of the relationship C/c, he would meet examples in adult language that force him to extend this first choice. A Korean child making the same hypothesis, in contrast, might be corrected if he extends *kkita* to cases of loose containment.[3]

In conclusion, there may be two different answers to the question in the title of this article: "Are there spatial prepositions?" Relative to the development of language, I believe that localism may be true and that space plays an important role in the evolution of "spatial prepositions" as it does in the evolution of thought (Cassirer 1953). However, the conceptualization of space involved in language is not a static topological or geometric representation, but rather a dynamic representation linked to the use of space that hosts our daily experience in the world. Nonetheless, for adults who use a developed language and for writers who exploit its richness, the priority of spatial notions in language may be completely lost and further abstract concepts may play a prominent role.

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CHAPTER 8

Deictic space in Wolof

Discourse, syntax and the importance of absence

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The role of deictic reference in Wolof is particularly interesting for two reasons. First, it permeates the entire system of the language (in noun determination, predication and subordination). Second, this language has a suffix which indicates the absence of localization in the space of the speaker – which plays a special role in the construction of various relationships of syntactic dependency. Thus, in Wolof reference depends on a dual mechanism of spatial anchoring: (1) in order to become definite, an object must necessarily be situated in the speaker's space (physically near or far); (2) if the object is indicated as not being localized in the speaker's space, it necessarily depends syntactically on another constituant indicating the situation in which it is validated. We propose to describe the various uses of these spatial suffixes as well as the specifically linguistic mechanisms that they bring to light, such as the links between deictic anchoring, predication and syntactical dependency, and more generally the central role played by the speech situation.

Introduction

In his efforts to summarize and renew a long tradition of research on linguistic space, Levinson (2003) has shown that three kinds of frames of reference are used in languages for locating an entity, namely (1) the intrinsic frame of reference – in which the coordinates are determined by the inherent features of the object serving as referent (cf. *He's in front of the house*: the house has an intrinsic orientation defining its front part); (2) the relative or anthropocentric frame of reference, where the coordinate system is based on an external viewer or point of view (*He's to the left of the house*: the left

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of the house is defined relative to the speaker's position), and (3) the absolute frame of reference using fixed bearings such as the cardinal points (*He's north of the house*). When the point of view used as the frame of reference is the speaker, the relative frame of reference is also called "egocentric" or more commonly "deictic".

More generally, "deixis concerns the way in which languages encode or grammaticalize features of the context of utterance or speech event, and thus also concerns ways in which the interpretation of utterances depends on the analysis of that context of utterance" (Levinson 1983: 54). Whether it is defined as the space of the speaker or as the spatial component of the situation in which the utterance is produced, this deictic space is of particular interest because, through this anchoring of speech in a specific time and place, language is related to the extra-linguistic world: the deictic system is therefore one of the interfaces of language with spatial non-linguistic systems. In fact, since the world is experienced by human beings through the inescapable prism of body and physical perception, certain traditions (from Kant to cognitive grammars) consider that the human body is the source of all our notions of orientation and direction. However, according to Levinson (2003: 24) this could be "a major ethnocentric error".[2] As a matter of fact, concerning linguistic systems at least, various authors (Adelaar 1997; Ozanne-Rivierre 1999; Levinson 2003) have revealed that surprisingly many languages never use the anthropocentric frame of reference to locate an object, even on a small scale. For instance, in Malagasy (an Austronesian language), instead of saying "the book which is on your right", one says "the book which is north (or south) of the table" (Ozanne-Rivierre 1999: 74).

In this chapter[3] I would like to present the case of a language where, conversely, reference to deictic space (or deictic anchoring) is omnipresent and spans almost all the categories of the language. Wolof is a Niger-Congo language mainly spoken in Senegal. It is an interesting language in a typological sense because of its pervasive use of three deictic suffixes in various linguistic categories such as noun modifiers, relative pronouns, prepositions, adverbs, verb conjugations, subordinating conjunctions, and negation. Spatial reference therefore plays a central part in the linguistic system of this language. By various means, Wolof uses the different kinds of frames of reference described by Levinson but the deictic system is remarkably grammaticalized in this language. As a result, the anthropocentric or more precisely "egocentric" frame of reference plays a special role.

Through the presentation of this "extreme" case, I also intend to question the nature and role of deictic space in language, and to show how deictic anchoring can become a linguistic tool used at different syntactic levels for specifically linguistic operations, such as subordination and predication. As a counterpart to the obligatory location of an object in the deictic space, one aspect of spatial reference appears then

2. For a discussion of Levinson's positions, see Dokic and Pacherie, in this volume.

3. This chapter is largely based on a previous study presented at the 16th International Congress of Linguists in Paris (cf. Robert 1998).

to be particularly important and is the source of various linguistic operations: the construal of the "absence" or non-localization of an entity in deictic space. According to the syntactic scope of the suffix indicating this "absence in the present situation", the non-localization of the entity in deictic space will display various values, including indefiniteness, negation, future, and hypothesis.

1. Deixis in noun modifiers

Wolof has three spatial suffixes specifying the location of an entity in the speaker's spatial sphere (Sauvageot 1965: 77–80). Most of the linguistic systems employing deictic spatial morphemes (Diessel 1999) are either binary, with an opposition between proximal and distal (like *this* and *that, here* and *there*) or ternary, with an additional medial term; they may also yield a distance-neutral term like the German pronoun *dies* ("this/that"). The Wolof system, however, is original in that the third term of the set is neither medial nor neutral, but indicates that the designated entity is "not localized" in the space of the speaker:

Table 1. Deictic suffixes in Wolof

-i	proximal
-a	distal
-u	not localized (or absent) in the deictic space

1.1 The article: Definiteness and localization

First and foremost, deictic suffixes are used for the formation of noun modifiers, and primarily for the definite article. Wolof is a language based on classes. There are ten classes in all, which can be subdivided into eight classes for singular and two for plural. The class morphemes are found in the form of a consonantal affix *C-* which cannot stand alone: *k-, b-, g-, j-, w-, m-, s-,* or *l-* for singular; *y-* or *ñ-* for plural. The definite form is placed after the noun and constructed by means of the (consonantal) class morpheme, to which is suffixed an indicator of determination in relation to the space of the speaker. Depending on the distance separating the element and the speaker, the result will be either a proximal definite value (formed with the suffix *-i*), or a distal definite value (formed with the help of the suffix *-a*). Thus for *xaj* "dog" (class *b-*) and *nit* "human being" (class *k-*), we will have:

(1) a. *xaj **bi / ba*** 'the dog close to / far away from the speaker'
b. *xaj **yi / ya*** 'the dogs close to / far away from the speaker'
c. *nit **ki / ka*** 'the person close to / far away from the speaker'
d. *nit **ñi / ña*** 'the persons close to / far away from the speaker'

The specification of proximity or distance relative to the speaker is obligatory and it is combined with the indication of definiteness. Wolof is therefore a language where one cannot refer to a specific object without specifying its position in the space of the speaker. Although not systematically present or identical, the uses of such a set of deictic morphemes are also found in other languages of the same Atlantic group, such as Sereer (Faye 1983), Palor (Sauvageot 1992) or Fula (Hilaire 1995), noticeably combining deictic location with definiteness (Sauvageot: ibid.).

The importance of deictic space in Wolof is also shown by the fact that the localizing preposition (*ci/ca*) is employed with these affixes and is sensitive to the indication of proximity/distance relative to the speaker:

(2) a. ***ci*** *néeg* *bi*
in-PROX room the-PROX[3]
'in the room (close to me)'
b. ***ca*** *néeg* *ba*
in-DIST room the-DIST
'in the room (far away from me)'

When asked about the (spatial) extent of proximity, Wolof speakers indicate that what is considered as being close to the speaker is what is "immediately verifiable". This interesting remark is a first indication regarding the nature of the deictic *origo*, and allows us to make the claim that the ultimate definition of deictic space is modal.

The deictic affixes are also used in the formation of the demonstratives in Wolof. I shall not go into the details of this extremely rich system (cf. Sauvageot 1965; Diouf 2001), but it is worth noticing that the system of demonstratives includes the addressee as a second reference point. Remarkably, the addressee's proximal form is also the anaphoric demonstrative. There are therefore two variables in the system of demonstratives: (1) proximity/distance and (2) location relative to the speaker or to the addressee – with the former case (the speaker serving as reference point) being the more prevalent in Table 2.

Table 2. The basic demonstratives of Wolof

Reference point: the speaker	*xaj bii* (∼ *bile*) 'this dog (close to me, wherever you are)'	*xaj bale* (∼ *bee*) 'that dog (far away from me, wherever you are)'
Reference point: the addressee	*xaj boobu* – 'that dog (close to you and far away from me ≠ *bii*)' – 'the dog in question' (anaphoric demonstrative)	*xaj boobale* 'that dog (far away from both of us, but closer to you than to me)'

3. A list of abbreviations can be found at the end of the chapter.

These spatial affixes – with the same values – are also at work in the formation of the spatial demonstrative adverbs *fii* ("here"), *fale* ("there"), *foofu* ("the place we mentioned"), *foofale* ("over there"), and the adverbs of manner *nii* ("so, in this manner with a nuance of proximity), *nale* ("in that manner"), *noonu* ("in the manner in question").

1.2 The morpheme (*-u*): Spatial indeterminacy and syntactic dependency

In addition to this combination of spatial anchoring and definiteness, the originality of the Wolof system lies in the role of the third spatial affix *-u*. This affix indicates that the object referred to is *not localized* in the space of the speaker, but this spatial indeterminacy does not simply correspond to indefiniteness. Nor is it simply neutral with respect to deixis. The combination of the classifier (creating the individuation of the object referred to) with *-u* (specifying its absence in the deictic space) does not result in the indefinite article,[4] but rather an *incomplete* indefinite phrase: **xaj bu* used alone is impossible because it is incomplete and requires an additional specification. In fact, the noun modifier *C+-u* functions as the indefinite relative pronoun (cf. 1.3.):

(3)	**xaj* ***bu***	→	*xaj* ***bu...***
	dog the-NOT.LOC		dog the-NOT.LOC. . .
			'a dog which. . .'

Thus the absence of localization in the speech situation functions as a lack of specification, creating a syntactic dependency. Surprisingly at first, this affix does belong to the deixis paradigm, as we will demonstrate.

1.3 From connective to relative clause and interrogation

At the level of noun determination, the morpheme indicating spatial indeterminacy has basically the role of a relator. For this reason, it is above all used as a connector when it directly associates two nouns:

(4)	a.	*fas-u*	*buur*
		horse-CONN(= NOT.LOC)	king
		'(a) king's horse'	
	b.	*mag-u*	*Moodu*
		elder.brother-CONN(= NOT.LOC)	Moodu
		'Moodu's elder.brother'	

4. In addition to the zero form, Wolof has an indefinite article formed with *a*, to which the classifier is suffixed: *ab xaj* "a dog". Nowadays, this indefinite article tends to be replaced by the cardinal "one": *benn xaj* "one/a dog".

When it is suffixed to a classifier, it allows the creation of a qualifying clause, all the while attributing an indefinite status to the noun thus determined:

(5) *xale* ***bu*** *jigéen*
child CLASS-NOT.LOC woman
'a child who (is) a girl' = 'a girl'

In (5) it is followed by a noun, but it can just as easily introduce a verb and then functions as an indefinite relative pronoun – as can be seen in examples (7) and (8). The classifier carrying a suffix indicating indeterminacy relative to the speaker's space serves to construct an indefinite relative clause: the proposition introduced by a subordinating relative ending in *-u* is specified as not being localized in relation to the utterance context.

(6) Definite article
dama *bëgg* *piis* ***bi*** / *ba*
VB.FOC1SG want piece.of.cloth CLASS-PROX / CLASS-DIST
'I want **the** piece of cloth (nearby)' / '**the** piece of cloth (far away)'

(7) Indefinite relative
dama *bëgg* *piis* ***bu*** *xonq*
VB.FOC1SG want piece.of.cloth CLASS-NOT.LOC be.red
'I want **a** piece of cloth **which** is red'[5]

Moreover, this non-localization of an element in relation to the speaker's space takes on different referential values depending on the presence or absence of a previous element which can serve as a *situational anchoring point*. Thus, if the main clause precedes the relative clause containing the *-u* morpheme, as in example (8), the relative pronoun refers to an indefinite house, but it has a precise referential value. Its principal characteristic consists in the fact that it is not localized in relation to the utterance context, but attached to the context of the main clause. However, if no context has been previously specified, the pronoun which is associated with an indefinite noun assumes a generic value as in examples (9) and (10). Finally, if there is neither a previous context nor a main clause following the relative clause, the latter corresponds to a question (example (11)).

(8) Indefinite relative
Seetiwoon *naa* *kër* ***gu*** *Ablay* *jënd*
visit-PAST PFT1SG house CLASS-NOT.LOC Ablaye (AOR3SG[6]) buy
'I visited **a** house **that** Ablaye bought'

5. There are no adjectives in Wolof: the terms corresponding to adjectives in the translation are stative verbs.

6. The third person Aorist appears here (and in the following examples) in its zero variant form (cf. Robert 1991: 199). We contrast this with example (19) in the second person where the morpheme is readily apparent.

(9) Generic relative
Ø *Kër* ***gu*** *Ablay jënd, mu tuuti*
house CLASS-NOT.LOC Ablaye buy AOR.3SG be.small
Ø '**Any** house **that** Ablaye buys is (always too) small'

(10) Generic relative having a gnomic value
Ø ***Ku*** *yàgg dox, yàgg gis*
CLASS.- NOT.LOC last walk, last see
Ø 'He who (= **any man who**) walks a long time sees many things'
(Traveling confers experience)

(11) Interrogation
Ø ***Ku*** *jël saabu bi?*
Ø CLASS.- NOT.LOC take soap the-PROX
Ø '**Who** took the soap?' Ø

In fact, *wh-* question words are formed by means of the classifiers and the (*-u*) affix of spatial indeterminateness, literally meaning "the one which is not localized in my space": *ku* "who?", *lu* "what?". This is also true for the two adverbial classifiers: the locative classifier (*f*+spatial suffix) and the one indicating manner (*n*+spatial suffix), which are both deictic in nature but which acquire an interrogative value when affixed with *-u*: *fi/fa/fu* ("here"/"there"/"where?"), *ni/na/nu* ("in this manner"/"in that manner"/"how?").

(12) *Nu mu sant?*
manner-NOT.LOC (= how) AOR3SG be-named
'What's his name?' (lit. 'how is he named?')

At this point we suggest the following conclusion concerning constraints on deictic anchoring in Wolof. First, if an argument refers to a definite object, it has to be located in the space of the speaker as close (*-i*) or remote (*-a*). Second, if it is specified as being not located in the space of the speaker, it is both indefinite in the situation of utterance and syntactically dependent on another component. Depending on the presence or absence of a preceding situation that serves to localize the complement (main clause), the clause containing this 'non-located' argument is an indefinite relative clause with a referential value, a generic relative clause, or (if there is no main clause) an interrogative clause. In this last case, we can say that the absence of object localization creates a discursive dependency – in the form of an expectation toward the addressee to provide a localization for this object – hence its interrogative value.

1.4 Relative pronoun: From indefinite to definite

In order to form the definite relative pronoun, one adds the definite modifier (cf. 1.1), which is normally placed after the rest of the phrase ((13) and (14)).

Table 3. The structure of relative clauses according to verb type

Dynamic verbs (and transitive stative verbs indicating localization)		
Indefinite Relatives	=	Classif.-**u** + action verb (16)
Definite Relatives	=	Classif.-**i** + action verb* (18)
Stative verbs (qualification)		
Indefinite Relatives	=	Classif.-**u** + qualifying verb (15)
Definite Relatives	=	Classif.-**u** + qualifying verb + [Classif.-**i**] (17)

* Some speakers evoke the possibility of adding the definite (Classifier+i) after a definite relative, by using an action verb. This phenomenon probably indicates a tendency to make the structure of action verb relatives correspond to that of stative verbs.

(13) Definite relative (for an object nearby)
dama *bëgg* *piis* *[**bu*** *xonq]* ***bi***
VB.FOC1SG want piece.of.cloth CLASS.-u be.red CLASS-i
'I want **the** piece of cloth (nearby) **that** is red'

(14) Definite relative (for an object far away)
dama *bëgg* *piis* *[**bu*** *xonq]* ***ba***
VB.FOC1SG want piece.of.cloth CLASS.-u be.red CLASS-a
'I want **the** piece of cloth (far away) **which** is red'

From this point of view, there is an interesting difference in Wolof between dynamic verbs and stative verbs – or more precisely between verbs expressing a quality, on the one hand, and verbs expressing an event-type predication (action verb) or a localization (transitive stative verbs), on the other hand (Robert 1991:307–308). Finally, when dealing with a definite relative pronoun, the structure of the relative clause is not the same for these two types of verbs. As can be seen in Table 3, action verbs require – at the level of the relative pronoun – anchoring in relation to the situation of utterance, so that we find the suffix *-i* or *-a*. This phenomenon can be explained by the semantics of these verbs: action verbs designate an *event* which constitutes a new situation and which therefore implies specific anchoring in time and space. In contrast, stative verbs predicating a quality do not define a new situation with a specific space-time reference: quality has already been posited in the situation defined by the main clause, and thus we find the suffix *-u* corresponding to a situational anaphor.

(15) Indefinite relative: stative (qualifying) verb
dama *bëgg* *piis* ***bu*** *xonq*
VB.FOC1SG want piece.of.cloth CLASS.-u be.red
'I want **a** piece of cloth that is red'

(16) Indefinite relative: action verb
xam *na* *xale* ***bu*** *dem* *Tugël*
know PFT3SG child CLASS-u go France
'He knows **a** child who has gone to France'

(17) Definite relative: stative (qualifying) verb
dama bëgg piis ***bu*** *xonq* ***bi***
VB. FOC1SG want piece.of.cloth CLASS.-u be.red CLASS.-i
'I want **the** piece of cloth that is red'

(18) Definite relative: action verb
xam na xale ***bi*** *dem Tugël*
know PFT3SG child class-i go France
'He knows **the** child who has gone to France'

(19) Definite relative: transitive stative verb (localization)
Nanu dem ci dëkk ***bi*** *nga xam*
OBLIG1PL go to town CLASS-i AOR2SG know
'Let's go to **the** town that you know'

1.5 From space to time and to discursive space

Like most deictic terms (Diessel 1999; Lenz 2003), the deictic suffixes of Wolof can express at the same time proximity/distance in space (examples (20) and (21)), in time (example (22)), but also in the space of discursive context (examples (23) and (24)).

(20) Space (nearby)
Kër ***gi*** *Ablaye jënd*
house CLASS-i Ablaye buy
'The house (nearby) that Ablaye bought'

(21) Space (distant)
Kër ***ga*** *Ablaye jënd*
house CLASS-a Ablaye buy
'The house (distant) that Ablaye bought'

(22) Time (distant)
Kër ***ga*** *Ablaye jënd-oon*
house CLASS-a Ablaye buy-PAST
'The house (whether distant or not) that Ablaye **had** bought'

The morpheme *-i* is compatible with the past marker (*-oon*): the relative pronoun then refers to an "element in the past that has been mentioned recently":

(23) Proximity in the discursive context
Xale ***bi*** *ma gis-**oon**, ndekete sa rakk*
child CLASS-i AOR1SG see-PAST, in.fact your younger.brother
la.
COMP FOC3SG
'The child that I saw (*and have just mentioned*), is in fact your younger brother'

(24) Distance either in space or in the discursive context
Xale ***ba*** *ma* *gis-**oon,*** *ndekete* *sa* *rakk*
child CLASS-a AOR1SG see-PAST, in.fact your younger.brother
la.
COMP FOC3SG
'The child (distant) that I had seen *over there*, is in fact your younger brother'
'The child that I had seen (*and had mentioned previously*), is in fact your younger brother'

2. Changing scale: Deixis in predication and in temporal subordinate clauses

We have thus far seen the uses of deictic affixes in noun modifiers, pronouns, and adverbs. However, in Wolof reference to deictic space is not limited to nominal reference, but is also at work in different linguistic components and pervades different syntactic levels: first, the deictic suffixes of Wolof have predicative uses in different conjugations; second, they are used in combining clauses, namely in the formation of temporal and hypothetical subordinating conjunctions.

2.1 Deixis and predication: Presence and absence, current events and negation

In their predicative function, (a) the deictic affixes expressing a location in the space of the speaker are used to form a conjugation indicating what the current situation is (current present tense), while (b) the affix indicating non-localization in the space of the speaker is used for negation, both in negative conjugations and in negative affixing. We might also identify (c) the passive-reflexive suffix (*-u*) with the spatial (*-u*) affix, but this explanation is more tentative.

2.1.1 *The "presentative" conjugation*

The endings *-i* and *-a* are in fact also used for the conjugation called the "Presentative" which presents a complex structure with an inflected component followed by the morpheme *ng-*, to which is added a suffix indicating a spatial determination. This conjugation is equivalent to a current present tense and implies that the process is taking place during speech time, either near (*-i*) or far from (*-a*) the speaker (examples (25) and (26)).[7]

(25) *mu.ng**i*** *dëkk* *c**i*** *dëkk* *b**i***
PRES3SG-PROX live in-PROX town CLASS-PROX
'(at present) he is living in the town nearby'

7. For more details on this conjugation, and more generally on the verbal system of Wolof, see Robert 1991.

(26) *mu.ng**a*** *dëkk* *c**a*** *dëkk* *b**a***
PRES3SG-DIST live IN-DIST town CLASS-DIST
'(at present) he is living in the town far away'

The reader will readily note the coherence of the system, since the morpheme indicating spatial determination is found at the same time in the structure of the verb (*mu ngi/mu nga*), in the preposition (*ci/ca*), and in the noun determiner (*bi/ba*). It can also be seen that the clue to spatial indeterminacy *-u* is not possible with this conjugation,[8] which specifically indicates a coincidence between the time-space coordinates of the process and those of the utterance (27). One nonetheless finds this *-u* in the anaphoric suffix *-oog(u)*[9] which can be affixed to the Presentative ((28) and (29)):

(27) **mu.ng-**u***
PRES3SG-NOT.LOC

(28) *mu.ng-**oogu*** *toog*
PRES3SG-ANAPHOR sit
'There he is sitting (the man who I was just speaking of)'

(29) *Nangu-wul-oon* *topp* *waxi* *waajuram,* *tey*
accept-NEG-PAST follow word-CONN parent-POSS to.day
*mu.ng-**oog***
PRES3SG-ANAPHOR
'He didn't want to listen to the advice of his father, and now look where he is!'

However, it is interesting to note that *-u* is used in a predicative function to form *negation*.

2.1.2 *From absence to negation* (-u)

The morpheme *-u* is used to form negation (as a suffix for negation and negative conjugations). As expected from our analysis, the verbal process with *-u* (to which is added here the spatial suffix) is interpreted as being *non-localized* in the utterance situation, and is therefore *not true (not the case)* at the moment of speech.[10]

(30) *Fecc**u**ma* (Negative conjugation, completed action)
dance.NEGACC1SG
'I am **not** dancing (at present)'

---

8. My colleague Jean-Léopold Diouf has mentioned to me an interesting archaic form combining the proximal form of the Presentative with a rare form of negative demonstrative *fuu*: *Mu.ngi fuu de !* 'He is in fact here (but I don't know where)'.

9. See the anaphoric demonstrative in Table 2.

10. For more details on the complex system of negation in Wolof, see Robert 1990.

(31) *D**u**ma* *naan* (Negative Emphatic conjugation)
NEGEMPH1SG drink
'I do **not** drink (I never drink)'

(32) *Maa* *naan-**ul*** (Negational suffix *-ul*)
SUBJ.FOC1SG drink-NEG
'I'm the one who did **not** drink'

2.1.3 *The passive-reflexive suffix* -u

Finally, one might well wonder whether the same morpheme *-u* is found in the formation of the suffix which has a passive/reflexive meaning:

(33) *sang* 'to shower' → *sang-**u*** 'to wash oneself, to take a shower'
yar 'to educate, to raise' → *yar-**u*** 'to be (well) raised, to be polite'

The difference in *scope* of *-u* may explain these two uses as negation and as reflexive:

– in the case of negation, *-u* applies to the verb in its predicative function: the verbal process is not localized at the moment of speech, and is therefore *not true (not the case)*
– in the case of a passive-reflexive structure, *-u* is suffixed to the verbal *lexeme*. The spatio-temporal indeterminacy no longer applies to the predication, nor to the modality of assertion. The verbal process is validated (according to the means expressed by the conjugation), but it lacks the syntactic relation between subject and object (there is no localization relating subject and object). The spatial indeterminacy entails in this case an agentive reflexivity, or a kind of reflexive "looping" of the verbal process back onto the situation created by the primary actant, i.e., the subject.

2.2 Temporal and hypothetical subordinate clauses

Spatial markers are also used to form temporal and hypothetical subordinate clauses. When suffixed to the subordinating morpheme *b-*,[11] the three spatial markers introduce respectively *bi*, a subordinate clause situated in the recent past close to speech time; *ba,* a subordinate clause situated in the remote past, far removed from speech time; and *bu*, a subordinate clause situated in a future moment yet to come or in a hypothetical moment.

11. The morpheme *b-* is functionally different from the classifier used to form the definite because it never varies morphologically (it always takes the form *b-*) and moreover appears at the head of a syntactic group. If this is still a classifier, its subordinating virtues can be explained by the fact that the classifier marking determination appears here *at the head* of the clause (and not after an element that it determines, as is the case with the definite) and therefore specifies the subsequent main clause with the clause it introduces.

Table 4. The temporal and hypothetical subordinating conjunctions

bi	"when"	moment of the recent past close to moment of utterance (34)
ba	"when"	moment of the past far removed from moment of utterance (35)
bu	"when"	moment in the future (36)
	"if"	hypothetical moment (37)

The relationship of anteriority or of simultaneity between the main clause and the subordinate is moreover marked by the suffix indicating anteriority (*-ee*) or incompleteness (*-y*) attached to the verb of the subordinate clause (Perrin 2005). What is remarkable in this system is that these spatial affixes directly link the temporal subordinate clause to the speech situation while constructing a link with the main clause (via the subordinating morpheme *b-*). As for the verbal suffix *-ee/-y,* it specifies the nature of the relation between the clauses (anteriority or simultaneity).

(34) *Def na ko* ***bi*** *mu nów-ee*
do PFT3SG OPR when-PROX AOR3SG come-ANTER
'He did it when he came (moment close to the "now" of uttering)'

(35) *Def na ko* ***ba*** *mu nów-ee*
do PFT3SG OPR when-DIST AOR3SG come-ANTER
'He did it when he came (moment far removed from the "now" of uttering)'

(36) ***Bu*** *dem-ee dëkk ba, na jënd ma*
when-NOT.LOC go-ANTER town CLASS-DIST OBLIG3SG buy me
piis-u mailus
piece-CONN blue.cloth
'When he goes to town, have him buy me a piece of blue cloth'

(37) *Dinaa ko ko wax* ***bu / su***[12] *ñów-ee*
FUTUR1SG IOPR OPR tell if come-ANTER
'I'll tell him if he comes'

3. The pivotal role of the speech situation in language

3.1 The semantics of the deictic suffixes

Concerning nominal determination, we have seen that spatial indices have two functions which are linked: they help situate an entity in the space of the speaker; moreover, they express the definiteness of the object thus determined. Remarkably, the absence of localization in the speaker's space not only signals indefiniteness, but also creates a syntactic dependency on what follows, because one expects additional determination. When suffixed directly to a noun, *-u* functions as a connector and introduces a noun

12. In this hypothetical use, *bu* has a variant form *su*.

Table 5. The role of absence at the nominal level

-u	– connector (links two nouns) – indefinite relative (links a clause to an antecedent noun) – generic relative (1st clause with no antecedent, followed by 2nd clause) – interrogative pronoun (no antecedent, no clause following)

Table 6. Semantics and uses of deictic affixes in Wolof

Localization (in space, time or discourse) relative to the speaker			
	proximity *-i*	distance *-a*	absence *-u*
Noun	proximal definite	distal definite	indefinite relative/interrogative
Predicate	proximal present	distal present	negation/passive
Subordination	close past	remote past	future/hypothetical

complement; when suffixed to a classifier, it introduces a noun (as a qualifying phrase), a relative clause, or an interrogative in the absence of a second predicate. Thus, *-u* either introduces a phrase that is dependent on the noun preceding it and that serves to determine it or it serves to construct a kind of discursive dependency (interrogation). In these various uses, the absence of spatial localization marked by the morpheme *-u* constructs a syntactic dependency that will assume different values, according to the nature of the terms it associates.

At the predicative level, we have seen that affixes indicating proximity or distance in relation to the speaker make it possible to use a morpheme marking 'current' present tense: thus, if it is true that a particular object must be located in the speaker's space in order to be definite, in the same way an event that defines the current situation must be located in the same deictic space. At the syntactic level, however, the absence of localization in the speaker's space defines the negation of the verbal process.

With respect to relations between clauses, spatial indices are used to construct temporal relations, by situating events once again in relation to the temporal space of the speaker. The absence of localization in deictic space-time then gives the subordinate clause a modal sense (possibility, future, hypothesis), which tends to show that possibility and hypothesis are conceived of as situations situated on another plane than that of the speech situation.

We can summarize the uses of these three spatial indices as a function of their role as noun determiners, predicative and subordinating markers, as in Table 6.

3.2 Deixis and the pivotal role of situation of utterance in language

Among the linguistic categories involving space, deictic space plays a special role in language use as part of the system of deixis. Deixis was defined by Lyons (1977:637) as "the location and identification of persons, objects, events, processes and activities being talked about or referred to, in relation to the spatio-temporal context created

and sustained by the act of utterance and the participation in it". In other words, the relation of the utterance to its spatio-temporal context is the basis on which its referential value is constructed. The deictic terms, also called 'shifters' by Jakobson (1957) or indexicals in the tradition of logic (e.g., Kaplan 1989), have this special property of acquiring their reference in the situation where they are uttered: *now* refers to the precise moment when I say *now*. But, as expressed by Lyons, there is more to it than this: deictics determine the referential value of whole sentences. More generally, deixis in language was well described by Culioli (1990, 1995), whose analysis allows us to give an elegant account of the system found in Wolof.

It is well known that deixis has three components: personal (*I/you*), temporal (*now/then*), and spatial (*here/there*). As described by Culioli, these components make up a system of variables or coordinates in which the speech situation functions as the *origo* from which referential values are computed. Culioli has added another fundamental principle: for any utterance to be complete and well formed, it must be related to the speech situation, i.e., to the parameters which define the personal and spatio-temporal coordinates of the utterance (Culioli 1971, 1978, 1990). The situation in which sentences are validated must be spectified in terms of a *site* or anchoring point. This situation is defined in relation to the cardinal speech situation as being identical (i.e., present) or different (past or future). As we shall see, this principle allows us to explain the connections found in Wolof between deictic space and the space of syntactic dependency. Utterances are always anchored, whether this deictic anchoring is explicit or implicit. By default, an utterance that is unmarked with respect to person and time – as can be found in Chinese (one can respond to a question simply with the verb 'come', with no indication of tense or of subject) – can only be interpreted in one of two ways, as indicated by the discursive structure as follows: by anaphoric means (the verb 'come' is then anchored in the situation defined in the previous utterance, meaning "he is coming", "he came", or "he will come"); by deictic means (the time and the subject are those of the situation of utterance, and 'come' means "I'm coming").

The speech situation that serves as the cardinal referential framework for the utterance can be defined by two parameters (Culioli 1971, 1990):

(1) the subject-utterer (the entity that is responsible for speech content and that serves as the source of modal values);
(2) the spatio-temporal reference coordinates of utterance (time and place of utterance).

The situational anchoring that is necessary for the construction of an utterance can be defined in terms of the relation between the speech situation (Sit_0) and the denoted situation (Sit_2) defined by particular personal and spatio-temporal coordinates. Culioli has defined three types of relations between (Sit_2) and (Sit_0) (see Table 7):

– the space-time of the denoted situation can be **identified** with the space-time of the utterance (identification value); this relation is expressed by the suffix ***-i*** of Wolof, which situates an object in a space identified with the speaker's space;

– the space-time of the denoted situation can be defined as **different** from the space-time of the utterance (differentiation value); this relation is expressed by the suffix ***-a***, which situates an object at a distance from the speaker, i.e., in a space and/or time different that is different from the speaker's;
– the denoted situation and the speech situation can also be related in a third way: in this case there is **a break** between the space-time of the process and the space-time of the utterance (absence of localization: the suffix ***-u***). Thus, the process is not validated in the space of the utterance; it is neither past nor present, it does not belong to the speaker's field of experience, it is situated 'on another plane' than that of the utterance (e.g., it may be a hypothesis).

This third type of relation includes different cases. From the temporal point of view, they include utterances that have a gnomic value, historical texts, tales (as opposed to narrations for which the utterer-speaker is responsible), but also hypotheses. I claim that the uses of the Wolof suffix *-u* correspond to this third type of case. Furthermore, by virtue of the need for a localization relative to the situation, the suffix *-u* which marks indeterminacy (and therefore also the absence of localization) in the speaker's space entails at the same time a syntactic dependency and a "situational anaphor" (Robert 1996). As a result, the noun or the process that is determined in this way is then attached to the situation in which the term governing it is situated. From the point of view of nominal determination, *-u* marks indefiniteness and syntactic dependency; in other words, indeterminacy relative to the speaker's space simultaneously constructs an indefinite determination and a syntactic link of dependency between the clause (or the noun) introduced in this way and the clause (or the noun) that it determines. From the point of view of situational anchoring, *-u* marks either a situational anaphor, if the element it determines can be attached to the preceding situation, or a generic or interrogative meaning, if no clause precedes the one introduced by *-u*. The absence of localization for the object creates a discursive dependency in the form of an expectation which is directed toward the addressee; the speaker needs to provide a localization for this object, hence its interrogative value.

Table 7. The different types of situational anchoring

Sit_0 : situation of utterance (deixis: space-time, speaker) Sit_2 : situation of the process (space-time and subject of the process) (Culioli 1978)	
-i : $Sit_2 = Sit_0$	identification between the two situations
-a : $Sit_2 \neq Sit_0$	differentiation between the two situations
-u : $Sit_2 \,_{\omega}\, Sit_0$	break between the two situations (the process is situated on another plane)

Table 8. The scope and uses of *-u*

-u : absence of localization in the space-time of the utterance	
Dependence	– connector (of noun complement) – indefinite relative – interrogative pronoun – subordinating marker indicating future – subordinating marker indicating hypothesis
Predication	– negation – passive-reflexive suffix
Scope	Function
on an argument	– connector, relative, interrogative marker
on the temporal anchoring	– future or hypothetical subordinating marker
on the verb	
– as a verbal lexeme	– passive-reflexive (for an object not localized in Sit_2)
– as a predicate	– negation (for a process not localized in $Sit_{0)}$

3.3 The role and syntax of absence (and the syntactic scope of *-u*)

Reasonably, the various semantic values of the morpheme *-u* can be explained by the variable syntactic scope of spatial indeterminacy and therefore by the morphosyntax of this morpheme. Here we are dealing with a morpheme which presents what I have termed a *fractal functioning* (Robert 2004): this morpheme functions on different syntactic scales (or levels), and at the same time as it is undergoes a 'stretching' of its syntactic scope, it presents a similar semantic structure through its various uses.

Thus, when indeterminacy applies to an argument, it functions as a connector, a relative or an interrogative pronoun (depending on the nature of what follows it, noun or clause). When the indeterminacy is temporal, it functions as a subordinating marker with a possible, future or hypothetical meaning. Finally, when indeterminacy applies to the verb, we have a passive-reflexive if the scope of *-u* is the verbal lexeme, and a negation if the scope of *-u* is the predication.

Conclusion

Spatial markers in Wolof are of great typological interest, since this language is permeated throughout its nominal and verbal system by the indication of spatial determination relative to the speaker. This system is also of great interest from a cognitive point of view, as it gives us an example of a language in which syntactic relations are largely defined by the anchoring (or the absence anchoring) in deictic space. This deictic anchoring is used over and over again at various syntactic levels where it assumes each time properties that are specific to each level (nominal determination, predication, or subordination). The functioning of spatial indicators in Wolof reflects the existence

of organic links between location in space and the organization of syntactic relations within the utterance.

Thus the example of Wolof reveals the central role of the speech situation in the construction of referential values for the utterance. The category of deixis in language, far from being limited to a simple indexing of the physical environment, is organized around a subject-utterer (created by the point of view of the speaker) that functions as an abstract reference point serving as a point of origin in a sophisticated system of localizations. It is by means of this point of origin that representations shared by the utterer (speaker) and co-utterer (addressee) can be constructed. The absence of localization in the space of the speaker is a fundamental corollary to this system of localization, conferring to it a certain referential strength by allowing speakers to talk about what is absent in the deictic space. As pointed out by Cabrejo-Parra (1992), the emergence of deixis *in absentia* is the condition for the emergence of syntax. Deixis is seen as the first level of linguistic abstraction, which makes it possible to go beyond the stage of pointing and also allows language to detach itself from physical reality. "Deixis does not limit itself to situating discursive objects in a supposedly external, intangible and real situation; its essential role is to structure this situation by allowing it to function linguistically, that is to say, formally"[13] (Achard 1992: 592).

Abbreviations

ANAPH	anaphoric suffix
ANTER	anterior suffix *-ee*
AOR	aorist conjugation
CLASS	noun classifier (a consonant C-)
COMP.FOC	complement focusing conjugation
CONJ	conjunctive verb affix *-a*
CONN	connective suffix (singular *-u* /plural *-i)*
di / d	imperfective predicative nexus marker
DIST	distal suffix (*-a*)
FUTUR	future conjugation formed with *di* + Perfect inflection
IMPER	imperative conjugation
IMPERF	imperfective suffix *-y*
IOPR	indirect object pronoun
NEG	negative suffix
NEGACC	negative conjugation, completed action
NEGEMPH	negative emphatic conjugation
NOT.LOC	spatial suffix (*-u*) indicating the absence in the deictic space

13. "La deixis ne se borne pas à situer des objets de discours dans une situation supposée externe, intangible et réelle, elle a pour rôle essentiel de structurer celle-ci en lui permettant de fonctionner linguistiquement, c'est-à-dire formellement."

OBLIG	obligative (injunctive conjugation)
OPR	object pronoun
PAST	past suffix *(w)-oon*
PFT	perfect conjugation
POSS	possessive
PRED	imperfective predicative auxiliary (cf. *di*)
PRES	presentative conjugation (discontinuous inflection: inflectional morphemes + *ngi/a)*
PROX	proximal suffix (*-i*)
SUBJ.FOC	subject focusing conjugation
SUFF	derivational verb suffix
VB.FOC	verb focusing conjugation

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CHAPTER 9

The semantics of the motion verbs

Action, space, and qualia

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Defining a class of motion verbs is a difficult task, that has given rise to a wide range of approaches (formal ontology, cognitive psychology, semantic features, case roles). By re-examining theoretical oppositions such as verb-framed and satellite-framed, objectivation and subjectivation, inaccusative and inergative, we show that these constructs are based on inadequate conceptions of motion and space. Numerous linguistic observations indicate that motion (and space) should not be used in semantics on the basis of a model that is essentially made of topologies and displacements, without any relation to other praxeologic, qualitative, or intentional dimensions. All of these intricate dimensions are co-constructed by language activity and cannot simply be dissociated from others, such as *path* and *manner*, nor properly assessed by merely adding a coding of case roles.

Following quite a different model of perception and action, we show that motion verbs (as basic as *monter, partir, sortir*) work out their semantics by specifying, through a variety of grammatical constructions, the "dynamics" whereby a phenomenological, practical and discursive field is constructed. Such an approach also explains the generic power of verb meaning, accounting for its transposition to so-called "functional" or "figurative" meanings.

Introduction

Until recently, the class of "motion verbs" has given rise to diverging approaches. Some call upon lists of descriptive features. Others opt for an ontology of space and movement that is more or less formal or psychological. Yet others address the question on the level of phrastic schemes, related to the coding of action in terms of distribution or projection of case roles and of "circumstances".

Although these attempts may be interesting, they do not in themselves account for the diverse ways in which space is involved and constructed in language use. In particular, we critically discuss the recurrent dichotomy between motion that is reduced to the dimensions of displacements in a pre-existing space and other values that are

ascribed to more subjective or intentional categories of space (such as manner, telicity, agentivity, etc.). This kind of dichotomy is at the center of the typological distinction between *verb-framed* and *satellite-framed* languages. We further argue that it artificially dissociates many uses known as functional or figurative.

The thesis we will develop here is that the meaning of motion verbs is critically comprised of praxeologic, qualitative, and assessive anticipations.[1] Furthermore, the salience of these dimensions is organized at the syntagmatic level, according to scales of abstraction which culminate in a "condensation" or a "coalescence" of qualities rather than in a "loss" or a "bleaching" of these qualities.

Our intention is not to deny the interest of pushing as far as possible the analogy between perception and the construction of meaning. On the contrary, because we agree with this theoretical and descriptive approach, we believe it is essential to choose the "right" theory of perception and of action. Indeed, the possible primacy of perception can only mean here the primacy of *perceptive meaning*. Thus, in following *Gestalt Theory* and phenomenology, we will see that, beyond space and time or motion and topology, it is above all necessary to define the semantics of motion verbs through *the dynamic processes* whereby an inextricably semantic and perceptive field is constructed. Such a view makes it possible to understand why these verbs can be transposed to other fields. The study of these verbs thus offers an excellent opportunity to illustrate the type of lexical and grammatical semantics we propose.

The chapter is organized in four sections. The first section examines the very concept of motion verbs. The second describes the two theoretical approaches that have been most frequently invoked in analyses of these verbs. The third introduces our model of perception and of action (as well as the notion of "anticipation"). The fourth further looks into some approaches, showing the insufficiency of the notion of "subjectivation" and of the opposition between inaccusativity and inergativity.

1. As a first intuitive definition, we take "assessive" to mean "assessing or evaluating qualitative dimensions of experience (whether bodily, intersubjective, and/or socially instituted)". "Praxeologic" (as the morpheme *prax-* shows) pertains to action, but from a qualitative, "internal" and "external" point of view (e.g., primal perceptive sketch; synesthetic composition of gestures; attitudes, dispositions). In this sense, "praxeologic" should be distinguished from "pragmatic", which designates a more articulate (developed in space-time) and/or a more normative and socially constituted level of action (e.g., domain-specific practices).

1. The concept of motion verbs

If we review the concept of motion verbs,[2] we are confronted with a variety of somewhat disparate descriptive registers, including the level of meaning in speech and lexical semantic identity (in the interaction between lexical semantics and morphology).

Leaving aside for now questions related to bounding phenomena or to the location of an object in relation to a specific place,[3] we propose in Table 1 an elementary classification based on a stock of space-time properties, themselves based on kinetic modalities related to a pre-geometrized spatiality (following Geckeler 1973; Lamiroy 1987; Fradin 1988; Boons 1987; Pottier 1997).

Of course, this first sketch leaves out many decisive aspects of how the meaning of verbs is constructed in speech in relation to context. These semic analyses are often not very satisfactory, in spite of (or rather because of, as we will see) the "intuitive" and "spontaneous" nature of the features we use. In this type of approach, the concept of "lexicon" and the view of movement in space are both limited.

A second axis of classification, mentioned above, is related to the set of phenomena that includes zoning, bounding, crossing limits, constructing a point of view (or windowing, in some models), which are central to the main theories of aspect (see for example *Aktionsart* in German grammar, or more generally *aspect* in the linguistics of Slavic languages, see Archaimbault 1999). Here the focus is on a certain type of framing, not only in terms of aspectualized temporal phases, whether "initial" (*partir*, *sortir*… 'to leave', 'to go out'), "medial" (*passer*, *cheminer*, *errer* 'to pass', 'walk on', 'wander'), or "final" (*approcher, arriver, atteindre, entrer, rejoindre* 'to approach', 'to arrive', 'to reach', 'to enter', 'to join'), but also in terms of features such as imminence, frequency, unicity ("semelfactivity", in some Slavic languages), and even urgency.[4]

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2. As announced above, we intend to re-analyze this concept, whether it is viewed ontologically or defined in grammatical terms, i.e., as intransitive verbs syntactically involving (and implying in its semantic valence) a single agent, combined with a locative landmark, whose status can vary between that of a frame, a "circonstant" or even of a quasi-agent (*franchir la ligne*, *courir cent mètres* 'to cross the line', 'to run a hundred meters') (see François 1986).

3. In this table we only consider process verbs, excluding those that lexically imply boundaries. (following the well-known test contrasting prepositional-phrases, such as *Pierre a couru/dansé/marché… pendant cinq minutes* 'Pierre ran/dansed/walked for five minutes' vs. * *en cinq minutes* 'in five minutes'). These verbs belong, at least theoretically, to the class of inergatives (except for *tomber* 'to fall', which is bounded and inaccusative), whereas verbs which integrate boundaries or deictic properties are inaccusative (see below).

4. In Slavic (and many others languages) the verbal base which expresses an imperfective verb is often prefixed by a morpheme (particle, preposition) providing information about boundaries. Thus, in Bosnian Serbo-Croatian (Redzovic 2004:32), *ići-* ('go') provides a base for: *na-ići-* ('bump into someone'), *ot-ići-* ('leave'), *iz-ići-* ('go out'), *u-ći-* ('enter'), *do-ći-* ('arrive'), *pri-ći-* ('approach'), and *s-ići-* ('go down'). Tibetan also makes use of prefixed particles indicating location, not necessarily by bounding, but also in terms of direction

Table 1. Elementary classification of motion verbs*

	S1	S2	S3	S4	S5
bouger ('to move')	O	O	O	O	o/+
courir ('to run')	+	–	+	+	+
danser ('to dance')	O	O	+	O	+
errer ('to wander')	o/+	–	–	–	+
marcher ('to walk')	+	–	+	–	+
monter ('to go up')	+	+	O	O	–
remuer ('to move, fidget')	–	O	–	O	+
sauter ('to jump')	O	+	O	O	+
tomber ('to fall')	+	+	+	+	+
zigzaguer ('to zigzag')	+	O	+	O	+

* S1 = progression in space
S2 = vertical displacement
S3 = regular displacement
S4 = speed
S5 = quality specified as "manner", "modality", "instrument" or others (*voler*,[5] *skier*, *zigzaguer* 'to fly, to ski, to zigzag').

This type of framing must be further defined, for example by the mode of determination, of location (of the spaces crossed), or of motion – either by postulating oppositions such as the one between *place as a frame* (German *im Zimmer* 'in the room', dative) and *place as a target* (German *in das Zimmer* 'into the room', accusative) or by (re)introducing deixis, as in *Sortez* 'Leave!' (German '*Hinaus!*') and *Entrez* 'come in!' (German '*Herein!*').

These attempts, however necessary, are insufficient. Our thesis is that it is necessary to pay attention (at least) to the qualitative modes of action or of gesture which accompany any topological or geometrical assessment of space. We have already raised these questions in previous writings on prepositions, on nouns, and more recently on verbs[6] (see Cadiot 1991, 1997, 1999, 2002; Cadiot & Visetti 2001a, b, 2002; Lebas 1999, 2002; Lebas & Cadiot 2003; Visetti 2004; Visetti & Cadiot 2000, 2002). For the mo-

(e.g., upstream/downstream, right/left). Forest (1999:56) reminds us that in Russian *to come* is translated (not always easily) by *prixodit* and, if necessary, by *zaxodit* ('to come for one moment'), or by *podxodit* ('to approach').

5. Note that, *voler* 'to fly' need not necessarily imply a displacement and can mean "to be supported in the air by means of wings" (Martin 1983:63).

6. Along with our critical approach of Cognitive Linguistics, our work partly originated in a long-lasting debate with the linguistic trend known in France as *Linguistique de l'énonciation* (notably Culioli, Ducrot, Anscombre), as well as in some views of polysemy (e.g., Franckel, Paillard, Victorri; for the opposite point of view, see Kleiber 1999). Although our own work belongs to linguistic semantics, we are interested in contemporary attempts to develop phenomenological approaches to cognitive science (e.g., Petitot et al. 1999). Among different authors in

ment, let us simply note the compromise idea: there is a permanent (although variable) interweaving of space with qualitative, perceptive, and praxeologic "categories"; even if these categories are indirectly relevant to space, they do not necessarily serve the ultimate goal of locating. Very often, these qualitative and "praxeologic" dimensions are more easily observed in uses that are considered to be "functional", "grammaticalized" (also see the recent work of Nicolle 2002) "abstract", or "figurative". But they are also at work in a number of uses considered to be "spatial". We believe that these dimensions cannot be postponed to "later" pragmatic considerations, and that they are central to the semantics of motion verbs, which display a strong generic property, enabling them to be transposed without field restrictions. In contrast, as will be shown, the dimensions considered as "configurational"[7] correspond to what we call particular *profiling* (in a sense close to that of Langacker 1987. See Cadiot & Visetti 2001a: 127) The thesis to be developed here is that all motion verbs (*courir*, *marcher*, *tomber*, *ramper*, *surfer*, *nager*, *passer*, *plonger*, etc. 'to run, walk, fall, crawl, surf, swim, pass, plunge') comprise, by definition (or by strong convention), praxeologic, qualitative and assessment by anticipation. Furthermore, the salience of these dimensions is organized at the syntagmatic level, according to "scales of abstraction" which culminate in a "condensation" or "coalescence" of qualities, rather than in a "loss" or "bleaching" of these qualities. For example, for *marcher* 'to walk', we will invoke displacement, and therefore motion, but more basically regularity, mecanicity, and correct operation (*Le moteur marche* 'The engine is running', *Ca marche bien, ton affaire ?* 'Is your business going well?', *Il nous a fait marcher !* 'He put us on!'. For *tomber* 'to fall', we refer to verticality, supervening, suddenness, but also to surprise, non-control, with gradations between spatiality, agentivity, evenementiality, metaphoricity: *la pluie tombe* 'the rain falls', *tomber la veste* 'to take off one's jacket', *la température tombe* 'the temperature drops', *la nouvelle tombe* 'the news just came through', *ça tombe bien* 'it comes at the right moment', *tomber dans les pommes* 'to pass out', *tomber amoureux* 'to fall in love').

Even if one wants to maintain that space is more basic, it becomes problematic to assume that the agentive structure is simply added to a scheme of pre-existing and independent movement. On the contrary, the agentive system goes hand in hand with a "stylistic" co-development of movements, which argues against placing invariants on the level of objective representations or configurations. Hence the series *Paul monte l'escalier/sur une chaise/la valise/une maquette* ('Paul goes up the stairs/climbs on a chair/brings up the suitcase/puts together a model'). For the same reason, some authors (Langacker, Talmy) recommend centering the analysis on a purely topological core meaning, which is viewed outside of any "objective" spatiality (in particular Euclidean). But in so doing they pay the price of making equally artificial the explanation

cognitive linguistics, Sinha & Jensen de Lopez (2000), Sinha (2005) and Zlatev (1997, 1999) propose views that are very close to ours.

7. By *configurational* we mean that which is determined entirely by the form of schemes or diagrams, made salient against backgrounds with pre-existing topology.

of those uses (which nonetheless remain related to space), for example *Paul monte une maquette* ('Paul puts together a model'), where the notions of increment, internal fitting, and achievement are central (Lebas & Cadiot 2003). In fact it is difficult to see how we can attribute a secondary status to the *quality* of motion, when we say that motion does not refer to a displacement, in the sense of a change of position (even in topological space), but rather to a transition or a transformation affecting one and only one place.

2. Two theoretical frameworks

Beyond the various descriptive approaches mentioned above, two major theoretical frameworks in cognitive linguistics stand out, in that they highlight what may presented as a continuum of problems. The first framework (Langacker, Talmy, and Vandeloise in his first writings) isolates at the level of lexical and grammatical units, a privileged core of meaning of a topological or configurational type. The second one (from Tesnière to Goldberg, through Fillmore, Anderson, Helbig and some others) is more explicitly based on an analysis of sentences, and puts forward the case-role register. In both cases, the concept of movement in space, considered to be too narrowly referential, is reconstructed within a much more schematic framework, in which either topological and dynamic categories or case endings, which are both theoretically unfettered by perceptive space, force us to reconsider questions about space and motion. Let summarize rapidly below the major features of these two types of approaches.

In the first approach the configurational (*framing*) and qualitative aspects of motion are clearly dissociated. Qualitative dimensions are sometimes grouped together as related to the *manner of motion* and as secondary properties of displacements, presumably made up beforehand in a topological layer. As for the configurational aspects, they arise from a triple point of view: *representational*, as a positioning frame for entities referred to in discourse; *grammatical*, as a generic layer of meaning (expressed in particular by specialized markers, such as prepositions or adverbial groups); and *typological* (some languages focus these dimensions on the verb, others on the satellites of the verbal group). Of primary importance is an autonomous topological framework, which defines places and displacements for entities considered to be external to each other. It is then necessary to refer to lexical theory to deal with all of the praxeologic and/or qualitative dimensions, thereby presupposing a strong division between units that convey configurational dimensions (positions, borders, displacements) and other units.

In the second approach, configurational dimensions give way to coded schemes of action, built out of *cases* or agentive *roles*. These schemes give rise, for example, to an agentive continuum, ranging from full agentivity (control, telicity, volition) to weak ergativity, implying only a supply of energy without intentionality, generalizing a certain physical mode (configuration + energy). This is a much more analytical and discontinuous model than the previous one: it ignores, or at best factorizes, the topol-

ogy of the field, seeking to standardize this topology in the form of a discrete repertory of locative "scenarios". As in any purely discontinuous approach to categorization, we encounter intermediate cases between Agent, Patient, Experiencer, Theme, Source, Motive, etc: hence the attempts to give a bit of flexibility to this categorical system by a list of features and gradual scales. These solutions often rest on a kind of discrete iconicity, and mainly aim at grammatical issues (enumeration of the possible structures of a simple utterance). The rule is to leave out qualitative dimensions, resulting in the ontological problem of postulating exterior protagonists, prior to their relations: historically, this has led to difficulties with simple predicates, absolute uses, reflexive uses, etc., because the methods consisting of bleaching of agents or subjectivation were far from satisfying.

Of course, many authors combine elements of both approaches to different degrees. Thus, Langacker regards case roles as coding conceptual enrichments from the lexicon, adding them to his grammatical diagrammatics. In the same way, in his *Construction Grammars* Goldberg proposes a partial synthesis of these two theoretical traditions.

These two families accept a tradition (without actually discussing it) which considers a place to be isolated before a displacement, a displacement to be configurated independently from its modality, and an agentive entity to be isolated before its action, transformation or function (which is not without impact on nominal semantics). All this leads to a typological distinction, introduced by Talmy and largely cited since in psycholinguistic and typological studies. The distinction between *verb-framed* and *satellite-framed* is based on a separation between configurational aspects (*framing*) and qualitative dimensions (*manner*) of processes[8] (for a recent presentation, see Talmy 2000). In such a classification of languages, given the major components expressing the *frame*, the majority of Romance languages are *verb-framed*. In other words, verbs would be responsible for expressing the configurational dimensions of processes, whereas in languages such as English or German this would be done by satellites (French *elle traverse la rivière à la nage* 'she crosses the river by swimming' vs. English *she swims across the river*). This makes it possible for Slobin to distinguish languages independently of other kinds of classification, as well as to study children's language acquisition accordingly.

Although this distinction is heuristically useful, its typological consequences must be examined, as Slobin (this volume) himself underlines. Moreover, its theoretical validity is to be questioned. For instance, there are obviously cases in French, where the *frame*, i.e., the topologico-dynamic configuration of the scene, is specified by satellites

8. In fact this distinction is quite present in traditional grammars, for example of German or Russian. However, the concept of "satellite", insofar as it initially indicates prepositional groups distinct from the verbal base, must be discussed again to account for affixation phenomena, in particular in languages with "affixal morphology", used extensively in composite verbal bases, where one would not expect to observe the type of semantic compositionality supposedly characteristic of *satellite-framing*.

(*il vole de branche en branche* 'it flies from branch to branch'), *il a dansé jusque chez lui* 'he danced home', *il a sauté par dessus la barrière* 'he jumped over the fence'). In addition, even if we take into consideration verbs such as *aller*, *sortir*, *partir*, *entrer*, *traverser*... 'to go, go out, leave, enter, cross', the *frame* interacts with prepositions. Hence the fine-grained but clear meaning differences between *partir à*/*pour*/*sur*/*vers Paris* 'to go to/for/on/towards Paris': the trajector can be configurated as the aiming point defining the process (*à*), as a strongly anticipated destination (*vers*), as an aim without anticipation of reach (*pour*), as a projected contact zone which is independent (*sur*). In these cases, the extension of the trajectory appears to be more or less guaranteed, depending on the degree to which we focus on its different phases.

Strictly speaking, although the distinction between *verb-framing* vs. *satellite-framing* only applies to the expression of motion, it implies an excessive focus on real or virtual displacements. Of all the changes which take place in space, displacements seem to preoccupy these authors, who artificially introduce them in many cases where they are hardly relevant. Hence the process of explaining *la route monte* 'the road goes up' by the animation of entities (the road is to some extent metaphorized) or by subjectivation (from the mobile point of view of the "subject" or of the "conceptualizer" that is responsible for motion).

Following a previous remark, also note that these views treat absolute or intransitive uses (*Paul monte, tombe, émerge, se promène, marche, court, zigzague, nage, vole* 'Paul goes up, falls, emerges, strolls, walks, runs, zigzags, swims, flies') as resulting from the suppression of a trajectory and a detached trajector, usually implied in real displacements.[9] They thereby ignore dimensions bound to the subject, which are not necessarily associated with an actual displacement, but rather with a change that is perceived from inside and outside the subject, and that cannot be reduced to an external trajectory in a topological space (*ah, tu tombes bien !*) 'well, you're just in time'). And even if no motion is involved, the scene can still be perceived in space (*cette fois, la photo est bien sortie* 'this time, the photograph came out well').

These remarks apply to all uses where motion and/or space are involved. However, what can we then say of more functional uses (*la montre marche*, *la plante vient bien* (Forest 1999: 59), *la nouvelle tombe/sort* 'the watch is working', 'the plant is doing well', 'the news comes out/is issued') or of so-called "metaphorical" uses (*marcher*

9. Some of these verbs are also treated as "manner verbs" involving some added intensional dimension. Hence the mechanical translation of English *He swam across the Channel* by *Il a traversé la Manche à la nage*, or of German, *Er laüft in das Haus* by *Il entre dans la maison en courant* 'he enters the house by running'. Although these translations are complete as far as reference is concerned, they are too analytical, ignoring the lexical coalescence of motion and manner in German and English, and imposing, in French a focus on "manner", which is not always natural. Such translations over-estimate the salience of "manner" in the verb. In German, for example, *laufen* can be understood aspectually, as 'put into motion without delay', rather than as indicating a particular manner of motion such as 'running'.

dans la combine, *tomber dans les pommes*) 'to get involved', 'to pass out')[10] in which these dimensions are only in the background, if at all? By privileging space or topological schemata, as is the case with the distinction between verb- and satellite-framing, cognitive linguistics (the first tendency identified above) thought it could identify an autonomous semantic level, which would be completely generic and apply to many domains, thus taking on the function of a grammatical layer of meaning. If this were the case, this level should behave as an invariant, for each unit and each field implemented. Our remarks raise the problem of isolating such a diagrammatic level and lead *a fortiori* to doubt this alleged invariance. Contrary to this conception, and even when space is obviously involved,[11] we observe that configurational and other dimensions are entirely interdependent in semantics. In parallel, we see the weakness of the invariance hypothesis for the schemes that presumably characterize these units (verbs, prepositions, or others).[12] Conversely, what appears to be best transposed from one use to the other (from spatial to other more "functional" or "figurative" uses) are dimensions that can be qualified by analogy with sensitive experience as "praxeologic" and "assessive", that is dimensions that must be independent of any pre-built spatiality, without falling back on coding case roles with no relation to the true perceptive register.

We have here a double challenge: to better describe the relation between perception and language within experience; and to better ground the analogy (frequently called upon) between the construction of forms in perceptive activity and the construction of "semantic forms" in language activity. In order to take up this double challenge, we must go beyond narrowly spatial or topological approaches to more global views of experience, where praxeologic, qualitative, and empathic anticipation of perception are essential. If space is viewed as an "empty", homogeneous, and indistinct medium, and if motion is reduced to the diagram of a trajectory, we only have marginal states within the global activity of speakers. We now need to demonstrate some generic features of this global activity.

The following section attempts to discuss a perceptive and practical "model" which can take on this double task. By "model", we mean the choice of a *theoretical perspective* on perceptive experience. This is decisive for any linguist who hopes to

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10. Not to mention other uses that seem to combine all of these dimensions, as *allons bon* 'come on', *n'allez pas croire que...* 'don't [go] believe that'), analyzed at length by R. Forest (1999: 59–79).

11. It is sometimes possible to understand an utterance in two ways, depending on the attention we pay to the external frame or to more "empathic" or "stylistic" modalities of action, for example. Ex. *Il a zigzagué à travers les vagues* 'he zigzagged through the waves'). *Zigzag* is sometimes a way of moving, that is identified and exteriorized in the form of an extended trajectory, but sometimes a more unspecified way of being driven within a space where overall directions or changes of place are not in the foreground.

12. The consequence is of course to multiply the lexical sub-entries for one unit.

find a privileged domain of application or a theoretical foundation in this perceptive experience.

3. Towards a perceptive and praxeologic model

In the two preceding sections, we showed the need to widen our observations, while relying on a theoretical apparatus which integrates perception, action, and expression from the outset to provide lexical descriptions, in particular for so-called "spatial" lexical units. What we need is a theory of perception that can account for general experience (and not simply for the structures of sensory fields) and be transposed into semantics – whether it is associated with cognitive assumptions, or more empirically, with a satisfactory format for a linguistic investigation.

For this purpose, we rely on the frameworks of phenomenology (mostly through Gurwitsch and Merleau-Ponty), of *Gestalt* theory (mainly the Berlin school) and of *microgenesis* (Rosenthal 2004). The main ideas can be summarized as follows (see details in Cadiot & Nemo 1997a, b, c; Cadiot & Visetti 2001a, b, 2002; Lebas 1999, 2002; Lebas & Cadiot 2003; Visetti 2004; Visetti & Cadiot 2000, 2002).

- the multimodal and synesthetic constitution of the field and of units (experience of waves, of crescendo, of the cold rigidity directly perceived visually from glass or metal);
- the immediate perception of causal, functional or agentive values, independently of and prior to the differentiation of roles inside an agentive enrichment (see Heider and Simmel 1944; Michotte 1954; Kanizsa 1991);
- the dimensions of *requiredness* (Köhler), *Aufforderungscharakter* (Lewin) or *affordances* (Gibson) ("requisition", requirement, call and suggestion values ..., with the archetypical example of the perception of artefacts), i.e., there is an immediate and constitutive solidarity between practical objects and routines; objects and practical fields give rise to, and even merge with, the projects of action in which they are seized;
- immediate stylistic/behavioral identifications (e.g., recognition of silhouettes and their natural bearings: to run, jump, crawl, swim...);
- the immediate perception of the emotional value of forms, in relation to mood, atmosphere or affect, as well as singular event modalities (excitation, violence, brusqueness, monotony, invasion, rupture...);
- the physiognomic dimensions of perception: following Werner, Gestalt theory includes here dimensions that do not refer to an analytical or morphological structuring of the field and tend to diffuse rather than to remain strictly confined within the limits of "support-entity" (cf. Rosenthal 2004; Rosenthal and Visetti 2003: 177–191). The concept of physiognomy basically relates to expressivity and animating interiority (the precise way space is filled) which are characteristic of some entities, that are perceived in a empathic mode, – although they are not

necessarily animated or alive.[13] Contrary to intuition, the idiosyncrasies of a physiognomy are by no means contradictory to the idea that features can be transferred (as in the case of synesthetic polysemy: *soft, bitter, hard, clear,* etc.). The holism of a physiognomic perception also obliterates morphological articulations or more generally withdraws the modes of individuation that are anchored in configurations. These ideas again call into question spatialist conceptions of perception.

Some remarks on the perception of actions and intentions. The experiments of Heider and Simmel (1944) relate to the perception of intentions, studied through small cartoon films where one only sees very simple geometrical figures (triangles, circles, sticks), moving in relation to each other. Subjects then perceive them as committed in so many complex scenarios (aggression, combat, escape, protection, marks of affection). To his subjects, Michotte (since 1946) proposed animations of similar forms, whose movements give the impression of colliding, pushing, launching, continuing, and skirting. These experiments highlighted the generality of such phenomena, and at the same time their very fine dependency on the trajectory features, distances and speeds (for a discussion and complements, see Kanizsa 1991, Chs. 6 and 7). Within the more contemporary framework of neurosciences, the *mirror-neuron* is often presented as a confirmation, at the cerebral level, of this "empathic" structure of behavioural perception: the aforementioned mirror-neurons activate in the same way, whether the subject is perceiving a certain specific action carried out by someone else (like grabbing an apple), or is carrying out this action himself, or even is only preparing to carry it out. If we try to take these various works into account, we better understand, for example, that the *control* feature, often called into play in the descriptions of verbs of action (and without being analyzed!), always implies an interlacing of temporal, aspectual, attentional and qualitative (intensity, effective control modalities) dimensions; far from proceeding only from spontaneous physics, this feature qualifies the entire register of intentionality, and therefore registers in the field of the interactions between subjects.

Let us also underline a very significant point of interpretation of the experiments evoked in this note. One can obviously summarize them by saying that there is spontaneous investment of movement by "modalities" of action, which animate what becomes in fact a scene or a scenario. But such a formulation tends to isolate the movement, and to make its perception a precondition. One can imagine on the contrary – and it is this option which we adopt in the debate – that the dynamics of praxeologic and emotional anticipation take part at an early stage in the differentiation of the

13. The term *empathy* often goes hand in hand with the idea of a subjective projection, which attributes to neutral objects modalities or values that are specific to an interior source. In contrast, this concept of physiognomy specifies that it is through and from language activity that we perceive these types of qualities, along with other values provided by languages and cultures (*linguistic qualia*, in a way: a *sad* room, a *faded* smile, even a *sexy* car). This point should be stressed in relation to our criticism of the thesis of *subjectivation*, concerning some verbal uses (see Section 4, below).

field, and thus in the perceptive constitution of significant contrasts and movements themselves.

These ideas can be found in writings from the Berliner Gestalt school (for a discussion, see Rosenthal & Visetti 1999, 2003). However, this psychology, which is also a general theory of forms, was limited at the time because its dynamic properties insufficiently took into account the constituency (for perception itself) of action and its anticipation.

At the same time, and for various reasons historically related to its scientific context, this school did not succeed in developing a consistent "genetic" program. It is therefore fundamental to extend these ideas, at least towards a *microgenetic* theory of forms which highlights anticipation (in particular anticipation related to action). Anticipation corresponds to a "tension" of subjects whose impact lies possibly upstream of any effective programming of movement (Rosenthal 2004). Thus, conceiving of forms as "action field phenomena" – according to an expression inspired by E. Straus – is particularly relevant to our approach to semantics. Again, in such a theory *form* has the following properties: (i) it is constituted within a *field*, whose spatiality is only one fundamental dimension of exteriorization; (ii) it comprises varying degrees of individuation and localization; (iii) it corresponds to modes of unification that are qualitative and praxeologic, and not only morphological and positional; and (iv) it differentiates itself, to varying degrees, within multiple layers, organizing "from inside" the dynamics deployed and exteriorized in space/time.

In contrast to some researchers in cognitive linguistics who also refer to phenomenology and Gestalt theory (Lakoff and Johnson, but also Langacker or Talmy), we retain above all the principle of a deepening and a widening of the perceptual layer,[14] comprised of the dimensions of an immediately and variably qualified experience. All things considered, the primacy of perception can only mean the primacy of *perceptive meaning*. We therefore disagree with strategies consisting of detaching a diagrammatic level (Langacker) or of making space the starting point of any conceptualisation, which distort both semantic analysis (e.g., polysemy and metaphor) and the very concept of perception. This appeal to one single and supposedly universal layer of space leaves no room (or only a secondary role) for more deeply relativistic, cultural and/or linguistic characterizations, since languages do not primarily register their own options in terms of a predetermined system of psychological universals.[15]

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14. We sometimes use the word *perceptual* to mean a *general* cognitive *modality*, which cannot be reduced to a simple topological schematism, nor to the sensory modalities (the "five senses", proprioception, kinesthesis, emotions…).

15. *A contrario*, it is advisable to start from a theory of perception which recognizes the modalities of its *social* constitution, through the specificity of daily practices (and of all semiotic performances) and which does not reduce the specificities of languages to universals that are based (more or less surreptitiously) on the study of Indo-European languages. An example illustrating the relativity of the linguistic opposition *dans/sous* ('in/under'), in relation to daily gestures and utensils (involving *vision*) can be found in Sinha and Jensen de Lopez (2000).

Other approaches try to find a model in the stages of first language acquisition, insofar as acquisition would stem directly from the construction of a spatial framework designed like a detached system of positions and orientational vectors. Depending on the study, space sometimes plays the role of an imposed framework, necessarily conditioning the resolution of meaning, and sometimes that of a term locating the progressive convergence of language and some fundamental cognitive structures during ontogenesis. However, if this framework is indeed universal, it is difficult to believe that its abstract and highly conventional nature, which is neutral with respect to any practical engagement, should impose itself without language keeping a trace of this process. Our intuition is that the majority of the units which we view *a posteriori* as being dedicated to the expression of space should carry over the traces of this process into adult language. Such a process is necessary, according to this type of assumption (quite different from ours), for "emptying" and "topologizing" corporal and practical space, turning it into an exteriorized set of places, between which separate entities might circulate.

Our criticisms of such supposed laws of development apply to the immediate level of speech: it would be at the very least questionable to postulate that we can always assign speech to a pre-existing space. On the contrary, it is most probable that space (like time) is constantly recomposed by the perspective of an action, and consequently that language must anticipate, accompany, and record these perpetual adjustments.

Our *reductio ad absurdum* leads to the same conclusion: analysis should not privilege a single level of space. What seems to be dependent on the constitution of languages is a social and cultural *Lebenswelt*, which of course includes bodily experience in relation to the practical and interpersonal environment. Spatialistic and/or topological approaches capture only some isolated effects. If we must insist on bodily experience, we prefer to focus on its self-centering, synesthetic, and anticipatory character, which appears in a whole series of verbs (*toucher*, *résister*/*céder*, (*re*)*serrer*, *maintenir*, *rompre*, *insérer*, *adjuster*, *enterrer*, *noyer*, *recouvrir*, *camoufler*, *se débarrasser de*, *coller*, (*dé*)*bloquer*...) or of substantives (*douceur*, *fluidité*, *rudesse*, *rugosité*...).[16] However, we should not imagine here a "body" that would function as a "symbol" for semantics, and that would be independent of any language, such as the one proposed by Lakoff and Johnson in their concept of *embodiment*. The bodily experience mentioned above does not refer to a causal predetermination, but to the sensitive, practical, and already linguistic core of gestures and social practices that give rise to meaning.

Within one language, a comparable difficulty arises with *seeing as*, by which we *see* things as we *name* them. Diverse designations thus condition perceptual differences and are not reduced to providing different labels for intact entities (see Carlson & van der Zee 2001, in particular the articles of Smith; Richards and Coventry; Tversky et al.).

16. 'to touch, resist/give up, squeeze/tighten, maintain, break, insert, adjust, bury, drown, cover, conceal, get rid of, stick, (un)lock...', 'softness, fluidity, harshness, roughness...'

As a consequence, we minimally need more diverse dimensions in semantic analyses of the more "central" or "grammatical" units. Prepositions provide a striking example illustrating the insufficiency of "abstract" topologico-kinematic characterizations; at the same time they invalidate the constructs which start from a more "tangible", physical or spatial, core meaning. As we have argued on several occasions (see Cadiot & Visetti 2001). it appears that the uses of prepositions are conditioned, *inter alia*, by values pertaining to the "interiority", "expressivity" and "internal program" of the entities/processes which they connect. These uses are also conditioned by values related to the dependence, control, and reciprocal appropriation between these various instances. Finally, these values can either be posed clearly in exteriority, or retained in the constituent dynamics of speech, appearing only as an "aspect" of what is thematized. Although these values sometimes overdetermine some configurational values, they can very well appear without them. A whole range of cases is thus observed. And far from considering the later values to be derived only later on, they should be registered at the heart of the most primary *motifs*. Thus, these lexical values do not exceed the grammatical core of language: precisely, they truly *are* grammatical values, i.e., very generic and essential values, "worked over again" by each use. They are carried out according to various "profiles", in both abstract and concrete uses, including for spatial or physical uses which in this respect are not particularly privileged.

In particular, consider (*contra* Langacker) the three topological values of inclusion (*inside, between, among*), proximity (*towards, near, by, opposite, over*) and contact, which are considered as a simple contiguous positioning (*on, against, along*). Although these values are fundamental, they are insufficient to express the grammatical "motif" of any preposition – except by tangling up these topological values from the start with others which are expressed jointly and specifically for each preposition.

A prepositional *motif* is thus a mode of apprehension, immediately available in all areas of language activity, without any analogical or metaphorical transfer from more specific values, allegedly already present. It is a kind of highly unstable "quasi-form", a "germ of meaning", which allows us to generate the diversity of all possible values by syntagmatic resumption and stabilization. Such a *motif* unifies, and puts in transaction, dimensions of meaning which cannot be dissociated at this level (even if it is possible to distinguish them). These dimensions are separable only as a result of their *profiling*, i.e., by a differential stabilization and inscription in more specific semantic fields, and by thematic involvement. This profiling process should not be confused with a simple instantiation: from case to case, one or the other dimension of the *motif* can be "virtualized", even completely neutralized, and at the same time other specifications (unforeseeable from the *motif* itself) can come to enrich it. All things considered, a *motif* is an unstable seed, which uses a process of determination by stabilization in co-text.

An example already discussed elsewhere (see Cadiot 1997, 1999; continued in Cadiot & Visetti 2001a that develop other prepositional motifs (*pour*, *avec*, *sous*, *contre*, *dans*, *en*, *par*, *chez*), together with examples often left aside in spatialist studies) is seemingly unfavourable to our theses: the case of *sur* 'on', which corresponds to a principle

of definition-delimitation of two "segments" or "phases" by means of their "contact". Consider the following illustrations:

> *les enfants jouent* ***sur*** *le trottoir, Pierre travaille* ***sur*** *Paris/****sur*** *cette question, une menace plane* ***sur*** *la ville, condamner* ***sur*** *de faux témoignages, payer l'impôt* ***sur*** *le revenu, fixer son regard* ***sur*** *quelqu'un, être* ***sur*** *le départ, agir* ***sur*** *un coup de tête/****sur*** *le champ* without forgetting the value of sequence: ***sur*** *ce, il disparut à jamais.*[17]

In contrast to the frequent notions of "surface" (a geometrical concept) or of "height" (already way too specific), the richer and more open *motif* "put in contact" appears to be plausible. It is obviously complex. Of course, before or after the realization of its fully dynamic value, it comprises the possibility of a static projection which is like a side effect or a stabilized alternative (localization, base, support). But it is basically an aspectual and intentional motif of aiming and approach, and at the same time a motif of exploitation, valorization of the contact by a certain activity (support, rebound, perlaboration between the two "phases" which however remain external to one another): hence the values of objectivity, sequence, incidence, reaching, imminence. Its configurational expression, when fully deployed, undoubtedly comprises an "axial" location of the dynamic momentum, another "transversal" location for the contact zone, and the maintained exteriority of both "phases" thus delimited (if the contact zone is indeed the topological border of the access point, it is however not its edge, but remains "outside") hence the paradoxical tension with some thematic realizations, as in *Max dort sur le dos* 'Max sleeps on his back'. Of course, the terms we use here (support, aiming, momentum, …) are to be understood in a very open sense. Their polysemy remains active and unresolved (this is in no sense metalanguage!).

In short, our approach can be characterized by the following principles: (i) space or physical uses have no privileged status and we therefore do not need to invoke any figurative or metaphorical transfer of meaning; (ii) we need to search for *grammatical motifs* which are *immediately* effective in all areas of language activity; (iii) these *motifs* cannot be reduced to their configurational expression, which is only one aspect of their dimensions; and (iv) these *motifs* are unstable "seeds", ready to be stabilized to varying degrees by resumption within profiling dynamics which are not immanent to them.[18]

It might be objected that the versatility of so-called "spatial" units does not prevent us from distinguishing a first layer of meaning, whether or not it is a model for other values (which are then said to be temporal, modal, functional, etc.). Our answer is twofold. First, as far as epistemology and/or cognition are concerned, we just

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17. 'the children play on the sidewalk, Pierre works in Paris/on this question, a threat looms over the city, to condemn on false testimony, to pay income tax, to fix one's glance on somebody, to be about to go, to act impulsively/immediately, and with that, he disappeared'.

18. There is no absolute standard or scale for this stabilization. If we imagine that such a scale is adapted to a particular speech type, however, there is no necessity of aligning all units on a single standard. As for reference, there are variable "depths" of thetic engagement, which can be expressed with different rhythms and different degrees of indexicality.

argued against the model of perception that is implicit in this approach to space. Second, as for methodology and (more directly) linguistics, it is not clear which criteria should serve to categorize a segment of utterance as spatial.[19] Once again, although the omnipresence of space cannot be denied, we have to underline its extreme diversity and different types of topological organization that result from (rather than precede) semantic "programs" of another quality.

4. "Constitution dynamics"

In order to extend the preceding points, we will first examine basic motion verbs, such as *sortir* 'go out' and *partir* 'to leave', which illustrate the non-separation between perception, action and quality, as well as the intertwining of their various (spatial or other) values. We will then present a detailed comparable analysis of the verb *monter* 'to go up' and criticize, following Lebas and Cadiot 2003, the well-known thesis of "subjectivation", supposed to give an account of uses such as *la route monte* 'the road goes up'. Finally, we will consider the heavily debated opposition between inaccusative and inergative verbs.

4.1 Back to motion verbs

The following verbs are among the first frequently cited to support the classification of French as a *verb-framed* language: *aller*, *arriver*, *se diriger*, *entrer*, *partir*, *sortir*, *traverser*, *venir* 'to go, arrive, head to, enter, leave, go out, cross, come'. Consider the verbs *partir* 'to leave' and *sortir* 'to go out'. What inherently indicates the construction of their *frame*? Although these examples may seem to be difficult to account for in our thesis, we will show the following: rather than to specify a geometrical trajectory or to merge with the layout of a trajectory in a topological space, these inherent indications refer to "supervening" modalities, which are located before any distinction between event and action.

From its etymological phylum (see dictionaries, e.g., *Le Robert Historique* 1992: 1439. Pop Lat. * *partire, partiri*: 'to part'), *partir* retains the motif of a "detachment"

19. For example, consider some of the diverse uses of the French prepositions *en* and *par*:

hommes ***en*** *mer, maison* ***en*** *flammes, pommier* ***en*** *fleurs, chienne* ***en*** *chaleur, femme* ***en*** *cheveux, propos* ***en*** *l'air* ('men at sea, house on fire, apple tree in bloom, dog/bitch in heat, all-hair woman, idle talk') *Voyager* ***par*** *la route, être emporté* ***par*** *le courant, passer* ***par*** *le jardin, prendre* ***par*** *la gauche, regarder* ***par*** *le trou de la serrure, attraper* ***par*** *la cravate, tuer quelqu'un* ***par*** *balle* ('to travel by road, to be carried away by the current, to go through the garden, to take a left, to look through the keyhole, to catch by the tie, to shoot someone to death')

over the background of "division", attested to by the polysemy of the noun *départ* 'departure' (*faire le départ*/*être sur le départ* 'to part/be on the point of departure'). As for the verb *sortir*, it keeps from its Latin etymology the principle of a sudden appearance or a pounctualized emergence. *Le Robert Historique* presents a double source: Latin *sortiri, sortitus* 'which was drawn lots for, pointed by fate', therefore 'which escapes, and appears to the outside'; *surrectus, surgere*: 'to burst out').[20] The inchoativity or bounding carried by these two lexemes are interdependent of a background which could play a locating role. But they do not imply a hypostasis of this background in terms of sites. Rather, they are "clearing/escaping" modalities, that are sometimes associated with an already available spatial frame (on the *etic* level, in the sense of Pike 1967) and that sometimes take precedence over it, traditionally only conditioning schematizations that are barely differentiated. It is therefore insufficient to describe the difference between *partir* and *sortir* in terms of *framing* (in the sense of *verb-framed* languages). Of course, it is true that *sortir* refers to a topological difference between inside and outside, with a perspective focused on the crossing phase. But *partir* has a different focus: it comprises emission, detachment, even movement, without imposing any extension or even any determined localization, to what constitutes its supporting point (its "source"). It also maintains an open perspective, somewhat marked out, which anticipates an entirely detached target – a *telos* – that does not have to be actually reached (*partir pour* 'to leave for').[21]

Examples such as *le lièvre est parti sous nos pieds*, *le coup est parti* 'the hare took off under our feet', 'the gunshot went off' develop this somewhat ergative pole of "detachment" (here, explosive), while opening the perspective of being elsewhere for a certain duration. *Le lièvre est sorti sous nos pieds* 'the hare came out under our feet' builds the very different profile of a sudden appearance and emergence (from a burrow, a thicket). *Partir pour Paris* 'to leave for Paris' is typical of this analysis. Conversely, **sortir pour Paris* 'to go out for Paris' is inappropriate, because *pour* 'for' pushes away the target from the process of *sortie* 'exiting', and at the same time registers it in a constitutive *telos*. But, as mentioned above, *sortir* accepts direct transitions only towards "zones" or "phases", where boundaries can be immediately attached to the threshold

20. The dimension of "drawing lots" (more generally of hazard) seemingly confined to the fields covered by the noun *sort*, remains very present in uses such as *sortir*: *il n'est rien sorti de cette discussion*, *le numéro 37 est sorti au* Loto 'nothing came out of this discussion', 'the number 37 came up' (lottery), etc. We assume that this dimension always remains coiled in intension, with the idea that the external phase of any *sortie* 'exit' remains unspecified or even contingent at the level of the verb itself, in contrast with its upstream phase, which involves some interiority.

21. These main directions can be determined from the lists of parasynonyms in dictionaries. For example, with respect to intransitive uses of *partir*: *déguerpir*, *échapper*, *s'enfuir*, *s'effacer*, *filer*, *se sauver*, *s'éclipser*, *disparaître*, *démarrer*, *commencer* ('to bolt, escape, flee, fade, slip away, run away, make off, disappear, get off, start'). For *sortir*: *sourdre*, *dégager*, *percer*, *poindre*, *pousser*, *apparaître*, *provenir de*, *naître*, *tirer*, *extraire*, *vider*, *publier* ('to spring up, clear, break through, come out, push, appear, come from, be born, draw, extract, empty, publish').

(*sortir dans la rue* 'to go out in the street'). With *sortir*, we can have a detached and programmed target only if the process is repeated with another predicate (*sortir* ***pour*** *aller au restaurant* 'to leave [to go] to the restaurant'), or if the target is expanded to the dimensions of a trajectory providing the transition (*je sors pour mon cours* 'I'm going out for my lesson'). For the same reason, *sortir vers la rivière*, or *sortir côté rivière* 'to head out in the direction of the river/on the river side' is perfectly acceptable since *rivière* brings a mere direction, which conditions the transition in the immediately contiguous phase of the threshold.[22]

Furthermore, unlike *partir* which punctuates an inchoative moment, *sortir* maintains an interior zone open, in line with the transformation that brings the "releasing" of threshold crossing. This is obvious for *sorties* ('exits') which are displacements. But it is also a possible analysis for uses involving emergence without motion: *la couleur sort bien sur ce fond*, *la couleur est bien sortie* 'the color brings out well on this background', 'the color came out well' (for dyeing or photography). This tends to show that the "figure/ground" distinction (a leitmotiv in cognitive linguistics) cannot be reduced to a partition of only configurational (spatial) data. It is inseparable from qualitative dynamics and from non-spatial dimensions of the field, since the very contribution of linguistic units range from meaning effects that are stabilized in exteriority and meaning effects that are implemented at the level of internal dynamics.

Whether we call it *topology*, *configuration*, or *framing*, the schematism we are criticizing must be settled on the basis of aspectualization and perspective which depend upon fine perceptions of qualitative phases such as emission, interruption, crossing, emergence, anticipation of a target, of a contact, of a junction. . . All this can be woven in space/time or profiled in the modalities of a topology which would no longer depend on perceptive fields. But if we take into account the *dynamics of constitution*, we must underline the qualitative dimensions of these perceptive and practical generalized processes. Indeed, the potential of generalization, called upon by cognitive linguistics, resides in the dynamics of constitution, and not in topologies or pre-existing spaces. From these internal dynamics emerges the fact (already suggested by etymology) that *partir* contains a certain quality of "emission" (a punctualization qualified or aspectualized "from the inside"), brings about a kind of detachment, and refers to a projection until disappearance (Cadiot 1991:49). In comparison, *sortir* (as the etymology again shows) comprises by definition a sudden appearance or emergence, maintaining the perspective on the threshold-phase. The words we use in these glosses make these dimensions somewhat more "intense", so as to underline the tight fusion between aspectual/qualitative dimensions of lexical meanings and their configurational dimen-

22. The continuity implied by *vers* 'in the direction of', is often opposed to the 'solution of continuity' between source and target indicated by *pour* 'for'. From this point of view, there is even a common instruction in *sortir* and *vers*, on the one hand, and in *partir* and *pour*, on the other hand.

sions that are traditionally considered to be grammatical and represented in cognitive linguistics by "spatial" diagrams.[23]

4.2 The case of 'monter' and subjectivation

A second illustration of our thesis concerns the verb *monter* 'to go up' discussed in Lebas and Cadiot (2003) in relation to the notion of "subjectivation" which is frequently invoked to account for uses such as *la route/l'escalier monte* 'the road goes up/the stairs go up'. Tables 2 to 4 show the main results of this analysis.[24]

Table 2. Some constructions with *monter* 'to go up' (see *Le Petit Robert 1* 1988; *Le Robert Historique* 1992).

1. **Prepositional uses with a human subject:**
   - associated to the idea of an upward movement:
     monter sur une hauteur, *au grenier*, *dans sa chambre*
     'to go up on a hill, to the attic, to one's bedroom'
   - a more inchoative phase:
     monter dans un taxi 'to get into a taxi'
   - generic use with an "epistemic" horizon:
     monter à bicyclette, 'to ride a bicycle'
     monter à cheval 'to ride a horse'
   - metaphorical transposition preferentially fixed in set phrases:
     monter en grade 'to be promoted'
     monter sur ses ergots 'to get one's hackles up'
   - early spatial uses in an intentional modality (progression, promotion):
     monter au front 'to into the attack'
     monter en première ligne 'to go to the front'.
2. **Intransitive uses with a non-human subject:**
   - physical or spatial uses:
     le soleil monte à l'horizon 'the sun rises on the horizon'
     brouillards montant du fleuve 'fogs coming up from the river'

23. Language evolution sometimes shows a tendency to "reprocess" or modulate by means of a prefix emerging dimensions of a lexeme, which are in line with those discussed here. For example, *sortir* gives rise to ***re**ssortir*, does not mean '*sortir* once again', but underlines the qualitative dimensions described here, i.e., something like 'to come out **better**'. In the same way, *rentrer* does not "redouble" the process of *entrer* '***go into***', but stresses a certain ergativity in an ambiguous way that can lead to more or less intensity.

24. As Nemo points out, even in denominative uses, a *mount* (as in *Mount Everest*) may correspond to a very weak ascending "displacement", referring to a kind of "eminence", rather than to spatial scales (e.g., *Mount Euvray* in Sologne, or *Mount Venus*, whose position varies according to authors since the Pleiad (see *Le Robert Historique* 1992: 1267): the dimensions of verticality and displacement can fade or vanish and they are more present in the verb or in the dynamic noun *montée*.

- "spatialized" analogies:
  bruits montant de la rue 'sounds coming up from the street'
  les eaux montent 'the water rises'
- increase on projected scales:
  les prix montent 'prices go up'
  la température monte 'the temperature goes up'
- quantitative but also directly qualitative intensification (a first physical value is modally and/or intentionally qualified):
  la fièvre monte 'the fever goes up'
  le ton monte 'the discussion becomes heated'
  la tension monte 'the tension goes up
  la douleur monte 'the pain grows'
  la moutarde me monte au nez 'the mustard comes up my nose'
- borderline cases, where the absence of internal progressiveness partially blocks a possible rise:
  ?*le plaisir monte* 'the pleasure rises',
  ?*la souffrance monte* 'suffering rises'.

3. **Transitive uses:**

- investing the vertical axis:
  monter un escalier, une côte 'to climb the stairs, a hill'
- transpositions on pre-constructed and "projected" scales:
  monter le son 'to raise the sound'
  monter la gamme 'to go up the scale' (music)
- more static and "usual" uses:
  monter un cheval 'to get on a horse'
- assembly or organization (as in the noun *montage*):
  monter une page, un dossier, un kit, un projet, un spectacle, un complot, un coup...
  'to put together a page, a file, a kit, to set up a project, to put on a show, to hatch a plot, to plan a trick,
- at the transition of assemblage/organization and verticality:
  monter la mayonnaise 'to whip up the mayonnaise',
  monter un mur 'to put up a wall'

These lists already show the remarkable variety of aspectual and intentional meanings in uses of this verb. Admittedly, motion towards a polarized state marked HIGH strongly characterizes its semantics but only if this "rising" dimension is not reduced to spatial verticality.[25] It is essential to notice the dimension of intentional programming or the anticipation of a terminal point, which is more readable in the "assembly/put together" uses (*monter un kit* 'to assemble/put together a kit', or even *monter une maison* 'to build a house', where the construction process is considered to be inherently programmed) or in the "constitution" uses (*monter un projet* 'to set up a project'). We therefore see an inherent telicity or programmed aiming at the center of the meaning of *monter,* even though the boundaries of the process are not imposed but only in-

25. Even if supplemented by a final "target covering" phase, as Pottier (1997) suggested.

Table 3. Main dimensions in constructions with *monter* 'to go up'

ascending	*escalader, grimper, gravir, s'élever*
rising	*élever, hausser hisser, lever, percher, soulever, surélever*
inchoation/ embarkment	*partir, s'embarquer*
increase	*augmenter, croître, forcir, gonfler, grandir, grossir, se développer, enfler, lever, progresser, s'étendre*
assembly	*bâtir, construire, dresser, échafauder, édifier, fonder, installer,placer, positionner, ajuster*
contrivance	*combiner, organiser, ourdir, trafiquer*
combination	*(s')accoupler, (s')opposer*
a put-up trick	*coup monté*

Table 4. Distribution of nouns associated with *monter* 'to go up'

ascending motion	*montée*
increase	*montagne* (une montagne de problèmes)
hill	*mont*
embarkment	*monture*
assembly/contrivance	*montage*

scribed in a horizon that can be modalized. This form of telicity is still decisive in uses where the displacement could appear to cover it entirely, as in *Anne monte se coucher* 'Ann goes up to bed' and even in *Anne monte l'escalier* 'Ann goes up the stairs', where one can even notice the subject's intentionality.

This same dimension ensures transitivity between *monter* and objects that can be seen as a synthesis of a sequence or a directed progression: *monter la côte, l'escalier, l'échelle, les gradins, les degrés* 'to go up the hill, the stairs, the ladder, the rows, the degrees'. Importantly, the mere possibility of vertical trajectory does not guarantee transitive uses of *monter* (??*Monter l'arbre*, *la colline*, *les airs* 'to go up the tree, the mount, the air', as shown by examples where a preposition mediates this necessary progressiveness: (*monter* ***à*** *l'arbre*, ***sur*** *la colline*, ***dans*** *les airs* *'to go up at the tree, on the hill, in the air'). The same progressiveness is responsible for the contrast between *monter le son* 'to raise the volume' with ??*monter le bruit* 'to raise the noise' and ? *monter la musique* 'to raise the music', insofar as *sound* incorporates a principle of intensity modulation, whereas *noise* or even *music* is less immediately profiled on a sequential or progressive mode.

This characteristic combination of progressiveness and telicity harmonizes with the possible implication of the process of constituting its object, which is then better considered as "effected" than as "affected". The "constitutional" uses fully exploit this combination, since the aspectual qualities of the process (with the possible salience of a generic pole marked HIGH) are then converted into those of the object itself (*monter un coup*, *un projet*, *la mayonnaise*, *oeufs montés en neige* 'to plan a job', 'to set up a project', 'to whip up the mayonnaise', 'to beat egg whites'). More conclusive still are

examples where a differential effect of lexical choice intervenes: *monter une histoire* 'to make **up** a story' is opposed to *inventer* 'to invent' or to *imaginer* 'to imagine', by suggesting a strong anticipation of the telic process of creation, all the more "depreciated" that it is located at a high degree of complexity (see *monter* ***toute*** *une histoire* 'to make up a **whole** story'). Unlike this "contrivance" effect, an example such as *monter un restaurant* 'to set up a restaurant' develops this polarization positively, differently from *créer* 'to create' or *ouvrir* 'to open', but shows the same type of object constitution. In the same way, *monter un cheval* 'to ride a horse' implies recomposing the horse as a *monture* 'a mount' (programming, domination), in an atmosphere of intensified activity, completely absent from *monter* ***sur*** *un cheval* 'to get **on** a horse'.

Verticality, assembly, project, embarkment, dominance, prescribed activity, contrivance, mechanics... thus have the status of more or less profiled modalities, dependent on implicit contrasts or "facets" expressing some kind of "family resemblance", and specified according to the types of context. If we agree, however, to ascribe these facets to the concept of *linguistic motif* (introduced in Cadiot & Visetti 2001a: Ch. 3), we find a certain form of unity, consisting of requalifying the pole HIGH according to the axis of the directed and organized subject's activity (anticipation of a terminal point, a polarized state marked HIGH, a sequentialized and cumulative trajectory). Spatial orientation and motion thus do not precede the perspective for action: on the contrary, they are perceived as a *montée* 'a rising' only insofar as they express this perspective.

It is also important to notice that the transitive uses of *monter* constitute their object by individuation, completion, and very variable exteriorization phases (from *monter les valises* 'to bring the suitcases up to', *monter un dossier* 'to assemble a project', *monter un coup* 'to plan a trick', *monter une mayonnaise*, 'to whip up the mayonnaise'). More radically, if "objects" are always constituted through language (and in the intersubjective exercise of consciousness) as extensions of the process, referents themselves remain practical modalities, whether they are constituted by an initial "programming" or approved by the process in progress.

Consider now the subject, that reveals the complex system of referential constitution known as "subjectivation", as in the following examples with *monter*:

> *La route monte franchement, puis arrive à un étang.* 'The road goes up sharply, then arrives at a pond'. *Son champ commence ici et monte jusqu'en haut de la colline là-bas.* 'His field starts here and goes up to the top of the hill over there'. *Cet escalier monte à l'étage des chambres.* 'These stairs go up to the bedrooms floor'.

To describe these phenomena we are tempted to radically separate referential stability – the present objects – and the displacement or action – in fact the "conceptualizer" of the scene. This option is variously expressed by cognitive theory (Langacker, Sweetser, Traugott) and even by "Argumentation Theory" (Verhagen 1995) (see Lebas & Cadiot 2003 for more details). It is based on the assumption of an exteriority between the predicate and its arguments, which we already criticized, on the phenomenological level as well as in relation to its linguistic status. It is at the same time the nominal

model that seems to be much more dynamic and discursive, and the verbal model, much richer than case role markings, which must be strongly softened and especially interpreted in an indexical theory of the linguistic sign.

What is the point of view of these authors? They consider it to be essential to preserve motion in the semantic core of *monter* and this movement must therefore be transferred to a "subjective" level. The activity of the "conceptualizer" then takes over what cannot be attributed to any agent in the scene or to any virtual agent who would move "to the outside", through telepathy on the part of the conceptualizer, or with whom he would empathically identify.[26]

Somehow, the "conceptualizer" is called upon to mediate some type of objects (such as roads, ways, means of access, etc.) and types of movements (*to go, to go up*, *to go down*, *to zigzag*, etc.) so as to define these objects as places traversed by these movements.

Such devices go hand in hand with a double (and unquestioned) separation:

– on the level of their general conception of language activity, they assume a separation between an objective sphere (the road as an already stabilized extension, movement confined to displacement) and a subjective sphere (the conceptualizer, instance of representation of objects and objectified events);
– on the linguistic level, they take for granted a separation between argument and predicate, according to an overly exclusive syntactic model.

Yet, the words *road*, *way*, *stairs*, etc., do incorporate essential predicative aspects, which are specified in terms of movement perspectives, access, trajectory. Correspondingly, the roads, ways, staircases of our practical world are not "objects" disjoined from these perspectives.[27] The examples above show how a place qualified by the word *road* takes on "advancing" qualities, while an area qualified by the word *field* takes on "spreading" qualities, and *stairs* provides the support for a "rhythmic" or "spaced out" progression. The utterances in question are peculiar only if one distinguishes mobile and autonomous agents from agents that are syntheses of movements, projections, and

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26. It is difficult to determine the exact composition of the "subjectivity"/ "objectivity" mixture proposed by Langacker (1987, 1991 and 1999), as well as its "empathic" nature. But whatever projection occurs (according to this type of "empathic" conception), the idea remains of a displacement over a stabilized extension. We admit that an "empathic" dimension is necessary to accept, for example, *la route monte* ***avec peine*** *jusqu'au sommet* 'the road goes up **with difficulty** to the top'). However, this interpretation encounters difficulties, in particular with the phenomena of defectivity related to time and specificity: **la route est montée (avec peine) jusqu'au sommet* 'the road went up (with difficulty) to the top'), or ? *telle route monte plus péniblement que telle autre* 'such road goes up more painfully than such other').

27. Once again, the cases discussed here are the most unfavourable for our thesis and analyses in so-called notional or abstract domains would be more intuitive (e.g., in idiomatic expressions such as *route du bonheur*, *chemin de la sagesse*/*du succès* 'road to happiness', 'ways to wisdom/success').

trajectory modalities. This is legitimate at a certain level. But the explanations we criticize lean too exclusively on what they take to be necessary, namely a space which exists only as a marking system and as a support for the motion of agents. To such a view we oppose another one where the dissociation between agents, processes, and frame does not have to be assumed in the same way, and where the mobile-trajectory model is nothing more but one particular and reductive vision of motion.[28] Coming back to our examples, we can see that it is necessary to preserve this phase in the analysis where the syntactical subject (road, way, stairs) is in the process of being constructed through speech and where the predicate *monter* only evokes or outlines its supposedly "core" meaning – that of a movement particularized as a displacement of a mobile referent.

All things considered, there is no need for an additional "subjective" entity (the "conceptualizer", who would walk mentally on the road so that it could go up) to allow us to say that a road that goes up is a rising road: because a road is a road only insofar as it is a project or a perspective for such movements; but also because these movements themselves are only sketched as possible "expressions", "layouts" of a constitutive perspective in its inchoative phase (as is meant by *prendre la route* 'to hit the road').

Our thesis can be illustrated by some strong defectivity phenomena, that can hardly be accounted for by current cognitive linguistics:

> ?La route était en train de *monter* 'The road was going up'. **La route est/a monté(e) jusqu'au sommet* 'The road went/has gone to the top'. ?*Telle route monte plus péniblement que telle autre* 'Such road goes up more painfully than such other'.

These last examples show that it is precisely when the exteriority of predicates and arguments (to one another) is pushed too far that utterances become impossible, since the only remaining value of movement is something mobile following a trajectory (what is required here is an "animate", i.e., auto-mobile). It is only by remaining on this side of the fixity/animation duality (itself arising from the objectivity/subjectivity duality) that one can understand the complexity of profilings (*la route serpente à travers les bois* 'the road snakes through the woods'), or tighten the framing (*la route zigzague à travers les bois* 'the road zigzags through the woods'), or profile alternations of windowing, while maintaining a continued identity (*la route ne cesse de monter puis de descendre* 'the road keeps going up and down').

More generally, we insist on the importance of not considering motion and/or action only in their most exteriorized, objectified, or ontologized phases (for example, in the form of distinctions between change and movement or entity and process). Such reductions lead either towards a model of spatiality as a preconfigured extensional frame for locating displacements or towards a coding of praxeologic dimensions in terms of (also pre-existing) case roles. Conversely, we believe that the relevant praxeologic anticipations are recognized only if action-movement are not first dissociated

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28. For a phenomenological recasting of the concept of movement, in the continuation of M. Merleau-Ponty and J. Patocka, see R. Barbaras (1998, 2003).

into space (site/frame of unfolding), followed by modalities or manners, then finally by case roles; that is to say, if we consider the varying levels of individuation and the levels of dissociation between agents, frameworks, and processes.

4.3 The inergative/inaccusative distinction

It is possible to continue this discussion in a more grammatical framework, by considering the distinction between inaccusative and inergative verbs. This distinction is itself very problematic, but it is of particular interest in relation to motion verbs (see recent work by Legendre & Sorace 2004; Forest 1995). Like other Romance languages, French aligns its verbs on these two poles, a fact which incidentally shows that its characterization as a *verb-framed* language is insufficient.

Let us look at the strict configurational version of the "inaccusative hypothesis", as reported in Legendre and Sorace (2004). According to this hypothesis, intransitive verbs are divided into two types:

– Inergatives, which have a deep agentive subject as single argument: [NP[$_{vp}$V]],
– Inaccusatives, which have as single argument a direct object that is promoted at the surface to subject position: [$_{vp}$VNP].

Many syntactically inspired accounts, limited in general to restricted semantics (theta-roles, case roles), have attempted to establish this distinction and to make it operational. An inaccusative verb, for example, would have a surface subject that carries a role of patient or experiencer; it would join thetic judgements of supervening or existence (*Paul arrive, le temps passe* 'Paul arrives', 'time passes'). In contrast, inergatives would be oriented towards activity, corresponding to so-called "manner", without consideration of bounding (*marcher*, *nager* 'to walk', 'to swim'). "Projectionist" approaches seek to make this distinction on the level of lexical units considered out of context, whereas "constructionnist" approaches refuse to assign a final status to the arguments in advance, preferring to wait for the conjunction between constructions and lexical units (Legendre & Sorace 2004: 189–190).

Although some tests were proposed to support the idea of such a distinction, they conditioned distributions which did not overlap. The following criteria are widely quoted:

– The auxiliary used with the *passé composé* (past tense): *être* indicates inaccusative, *avoir* indicates inergative:

> *Je (suis + *ai) allé, arrivé, entré, parti, venu.* 'I went, arrived, entered, left, came'.
> *Je (*suis + ai) couru, sauté, nagé.* 'I ran, jumped, swam'.

– The partitive cliticization, acceptable only with inaccusatives:

> *Il en arrive/tombe sans cesse.* 'There come/?fall some all the time'.
> **Il en marche/nage sans cesse.* 'There walk/swim some all the time'.

– The Verb-Subject order, acceptable only with inaccusatives:

> *Il arrive/vient/paraît/ de nombreux touristes.* 'There arrive/come/appear many tourists'.
> **Il court/nage/saute/danse beaucoup de touristes.* 'There run/swim/dance many tourists'.

– Impersonal passive, acceptable only with inergatives:

> *Il a été couru/dansé sur cette piste*. 'There has been some running/dancing on this floor'.
> **Il a été monté/parti ici*. 'There has been some climbing up/leaving here'.

– Participial constructions, acceptable only with inaccusatives:

> *Paul arrivé/parti/sorti, la réunion commença.* 'Paul having arrived/left/gone out, the meeting began'.
> **Paul couru/sauté, la réunion commença*. 'Paul having run/jumped, the meeting began'.
> but: **Paul allé* (whereas at first glance *aller* is inaccusative)

As we said, these tests prove to be moderately reliable, if one tries to corroborate them with each of the others. Even by combining them or by weighting them it proves to be difficult to create rules that can define lexical classes.

In fact, we see that these distinctions born out of a syntactico-lexical typology, also imply precise knowledge about an "agentive activity without displacement" as opposed to a "dynamic telic change" (Legendre & Sorace 2004). "Activity" polarizes the inergative class and "change" does so for inaccusatives. The single surface argument of inergatives is the status of an agent controlling an action, without the action applying to a detached object (by definition intransitive), while the argument of inaccusatives is a patient, or the seat of a transformation process over the background of aiming ("telicity").

However, the distinction is muddled by aspectual features or supplementary arguments, which present these phenomena as effects of the ways in which they are constituted in discursive contexts, which themselves are better described in terms of field, of modulation of attention, and of distribution and individuation of backgrounds and figures.[29]

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29. In another theoretical context, and to reflect the graduality of the inergative/inaccusative distinction, Sorace proposed a hierarchy of features conditioning, for example, the selection of the auxiliary: changes of place, state, continuation of a pre-existing state, uncontrolled process, controlled process (with or without movement). Although this type of presentation is useful, it still returns to the question in a narrow lexical vision, detaching the syntactic acceptability of the sentences from the strictly discursive dimensions of coherence or even harmony.

Thus, the selection of the auxiliary *être* by inaccusatives seems to refer to a resultative phase, combined with a strong telic dimension. This is precisely why certain verbs, easily classified as inergatives, can also accept *être*, even marginally:

> *L'avion a atterri* vs. *A cette heure, votre avion doit certainement être atterri.*
> 'The plane has landed' vs. 'By this time your plane has certainly landed'.

It is well known that some verbs (*monter, passer*), while easily referring to medial phases (in the sense of Boons 1987), admit both auxiliaries, the selection being made according to this phase criterion (and to a differential evaluation), not because they belong to a fixed class:

> *Il a monté la colline* vs. *Il est monté sur la colline.* 'He climbed the hill vs. he climbed up the hill'.
> *Il a passé par ici* vs. *Il est passé à huit heures*. 'He went by here'. vs. 'He went by at eight o'clock'.

Let us stress the paradoxical nature of these oppositions: when progressiveness and ergativity are accentuated (*a monté, a passé*), telicity is absorbed; conversely, progressiveness and ergativity are neutralized by the perspective of a "merging" telicity, that is not necessarily programmed as a preliminary intention, but only indexed as being external to the process, whether local or temporal (*est monté, est passé*).[30]

In the same way, and following Forest (1995:181, sq.), we insist that participial sentences are sensitive, not only to aspectual factors (accomplishment, resultative), but also to "empathic" factors (in a somewhat different sense from the one used above):

a. **Pierre couru, nous sommes passés à table.*
'Pierre having run, we sat down at the table'.
b. ?*Pierre arrivé, la pluie a commencé à tomber.*
'Pierre having arrived, the rain began to fall'.
c. *Pierre enfin arrivé, nous sommes passés à table.*
'Pierre having finally arrived, we sat down at the table'.

These examples illustrate what Forest calls *empathy* (following S. Kuno): a principle of discursive "interest" and harmonization, "empathically" assumed by the "discursive core" and to which the two propositions must be integrated. The difference in acceptability between (b) and (c) is due to the fact that the participial phrase in (c) is presented as a condition for the contents of the main phrase to be realized.

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30. In less standard uses, we find the auxiliary *être* with verbs that are nonetheless classified as inergatives, such as *courir* (*Il a couru chez le docteur*), to accentuate an effect of supervening or punctualization: *aussitôt je suis couru chez le médecin*. In the opposite direction, Bauche (1916:112) notes that the auxiliary *avoir* is often used with verbs that are "neutral" (i.e. intransitive uses) or pronominal, for example "je suis monté au second", becomes "*j'ai monté au deuxième*"; "je suis sorti dans l'après-midi" becomes "*j'ai sorti tantôt*; "il est rentré ce matin" becomes "*il a rentré ce matin*".

Following these remarks about agentivity/telicity and empathy, we can illustrate other criteria and other dimensions of this discursive nature of the field, which lie more clearly within the scope of our discussion about analogy or about a perceptive model in semantics. Inergative verbs are known to react negatively to the partitive cliticization criterion. Yet, we can introduce some points of view which affect how entities are constituted in a field that is better understood in perceptual terms. For example:

a. *des camions, il en arrive beaucoup ici.*
'These come many trucks here'.
b. ?*des camions, il en zigzague beaucoup ici.*
*'There zigzag many trucks here'.
c. *des camions, il en roule beaucoup ici.*
'There drive many trucks here'.

Sentence (b) is barely acceptable, but (c) is correct.

These data are contradictory to the classification of *rouler* as inergative. This is probably because the process *rouler* 'to drive' is neither distributed to each *camion* 'truck', nor conceived of as a displacement. Rather, a holistic scene of moving trucks (or movements of trucks) is constructed, which occurs as a global event, indexed on a "landmark" or a particular point of view (for example that of an inhabitant), according to which the trucks are aspects of the movement rather than its agents (we can see here an essential mark of inaccusativity). In the same way, if a single sentence such as (a) is indeed not acceptable, we can easily accept a more elaborate sentence such as (b) or even (c):

a. **il en skie beaucoup*
'there is much skiing'
b. *dans cette station, des enfants, il en skie beaucoup*
'in this resort, there is much skiing of children'
c. *ici, des touristes, il en nage beaucoup*
'here there is much swimming of tourists'.

The Verb-Subject order criterion illustrates the same conditions for verbs classified as inergative. If we would probably refuse an example such as (a), the enrichment (b) is more easily acceptable:

a. **Il danse beaucoup de touristes.*
*'There dance many tourists'.
b. *Sur cette piste, il a dansé beaucoup de vedettes d'un soir.*
'On this floor there danced many short-lived stars'.

Then again, we can also invoke a holistic, non-distributive and "massified" interpretation, which is based on a 'thetic' judgement, where the plural does not point to a

number of individuals, nor to a collectivization, but rather to a reiteration of events indexed and unified by the landmark.[31]

Conclusion

These last considerations might seem somewhat of a digression from the subject of this chapter. In fact, what we have discussed under these various headings is better understood in terms of perceptual fields and constitution dynamics. The approach we propose avoids the symmetrical pitfalls of a purely lexico-syntactic approach and of an approach that is considered to be more semantically based on a pre-constituted ontology of movement/entities. Our account locates the process of constitution at the source of diverse meaning effects, echoing the diversity of constructions.

This is where we settle the issue of the constitutive diversity of the values presented by one lexeme, between "strong" agentivity/ergativity and "weak" passivity/ergativity, between the dissociation and the undifferentiation of agents, processes and landmarks, between events viewed from an external point of view and transformation seen from a more internal and qualitative angle.

To us, it would be impossible to attribute these variations to lexical units that are described by a unique format that would depend on a separation between lexicon and discourse. Our proposal is to assign the varying profiles (including syntactic ones) of lexical units to formation registers that anticipate the various phases of constitution of the semantico-discursive field. At the same time, we propose to rearrange in terms of an "interactive" constitution dynamics the whole interplay of semantic and aspectual categories, such as telicity, perfectivity, resultativity, agentivity, iterativity, including reference to motion and change. In other words, these categories are not primitive terms, nor properties which are permanently assigned to units, but properties that emerge with speech and which are not to converge in advance along with ontological preconceptions.

If the lexicon must be viewed in terms of stored information, a condition is that it cannot be isolated from the various stratifications or discursive phases. What is called "lexical unit" is variety of anticipation modes, that are not deductible from each other by composition, nor derivable from a uniform "ontological" model – especially not a model of space and motion. It is thus essential to turn to a microgenetic conception

31. Note the holistic nature of theticity itself, somewhere between existence and localization. Once again, this form of theticity does not make entities the source of the activity that is attributed to them and does not separately position these entities. They become aspects of the overall scene, a bit like weather statements (*la pluie tombe*, *il pleut* 'the rain falls, 'it is raining'), impersonal constructions (*il lui arrive de gros ennuis* Lit. 'There arrive to him some big troubles', i.e. 'he's got some big troubles'), and probably in intransitive constructions that are interpreted on the inaccusative side in a way that remains to be specified, (*le rideau tombe* 'the curtain falls' or even *la montre marche* 'the watch works').

of the semantic field, that calls for the perceptual and praxeologic nature based on the principles of phenomenology.

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CHAPTER 10

The representation of spatial structure in spoken and signed language[1]

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The system of spatial structuring in spoken language has three aspects. Componentially, there is a universally available roughly closed inventory of basic spatial elements that fall into a roughly closed set of categories. Compositionally, these elements combine into the whole spatial schemas that closed-class forms can represent. In each language, a particular set of such schemas is represented. Thirdly, certain processes extend or shift such schemas, allowing them to cover more spatial situations. In signed language, spatial structure is mainly represented by the "classificatory" subsystem, which systematically differs from the spoken language system. It marks finer spatial distinctions with its inventory of more structural elements, more categories, and more elements per category. It represents many more of these distinctions in any particular expression. It represents these distinctions independently in the expression, not bundled together into prepackaged schemas. And its spatial representations are largely iconic with visible spatial characteristics. The findings suggest that instead of some discrete whole-language module, as proposed by Fodor and Chomsky, spoken language and signed language are both based on some more limited core linguistic system that then connects with different further subsystems for the full functioning of the two different language modalities.

1. Reprinted with permission from Lawrence Erlbaum. The representation of spatial structure in spoken and signed language. In K. Emmorey (ed.) 2003. *Perspectives on Classifier Constructions in Sign Language*. Mahwah, NJ: Lawrence Erlbaum.

1. Introduction[2]

This paper combines and relates new findings on spatial structuring in two areas of investigation, spoken language and signed language. Linguistic research to date has determined many of the factors that structure the spatial schemas found across spoken languages (e.g., Gruber 1965; Fillmore 1968; Leech 1969; Clark 1973; Bennett 1975; Herskovits 1982; Jackendoff 1983; Zubin & Svorou 1984 as well as myself, Talmy 1983, 2000a). It is now feasible to integrate these factors and to determine the comprehensive system they constitute for spatial structuring in spoken language. This system is characterized by several features. With respect to constituency, there is a relatively closed universally available inventory of fundamental spatial elements that in combination form whole schemas. There is a relatively closed set of categories that these elements appear in. And there is a relatively closed small number of particular elements in each category, hence, of spatial distinctions that each category can ever mark. With respect to synthesis, selected elements of the inventory are combined in specific arrangements to make up the whole schemas represented by closed-class spatial forms. Each such whole schema that a closed-class form represents is thus a "prepackaged" bundling together of certain elements in a particular arrangement. Each language has in its lexicon a relatively closed set of such prepackaged schemas (larger than that of spatial closed-class forms, due to polysemy) that a speaker must select among in depicting a spatial scene. Finally, with respect to the whole schemas themselves, these schemas can undergo a certain set of processes that extend or deform them. Such processes are perhaps part of the overall system so that a language's relatively closed set of spatial schemas can fit more spatial scenes.

An examination of signed language[3] shows that its structural representation of space systematically differs from that in spoken language in the direction of what appear to be the structural characteristics of scene parsing in visual perception. Such differences include the following: Signed language can mark finer spatial distinctions with its inventory of more structural elements, more categories, and more elements per category. It represents many more of these distinctions in any particular expression. It also represents these distinctions independently in the expression, not bundled together into prepackaged schemas. And its spatial representations are largely iconic with visible spatial characteristics.

When formal linguistic investigation of signed language began several decades ago, it was important to establish in the context of that time that signed language was in

2. The present version of this ongoing research supersedes the version in Talmy (2001).

3. I here approach signed language from the perspective of spoken language because it is not at this point an area of my expertise. For their help with my questions on signed language, my thanks to Paul Dudis, Karen Emmorey, Samuel Hawk, Nini Hoiting, Marlon Kuntze, Scott Liddell, Stephen McCullough, Dan Slobin, Ted Suppala, Alyssa Wolf, and others, – who are not responsible for my errors and oversights.

fact a full genuine language, and the way to do this, it seemed, was to show that it fit the prevailing model of language, the Chomskyan-Fodorian language module. Since then, however, evidence has been steadily accruing that signed language does diverge in various respects from spoken language. The modern response to such observations – far from once again calling into question whether signed language is a genuine language – should be to rethink what the general nature of language is. Our findings suggest that instead of some discrete whole-language module, spoken language and signed language are both based on some more limited core linguistic system that then connects with different further subsystems for the full functioning of the two different language modalities.

2. Fundamental space-structuring elements and categories in spoken language

An initial main finding emerges from analysis of the spatial schemas expressed by closed-class (grammatical) forms across spoken languages. There is a relatively closed and universally available inventory of fundamental conceptual elements that recombine in various patterns to constitute those spatial schemas. These elements fall within a relatively closed set of categories, with a relatively closed small number of elements per category.

2.1 The target of analysis

As background to this finding, spoken languages universally exhibit two different subsystems of meaning-bearing forms. One is the "open-class" or "lexical" subsystem, comprised of elements that are great in number and readily augmented – typically, the roots of nouns, verbs, and adjectives. The other is the "closed-class" or "grammatical" subsystem, consisting of forms that are relatively few in number and difficult to augment – including such bound forms as inflections and such free forms as prepositions and conjunctions. As argued in Talmy (2000a: Ch. 1), these subsystems basically perform two different functions: open-class forms largely contribute to conceptual content, while closed-class forms determine conceptual structure. Accordingly, our discussion focuses on the spatial schemas represented by closed-class forms so as to examine the concepts used by language for structuring purposes.

Across spoken languages, only a portion of the closed-class subsystem regularly represents spatial schemas. We can identify the types of closed-class forms in this portion and group them according to their kind of schema. The types of closed-class forms with schemas for paths or sites include the following: (1) forms in construction with a nominal, such as prepositions like English *across* (as in *across the field*) or noun affixes like the Finnish illative suffix: *-n* 'into', as well as prepositional complexes such as English *in front of* or Japanese constructions with a "locative noun" like *ue* 'top surface', (as in *teeburu no ue ni* 'table GEN top at' = "on the table"); (2) forms in construction

with a verb, such as verb satellites like English *out, back* and *apart* (as in *They ran out / back / apart*); (3) deictic determiners and adverbs such as English *this* and *here*; (4) indefinites, interrogatives, relatives, etc., such as English *everywhere / whither / wherever*); (5) qualifiers such as English *way* and *right* (as in *It's way / right up there*); and (6) adverbials like English *home* (as in *She isn't home)*.

Types of closed-class forms with schemas for the spatial structure of objects include the following: (1) forms modifying nominals such as markers for plexity or state of boundedness, like English -s for multiplexing (as in *birds*) or *-ery* for debounding (as in *shrubbery*); (2) numeral classifiers like Korean *chang* 'planar object'; and (3) forms in construction with the verb, such as some Atsugewi Cause prefixes, like *cu-* 'as the result of a linear object moving axially into the Figure'.

Finally, sets of closed-class forms that represent a particular component of a spatial event of motion/location include the following: (1) the Atsugewi verb-prefix set that represents different Figures; (2) the Atsugewi verb-suffix set that represents different Grounds (together with Paths); (3) the Atsugewi verb-prefix set that represents different Causes; and (4) the Nez Perce verb-prefix set that represents different Manners.

2.2 Determining the elements and categories

A particular methodology is used to determine fundamental spatial elements in language. One starts with any closed-class spatial morpheme in any language, considering the full schema that it expresses and a spatial scene that it can apply to. One then determines any factor one can change in the scene so that the morpheme no longer applies to it. Each such factor must therefore correspond to an essential element in the morpheme's schema. To illustrate, consider the English preposition *across* and the scene it refers to in *The board lay across the road*. Let us here grant the first two elements in the *across* schema (demonstrated elsewhere): (1) a Figure object (here, the board) is spatially related to a Ground object (here, the road); and (2) the Ground is ribbonal – a plane with two roughly parallel line edges that are as long as or longer than the distance between them. The remaining elements can then be readily demonstrated by the methodology. Thus, a third element is that the Figure is linear, generally bounded at both ends. If the board were instead replaced by a planar object, say, some wall siding, one could no longer use the original *across* preposition but would have to switch to the schematic domain of another preposition, that of *over*, as in *The wall siding lay over the road*. A fourth element is that the axes of the Figure and of the Ground are roughly perpendicular. If the board were instead aligned with the road, one could no longer use the original *across* preposition but would again have to switch to another preposition, *along*, as in *The board lay along the road*. Additionally, a fifth element of the *across* schema is that the Figure is parallel to the plane of the Ground. In the referent scene, if the board were tilted away from parallel, one would have to switch to some other locution such as *The board stuck into / out of the road*. A sixth element is that the Figure is adjacent to the plane of the Ground. If the board were lowered or raised away from adjacency, even while retaining the remaining spatial relations, one would need to switch

to locutions like *The board lay (buried) in the road. / The board was (suspended) above the road*. A seventh element is that the Figure's length is at least as great as the Ground's width. If the board were replaced by something shorter, for example, a baguette, while leaving the remaining spatial relations intact, one would have to switch from *across* to *on*, as in *The baguette lay on the road*. An eighth element is that the Figure touches both edges of the Ground. If the board in the example retained all its preceding spatial properties but were shifted axially, one would have to switch to some locution like *One end of the board lay over one edge of the road*. Finally, a ninth element is that the axis of the Figure is horizontal (the plane of the Ground is typically, but not necessarily, horizontal). Thus, if one changes the original scene to that of a spear hanging on a wall, one can use *across* if the spear is horizontal, but not if it is vertical, as in *The spear hung across the wall. / The spear hung up and down on the wall*. Thus, from this single example, the methodology shows that at least the following elements figure in closed-class spatial schemas: a Figure and a Ground, a point, a line, a plane, a boundary (a point as boundary to a line, a line as boundary to a plane), parallelness, perpendicularity, horizontality, adjacency (contact), and relative magnitude.

In the procedure of systematically testing candidate factors for their relevance, the elements just listed have proved to be essential to the selected schema and hence, to be in the inventory of fundamental spatial elements. But it is equally necessary to note candidates that do not prove out, so as to know which potential spatial elements do not serve a structuring function in language. In the case of *across*, for example, one can probe whether the Figure, like the board in the referent scene, must be planar – rather than simply linear – and coplanar with the plane of the Ground. It can be seen, though, that this is not an essential element to the *across* schema, since this factor can be altered in the scene by standing the board on edge without any need to alter the preposition, as in *The board lay flat / stood on edge across the road*. Thus, coplanarity is not shown by *across* to be a fundamental spatial element. However, it does prove to be so in other schemas, and so in the end must be included in the inventory. This is seen for one of the schemas represented by English *over*, as in *The tapestry hung over the wall*. Here, both the Figure and Ground must be planes and coplanar with each other. If the tapestry here were changed to something linear, say, a string of beads, it is no longer appropriate to use *over* but only something like *against*, as in *The string of beads hung *over / against the wall*. Now, another candidate element – that the Figure must be rigid, like the board in the scene – can be tested and again found to be inessential to the *across* schema, since a flexible linear object can be substituted for the board without any need to change the preposition, as seen in *The board / The cable lay across the road*. Here, however, checking this candidate factor across numerous spatial schemas in many languages might well never yield a case in which it does figure as an essential element and so would be kept off the inventory. This methodology affords a kind of existence proof: it can demonstrate that some element does occur in the universally available inventory of structural spatial elements since it can be seen to occur in at least one closed-class spatial schema in at least one language. The procedure is repeated

numerous times across many languages to build up a sizable inventory of elements essential to spatial schemas.

The next step is to discern whether the uncovered elements comprise particular structural categories and, if so, to determine what these categories are. It can be observed that for certain sets of elements, the elements in a set are mutually incompatible – only one of them can apply at a time at some point in a schema. Such sets are here taken to be basic spatial categories. Along with their members, such categories are also part of language's fundamental conceptual structuring system for space. A representative sample of these categories is presented next.

It will be seen that these categories generally have a relatively small membership. This finding depends in part on the following methodological principles. An element proposed for the inventory should be as coarse-grained as possible – that is, no more specific than is warranted by cross-schema analysis. Correlatively, in establishing a category, care must be taken that it includes only the most generic elements that have actually been determined – that is, that its membership have no finer granularity than is warranted by the element-abstraction procedure. For example, the principle of mutual incompatibility yields a spatial category of "relative orientation" between two lines or planes, a category with perhaps only two member elements (both already seen in the *across* schema): approximately parallel and approximately perpendicular. Some evidence additionally suggests an intermediary "oblique" element as a third member of the category. Thus, some English speakers may distinguish a more perpendicular sense from a more oblique sense, respectively, for the two verb satellites *out* and *off*, as in *A secondary pipe branches out / off from the main sewer line*. In any case, though, the category would have no more than these two or three members. Although finer degrees of relative orientation can be distinguished by other cognitive systems, say, in visual perception and in motor control, the conceptual structuring subsystem of language does not include anything finer than the two- or three-way distinction. The procedures of schema analysis and cross-schema comparison, together with the methodological principles of maximum granularity for elements and for category membership, can lead to a determination of the number of structurally distinguished elements ever used in language for a spatial category.

2.3 Sample categories and their member elements

The fundamental categories of spatial structure in the closed-class subsystem of spoken language fall into three classes according to the aspect of a spatial scene they pertain to: the segmentation of the scene into individual components, the properties of an individual component, and the relations of one such component to another. In a fourth class are categories of nongeometric elements frequently found in association with spatial schemas. A sampling of categories and their member elements from each of these four classes is presented next. The examples provided here are primarily drawn from English but can be readily multiplied across a diverse range of languages (see Talmy 2000a: Ch. 3).

2.3.1 *Categories pertaining to scene segmentation*

The class designated as scene segmentation may include only one category, that of "major components of a scene", and this category may contain only three member elements: the Figure, the Ground, and a secondary Reference Object. Figure and Ground were already seen for the *across* schema. Schema comparison shows the need to recognize a third scene component, the Secondary Reference Object – in fact, two forms of it: encompassive of or external to the Figure and Ground. The English preposition *near*, as in *The lamp is near the TV* specifies the location of the Figure (the lamp) only with respect to the Ground (the TV). But localizing the Figure with the preposition *above*, as in *The lamp is above the TV*, requires knowledge not only of where the Ground object is, but also of the encompassive earth-based spatial grid, in particular, of its vertical orientation. Thus, *above* requires recognizing three components within a spatial scene, a Figure, a Ground, and a Secondary Reference Object of the encompassive type. Comparably, the schema of *past* in *John is past the border* only relates John as Figure to the border as Ground. One could say this sentence on viewing the event through binoculars from either side of the border. But *John is beyond the border* can be said only by someone on the side of the border opposite John, hence the *beyond* schema establishes a perspective point at that location as a secondary Reference Object – in this case, of the external type.

2.3.2 *Categories pertaining to an individual scene component*

A number of categories pertain to the characteristics of an individual spatial scene component. This is usually one of the three major components resulting from scene segmentation – the Figure, Ground, or Secondary Reference Object – but it could be others, such as the path line formed by a moving Figure. One such category is that of "dimension" with four member elements: zero dimensions for a point, one for a line, two for a plane, and three for a volume. Some English prepositions require a Ground object schematizable for only one of the four dimensional possibilities. Thus, the schema of the preposition *near* as in *near the dot* requires only that the Ground object be schematizable as a point. *Along*, as in *along the trail*, requires that the Ground object be linear. *Over* as in *a tapestry over a wall* requires a planar Ground. And *throughout*, as in *cherries throughout the jello*, requires a volumetric Ground.

A second category is that of "number" with perhaps four members: one, two, several, and many. Some English prepositions require a Ground comprising objects in one or another of these numbers. Thus, *near* requires a Ground consisting of just one object, *between* of two objects, *among* of several objects, and *amidst* of numerous objects, as in *The basketball lay near the boulder / between the boulders / among the boulders / amidst the cornstalks.* The category of number appears to lack any further members – that is, closed-class spatial schemas in languages around the world seem never to incorporate any other number specifications – such as 'three' or 'even-numbered' or 'too many'.

A third category is that of "motive state", with two members: motion and stationariness. Several English prepositions mark this distinction for the Figure. Thus, in one

of its senses, *at* requires a stationary Figure, as in *I stayed / *went at the library*, while *into* requires a moving Figure, as in *I went / *stayed into the library*. Other prepositions mark this same distinction for the Ground object (in conjunction with a moving Figure). Thus, *up to* requires a stationary Ground (here, the deer), as in *The lion ran up to the deer*, while *after* requires a moving Ground as in *The lion ran after the deer*. Apparently no spatial schemas mark such additional distinctions as motion at a fast vs. slow rate, or being located at rest vs. remaining located fixedly.

A fourth category is that of "state of boundedness" with two members: bounded and unbounded. The English preposition *along* requires that the path of a moving Figure be unbounded, as shown by its compatibility with a temporal phrase in *for* but not *in*, as in *I walked along the pier for 10 minutes / *in 20 minute*s. But the spatial locution *the length of* requires a bounded path, as in *I walked the length of the pier in 20 minutes / *for 10 minutes*.[4] While some spatial schemas have the bounded element at one end of a line and the unbounded element at the other end, apparently no spatial schema marks any distinctions other than the two cited states of boundedness. For example, there is no cline of gradually increasing boundedness, nor a gradient transition, although just such a "clinal boundary" appears elsewhere in our cognition, as in geographic perception or conception, e.g., in the gradient demarcation between full forest and full meadowland (Mark & Smith 2002).

Continuing the sampling of this class, a fifth category is that of "directedness" with two members: basic and reversed. A schema can require one or the other of these elements for an encompassive Ground object, as seen for the English prepositions in *The axon grew along / against the chemical gradient*, or for the Atsugewi verb satellites for (moving) 'downstream' and 'upstream'. Or it can require one of the member elements for an encompassive Secondary Reference Object (here, the line), as in *Mary is ahead of / behind John in line*.

A sixth category is "type of geometry" with two members: rectilinear and radial. This category can apply to an encompassive Secondary Reference Object to yield reference frames of the two geometric types. Thus, in a subtle effect, the English verb satellite *away*, as in *The boat drifted further and further away / out from the island*, tends to suggest a rectilinear reference frame in which one might picture the boat moving rightward along a corridor or sea lane with the island on the left (as if along the x-axis of a Cartesian grid). But *out* tends to suggest a radial reference frame in which the boat is seen moving from a center point along a radius through a continuum of concentric circles. In the type-of-geometry category, the radial-geometry member can involve motion about a center, along a radius, or along a periphery. The first of these is the basis for a further category, that of "orientation of spin axis", with two members: vertical and horizontal. The English verb satellites *around* and *over* specify motion of

4. As it happens, most motion prepositions in English have a polysemous range that covers both the unbounded and the bounded sense. Thus, *through* as in *I walked through the tunnel for 10 minutes* refers to traversing an unbounded portion of the tunnel's length, whereas in *I walked through the tunnel in 20 minute*s, it refers to traversing the entire bounded length.

the Figure about a vertical or horizontal spin axis, respectively, as in *The pole spun around / toppled over* and in *I turned the pail around / over*.

An eighth category is "phase of matter", with three main members, solid, liquid, and empty space, and perhaps a fourth member, fire. Thus, among the dozen or so Atsugewi verb satellites that subdivide the semantic range of English *into* plus a Ground object, the suffix *-ik's* specifies motion horizontally into solid matter (as chopping an ax into a tree trunk), *-ic't* specifies motion into liquid, *-ipsnu* specifies motion into the empty space of a volumetric enclosure, and *-caw* specifies motion into a fire. The phase of matter category even figures in some English prepositions, albeit covertly. Thus, *in* can apply to a Ground object of any phase of matter, whereas *inside* can apply only to one with empty space, as seen in *The rock is in / inside the box; in / *inside the ground; in / *inside the puddle of water; in / *inside the fire.*

A final category in this sampled series is that of "state of consolidation" with apparently two members: compact (precisional) and diffuse (approximative). The English locative prepositions *at* and *around* distinguish these two concepts, respectively, for the area surrounding a Ground object, as in *The other hiker will be waiting for you at / around the landmark*. The two deictic adverbs in *The hiker will be waiting for you there / thereabouts* mark the same distinction (unless *there* is better considered neutral to the distinction). And in Malagasy (Imai 2003), two locative adverbs for 'here' mark this distinction, with *eto* for 'here within this bounded region', typically indicated with a pointing finger, and *ety* for 'here spread over this unbounded region', typically indicated with a sweep of the hand. In addition to this sampling, some ten or so further categories pertaining to properties of an individual schema component, each category with a small number of fixed contrasts, can be readily identified.

2.3.3 *Categories pertaining to the relation of one scene component to another*

Another class of categories pertains to the relations that one scene component can bear to another. One such category was described earlier, that of "relative orientation", with two or three members: parallel, perpendicular, and perhaps oblique. A second such category is that of "degree of remove", of one scene component from another. This category appears to have four or five members, two with contact between the components – coincidence and adjacency – and two or three without contact – proximal, perhaps medial, and distal remove. Some pairwise contrasts in English reveal one or another of these member elements for a Figure relating to a Ground. Thus, the locution *in the front of*, as in *The carousel is in the front of the fairground*, expresses coincidence, since the carousel as Figure is represented as being located in a *part* of the fairground as Ground. But *in front of* (without a *the*) as in *The carousel is in front of the fairground*, indicates proximality, since the carousel is now located outside the fairground and near it but not touching it. The distinction between proximal and distal can be teased out by noting that *in front of* can only represent a proximal but not a distal degree of remove, as seen in the fact that one can say *The carousel is 20 feet in front of the fairground*, but not, **The carousel is 20 miles in front of the fairground*, whereas *above* allows both proximal and distal degrees of remove, as seen in *The hawk is 1 foot / 1 mile above the*

table. The distinction between adjacency and proximality is shown by the prepositions *on* and *over*, as in *The fly is on / over the table*. Need for a fifth category member of 'medial degree of remove' might come from languages with a 'here / there / yonder' kind of distinction in their deictic adverbs or demonstratives.

A third category in this series is that of "degree of dispersion" with two members: sparse and dense. To begin with, English can represent a set of multiple Figures, say, 0-dimensional peas, as adjacent to or coincident with a 1-, 2-, or 3-dimensional Ground, say, with a knife, a tabletop, or aspic, in a way neutral to the presence or absence of dispersion, as in *There are peas on the knife; on the table; in the aspic*. But in representing dispersion as present, English can (or must) indicate its degree. Thus, a sparse degree of dispersion is indicated by the addition of the locution *here and there*, optionally together with certain preposition shifts, as in *There are peas here and there on / along the knife; on / over the table; in the aspic*. And for a dense degree of dispersion, English has the three specialized forms *all along, all over* and *throughout*, as seen in *There are peas all along the knife; all over the table; throughout the aspic*.

A fourth category is that of "path contour" with perhaps some four members: straight, arced, circular, and meandering. Some English prepositions require one or another of these contour elements for the path of a Figure moving relative to a Ground. Thus, *across* indicates a straight path, as seen in *I drove across the plateau / *hill*, while *over* – in its usage referring to a single path line – indicates an arced contour, as in *I drove over the hill / *plateau*. In one of its senses, *around* indicates a roughly circular path, as in *I walked around the maypole*, and *about* indicates a meandering contour, as in *I walked about the town*. Some ten or so additional categories for relating one scene component to another, again each with its own small number of member contrasts, can be readily identified.

2.3.4 *Nongeometric categories*

All the preceding elements and their categories have broadly involved geometric characteristics of spatial scenes or the objects within them – that is, they have been genuinely spatial. But a number of nongeometric elements are recurrently found in association with otherwise geometric schemas. One category of such elements is that of "force dynamics" (see Talmy 2000a: Ch. 7) with two members: present and absent. Thus, geometrically, the English prepositions *on* and *against* both represent a Figure in adjacent contact with a Ground, but in addition, *on* indicates that the Figure is supported against the pull of gravity through that contact while *against* indicates that it is not, as seen in *The poster is on / *against the wall* and *The floating helium balloon is against / *on the wall*. Cutting the conceptualization of force somewhat differently (Melissa Bowerman personal communication), the Dutch preposition *op* indicates a Figure supported comfortably in a natural rest state through its contact with a Ground, whereas *aan* indicates that the Figure is being actively maintained against gravity through contact with the Ground, so that flesh is said to be "op" the bones of a live person but "aan" the bones of a dead person.

A second nongeometric category is that of "accompanying cognitive/affective state", though its extent of membership is not clear. One recurrent member, however, is the attitude toward something that it is unknown, mysterious, or risky. Perhaps in combination with elements of inaccessibility or nonvisibility, this category member is associated with the Figure's location in the otherwise spatial indications of the English preposition *beyond*, whereas it is absent from the parallel locution *on the other side of*, as in *He is beyond / on the other side of the border* (both these locutions – unlike *past* seen above – are otherwise equivalent in establishing a viewpoint location as an external Secondary Reference Object).

A third nongeometric category, – in the class that relates one scene component to another – is that of "relative priority", with two members: coequal and main/ancillary. The English verb satellites *together* and *along* both indicate joint participation, as seen in *I jog together / along with him*. But *together* indicates that the Figure and the Ground are coequal partners in the activity, whereas *along* indicates that the Figure entity is ancillary to the Ground entity, who would be assumed to engage in the activity even if alone (see Talmy 2000b: Ch. 3).

2.4 Properties of the inventory

By our methodology, the universally available inventory of structural spatial elements includes all elements that appear in at least one closed-class spatial schema in at least one language. These elements may indeed be equivalent in their sheer availability for use in schemas. But beyond that, they appear to differ in their frequency of occurrence across schemas and languages, ranging from very common to very rare. Accordingly, the inventory of elements – and perhaps also that of categories – may have the property of being hierarchical, with entries running from the most to the least frequent. Such a hierarchy suggests asking whether the elements in the inventory, the categories in the inventory, and the elements in each category form fully closed memberships. That is, does the hierarchy end at a sharp lower boundary or trail off indefinitely? With many schemas and languages already examined, our sampling method may have yielded all the commoner elements and categories, but as the process slows down in the discovery of the rarer forms, will it asymptotically approach some complete constituency and distinctional limit in the inventory, or will it be able to go on uncovering sporadic novel forms as they develop in the course of language change?

The latter seems likelier. Exotic elements with perhaps unique occurrence in one or a few schemas in just one language can be noted, including in English. Thus, in referring to location at the interior of a wholly or partly enclosed vehicle, the prepositions *in* and *on* distinguish whether the vehicle lacks or possesses a walkway. Thus, one is in a car but on a bus, in a helicopter but on a plane, in a grain car but on a train, and in a rowboat but on a ship. Further, Fillmore has observed that this *on* also requires that the vehicle be currently in use as transport: *The children were playing in / *on the abandoned bus in the junkyard*.

Thus, schema analysis in English reveals the element "(partly) enclosed vehicle with a walkway currently in use as transport". This is surely one of the rarer elements in schemas around the world, and its existence, along with that of various others that can be found, suggests that indefinitely many more of them can sporadically arise.

In addition to being only relatively closed at its hierarchically lower end, the inventory may include some categories whose membership seems not to settle down to a small fixed set. One such category may be that of "intrinsic parts". Frequently encountered are the five member elements 'front', 'side', 'back', 'top', and 'bottom', as found in the English prepositions in *The cat lay before / beside / behind / atop / beneath the TV*. But languages like Mixtec seem to distinguish a rather different set of intrinsic parts in their spatial schemas (Brugmann & Macaulay 1986), while Makah distinguishes many more and finer parts, such as with its verb suffixes for 'at the ankle' and 'at the groin' (Matthew Davidson personal communication).

Apart from any fuzzy lower boundary and noncoalescing categories, there does appear to exist a graduated inventory of basic spatial elements and categories that is universally available and, in particular, is relatively closed. Bowerman (e.g., 1989) has raised the main challenge to this notion. She notes, for example, that at the same time that children acquiring English learn its *in/on* distinction, children acquiring Korean learn its distinction between *kkita* 'put [Figure] in a snug fit with [Ground]' and *nehta* 'put [Figure] in a loose fit with [Ground]'. She argues that since the elements 'snug fit' and 'loose fit' are presumably rare among spatial schemas across languages, they do not come from any preset inventory, one that might plausibly be innate, but rather are learned from the open-ended semantics of the adult language. My reply is that the spatial schemas of genuinely closed-class forms in Korean may well still be built from the proposed inventory elements, and that the forms she cites are actually open-class verbs. Open-class semantics – whether for space or other domains – seems to involve a different cognitive subsystem, drawing from finer discriminations within a broader perceptual / conceptual sphere. The Korean verbs are perhaps learned at the same age as English space-related open-class verbs like *squeeze*. Thus, English-acquiring children probably understand that *squeeze* involves centripetal pressure from encircling or bi-/multi-laterally placed Antagonists (typically the arm(s) or hand(s)) against an Agonist that resists the pressure but yields down to some smaller compass where it blocks further pressure, and hence that one can squeeze a teddy bear, a tube of toothpaste, or a rubber ball, but not a piece of string or sheet of paper, juice or sugar or the air, a tabletop or the corner of a building. Thus, Bowerman's challenge may be directed at the wrong target, leaving intact the proposed roughly preset inventory of basic spatial building blocks.

2.5 Basic elements assembled into whole schemas

The procedure so far has been analytic, starting with the whole spatial schemas expressed by closed-class forms and abstracting from them an inventory of fundamental spatial elements. But the investigation must also include a synthetic procedure: ex-

amining the ways in which individual spatial elements are assembled to constitute whole schemas. Something of such an assembly was implicit in the initial discussion of the *across* schema. But an explicit example here can better illustrate this part of the investigation.

Consider the schema represented by the English preposition *past* as in *The ball sailed past my head at exactly 3 PM*. This schema is built out of the following fundamental spatial elements (from the indicated categories) in the indicated arrangements and relationships: There are two main scene components (members of the "major scene components" category), a Figure and a Ground (here, the ball and my head, respectively). The Figure is schematizable as a 0-dimensional point (a member element of the "dimension" category). This Figure point is moving (a member element of the "motive state" category). Hence it forms a one-dimensional line (a member of the "dimension" category). This line constitutes the Figure's "path". The Ground is also schematizable as a 0-dimensional point (a member of the "dimension" category). There is a point P at a proximal remove (a member of the "degree of remove" category) from the Ground point, forming a 1-dimensional line with it (a member of the "dimension" category). This line is parallel (a member of the "relative orientation" category) to the horizontal plane (a member of the "intrinsic parts" category) of the earth-based grid (a member of the "major scene components" category). The Figure's path is perpendicular (a member of the "relative orientation" category) to this line. The Figure's path is also parallel to the horizontal plane of the earth-based grid. If the Ground object has a front, side, and back (members of the "intrinsic parts" category), then point P is proximal to the side part. A non-boundary point (a member of the "state of boundedness" category) of the Figure's path becomes coincident (a member of the "degree of remove" category) with point P at a certain point of time.

Note that here the Figure's path must be specified as passing through a point proximal to the Ground because if it instead passed through the Ground point, one would switch from the preposition *past* to *into*, as in *The ball sailed into my head*, and if it instead passed through some distal point, one might rather say something like *The ball sailed along some ways away from my head*. And the Figure's path must be specified both as horizontal and as located at the side portion of the Ground because, for example here, if the ball were either falling vertically or traveling horizontally at my front, one would no longer say that it sailed "past" my head.

The least understood aspect of the present investigation is what well-formedness conditions, if any, may govern the legality of such combinations. As yet, no obvious principles based, say, on geometric simplicity, symmetry, consistency, or the like are seen to control the patterns in which basic elements assemble into whole schemas. On the one hand, some seemingly byzantine combinations – like the schemas seen above for *across* and *past* – occur with some regularity across languages. On the other hand, much simpler combinations seem never to occur as closed-class schemas. For example, one could imagine assembling elements into the following schema: down into a surround that is radially proximal to a center point. One could even invent a preposition *apit* to represent this schema. This could then be used, say, in *I poured water apit my*

house to refer to my pouring water down into a nearby hole dug in the field around my house. But such schemas are not found. Similarly, a number of schematic distinctions in, for example, the domain of rotation are regularly marked by signed languages, as seen below, and could readily be represented with the inventory elements available to spoken languages, yet they largely do not occur. It could be argued that the spoken language schemas are simply the spatial structures most often encountered in everyday activity. But that would not explain why the additional sign-language schemas – presumably also reflective of everyday experience – do not show up in spoken languages. Besides, the different sets of spatial schemas found in different spoken languages are diverse enough from each other that arguing on the basis of the determinative force of everyday experience is problematic. Something else is at work but it is not yet clear what that is.

2.6 Properties and processes applying to whole spatial schemas

It was just seen that selected elements of the inventory are combined in specific arrangements to make up the whole schemas represented by closed-class spatial forms. Each such whole schema is thus a "prepackaged" bundling together of certain elements in a particular arrangement. Each language has in its lexicon a relatively closed set of such prepackaged schemas – one larger than that of its spatial closed-class forms, because of polysemy. A speaker of the language must select among these schemas in depicting a spatial scene. We now observe that such schemas, though composite, have a certain unitary status in their own right, and that certain quite general properties and processes can apply to them. In particular, certain properties and processes allow a schema represented by a closed-class form to generalize to a whole family of schemas. In the case of a generalizing *property*, all the schemas of a family are of equal priority. On the other hand, a generalizing *process* acts on a schema that is somehow basic, and either extends or deforms it to yield nonbasic schemas (see Talmy 2000a: Ch. 1 and Ch. 3, 2000b: Ch. 5). Such properties and processes are perhaps part of the overall spoken-language system so that any language's relatively closed set of spatial closed-class forms and the schemas that they basically represent can be used to match more spatial structures in a wider range of scenes.

Looking first at generalizing properties of spatial schemas, one such property is that they exhibit a topological or topology-like neutrality to certain factors of Euclidean geometry. Thus, they are magnitude neutral, as seen in such facts as that the *across* schema can apply to a situation of any size, as in *The ant crawled across my palm / The bus drove across the country*. Further, they are largely shape-neutral, as seen by such facts as that, while the *through* schema requires that the Figure form a path with linear extent, it lets that line take any contour, as in *I zigzagged / circled through the woods*. And they are bulk-neutral, as seen by such facts as that the *along* schema requires a linear Ground without constraint on the Ground's radial extension, as in *The caterpillar crawled up along the filament / tree trunk*. Thus, while holding to their specific

constraints, schemas can vary freely in other respects and so cover a range of spatial configurations.

Among the processes that extend schemas, one is that of "extendability from the prototype", which can serve as an alternative interpretation for some forms of neutrality. Thus, in the case of shape, as for the *through* schema above, this schema could alternatively be conceived as prototypically involving a strait path line for the Figure, one that can then be bent to any contour. And, in the case of bulk, as for the *along* schema above, this schema could be thought prototypically to involve a purely 1-dimensional line that then can be radially inflated.

Another such process is "extendability in ungoverned dimensions". By this process, a scene component of dimensionality N in the basic form of a schema can generally be raised in dimensionality to form a line, plane, or volume aligned in a way not conflicting with the schema's other requirements. To illustrate, it was seen earlier under the "geometric type" category that the English verb satellite *out* has a schema involving a point Figure moving along a radius away from a center point through a continuum of concentric circles, as in *The boat sailed further and further out from the island*. This schema with the Figure idealizable as a point is the basic form. But the same satellite can be used when this Figure point is extended to form a 1-dimensional line along a radius, as in *The caravan of boats sailed further and further out from the island*. And the *out* can again be used if the Figure point were instead extended as a 1-dimensional line forming a concentric circle, as in *A circular ripple spread out from where the pebble fell into the water*. In turn, such a concentric circle could be extended to fill in the interior plane, as in *The oil spread out over the water from where it spilled*. Alternatively, the concentric circle could have been extended in the vertical dimension to form a cylinder, as in *A ring of fire spread out as an advancing wall of flames*. Or again, the circle could have been extended to form a spherical shell, as in *The balloon I blew into slowly puffed out*. And such a shell can be extended to fill in the interior volume, as in *The leavened dough slowly puffed out*.

One more schema-extending process is "extendability across motive states". A schema basic for one motive state and Figure geometry can in general be systematically extended to another motive state and Figure geometry. For example, a closed-class form whose most basic schema pertains to a point Figure moving to form a path can generally serve as well to represent the related schema with a stationary linear Figure in the same location as the path. Thus, probably the most basic *across* schema is actually for a moving point Figure, as in *The gopher ran across the road*. By the present process, this schema can extend to the static linear Figure schema first seen in *The board lay across the road*. All the spatial properties uncovered for that static schema hold as well for the present basic dynamic schema, which in fact is the schema in which these properties originally arise.

Among the processes that deform a schema, one is that of "stretching", which allows a slight relaxing of one of the normal constraints. Thus, in the *across* schema, where the Ground plane is either a ribbon with a long and short axis or a square with equal axes, a static linear Figure or the path of a moving point Figure must be aligned

with the short Ground axis or with one of its equal axes. Accordingly, one can say *I swam across the canal* and *I swam across the square pool* when moving from one side to the other, but one cannot say **I swam across the canal* when moving from one end to the other. But, by moderately stretching one axis length relative to the other, one might just about be able to say *I swam across the pool* when moving from one end to the other of an oblong pool.

Another schema deforming process is that of "feature cancellation", in which a particular complex of elements in the basic schema is omitted. Thus, the preposition *across* can be used in *The shopping cart rolled across the boulevard and was hit by an oncoming car*, even though one feature of the schema – 'terminal point coincides with the distal edge of the Ground ribbon' – is canceled from the Figure's path. Further, both this feature and the feature 'beginning point coincides with the proximal edge of the Ground ribbon' are canceled in *The tumbleweed rolled across the prairie for an hour*. Thus, the spoken language system includes a number of generalizing properties and processes that allow the otherwise relatively closed set of abstracted or basic schemas represented in the lexicon of any single language to be applicable to a much wider range of spatial configurations.

3. Spatial structuring in signed language

All the preceding findings on the linguistic structuring of space have been based on the patterns found in spoken languages. The inquiry into the fundamental concept structuring system of language leads naturally to investigating its character in another major body of linguistic realization, signed language. The value in extending the inquiry in this way would be to discover whether the spatial structuring system is the same or is different in certain respects across the two language modalities, with either discovery having major consequences for cognitive theory.

In this research extension, a problematic issue is exactly what to compare between spoken and signed language. The two language systems appear to subdivide into somewhat different sets of subsystems. Thus, heuristically, the generalized spoken language system can be thought to consist of an open-class or lexical subsystem (generally representing conceptual content); a closed-class or grammatical subsystem (generally representing conceptual structure); a gradient subsystem of "vocal dynamics" (including loudness, pitch, timbre, rate, distinctness, unit separation); and an accompanying somatic subsystem (including facial expression, gesture, and "body language"). On the other hand, by one provisional proposal, the generalized sign language system might instead divide up into the following: a subsystem of lexical forms (including noun, verb, and adjective signs); an "inflectional" subsystem (including modulations of lexical signs for person, aspect); a subsystem of size-and-shape specifiers (or SASS's); a subsystem of so-called "classifier expressions"; a gestural subsystem (along a gradient of incorporation into the preceding subsystems); a subsystem of face, head, and torso representations; a gradient subsystem of "bodily dynamics" (including amplitude,

rate, distinctness, unit separation); and an associated or overlaid somatic subsystem (including further facial expression and "body language"). In particular here, the subsystem of classifier expressions – which is apparently present in all signed languages – is a formally distinct subsystem dedicated solely to the schematic structural representation of objects moving or located with respect to each other in space (see Liddell 2003; Emmorey 2002). Each classifier expression, perhaps generally corresponding to a clause in spoken language, represents a soconceived event of motion or location.[5]

The research program of comparing the representation of spatial structure across the two language modalities ultimately requires considering the two whole systems and all their subsystems. But the initial comparison – the one adopted here – should be between those portions of each system most directly involved with the representation of spatial structure. In spoken language, this is that part of the closed-class subsystem that represents spatial structure and, in signed language, it is the subsystem of classifier constructions. Spelled out, the shared properties that make this initial comparison apt include the following.

First, of course, both subsystems represent objects relating to each other in space. Second, in terms of the functional distinction between "structure" and "content" described earlier, each of the subsystems is squarely on the structural side. In fact, analogous structure-content contrasts occur. Thus, the English closed-class form *into* represents the concept of a path that begins outside and ends inside an enclosure in terms of schematic structure, in contrast with the open-class verb *enter* that represents the same concept in terms of substantive content (see Talmy 2000a: Ch. 1 for this structure-content distinction). Comparably, any of the formations within a classifier expression for such an outside-to-inside path represents it in terms of its schematic structure, in contrast with the unrelated lexical verb sign that can be glossed as 'enter'. Third, in each subsystem, a schematic structural form within an expression in general can be semantically elaborated by a content form that joins or replaces it within the same expression. Thus, in the English sentence *I drove it (– the motorcycle–) in (to the shed)* the parenthesized forms optionally elaborate on the otherwise schematically represented Figure and Ground. Comparably, in the ASL sentence "(SHED) (MOTORCYCLE) vehicle-move-into-enclosure", the optionally signed forms within parentheses elaborate on the otherwise schematic Figure and Ground representations within the hyphenated classifier expression. To illustrate the classifier system, a spatial event that English could express as *The car drove past the tree* could be expressed in ASL as follows: The signer's dominant hand, used to represent the Figure object, here has a "3 handshape" (index and middle fingers extended forward, thumb up) to represent a land vehicle. The nondominant hand, used to represent the Ground object, here involves an upright "5 handshape" (forearm held upright with the five fingers extended upward and spread apart) to represent a tree. The dominant hand is moved horizon-

5. The "classifier" label for this subsystem – originally chosen because its constructions largely include a classifier-like handshape – can be misleading, since it names the whole expression complex for just one of its components. An apter term might be the "Motion-event subsystem".

tally across the signer's torso and past the nondominant forearm. Further though, this basic form could be modified or augmented to represent additional particulars of the referent spatial event. Thus, the dominant hand can show additional characteristics of the path. For example, the hand could move along a curved path to indicate that the road being followed was curved, it could slant upward to represent an uphill course, or both could be shown together. The dominant hand can additionally show the manner of the motion. For example, as it moves along, it could oscillate up and down to indicate a bumpy ride, or move quickly to indicate a swift pace, or both could be shown together, as well as with the preceding two path properties. And the dominant hand can show additional relationships of the Figure to the Ground. For example, it could pass nearer or farther from the nondominant hand to indicate the car's distance from the tree when passing it, it could make the approach toward the nondominant hand longer (or shorter) than the trailing portion of the path to represent the comparable relationship between the car's path and the tree, or it could show both of these together or, indeed, with all the preceding additional characteristics.

The essential finding of how signed language differs from spoken language is that it more closely parallels what appear to be the structural characteristics of scene parsing in visual perception. This difference can be observed in two venues, the universally available spatial inventory and the spatial expression. These two venues are discussed next in turn.

3.1 In the inventory

The inventory of forms for representing spatial structure available to the classifier subsystem of signed language has a greater total number of fundamental elements, a greater number of categories, and generally a greater number of elements per category than the spoken language closed-class inventory. While many of the categories and their members seem to correspond across the two inventories, the signed language inventory has an additional number of categories and member elements not present in the spoken language inventory.

Comparing the membership of the corresponding categories in terms of discrete elements, the number of basic elements per category in signed language actually exhibits a range: from being the same as that for spoken language to being very much greater. Further, though, while the membership of some categories in signed language may well consist of discrete elements, that of others appears to be gradient. Here, any procedure of tallying some fixed number of discrete elements in a category must give way to determining the approximate fineness of distinctions that can be practicably made for that category. So while some corresponding categories across the two language modalities may otherwise be quite comparable, their memberships can be of different types, discrete vs. analog.

Altogether, then, given its greater number of categories, generally larger membership per category, and a frequently gradient type of membership, the inventory of forms for building a schematic spatial representation available to the classifier subsys-

tem of signed language is more extensive and finer than for the closed-class subsystem of spoken language. This greater extensiveness and finer granularity of spatial distinctions seems more comparable to that of spatial parsing in visual perception.

The following are some spatial categories in common across the two language modalities, but with increasing disparity in size of membership. First, some categories appear to be quite comparable across the two modalities.

Thus, both the closed-class subsystem of spoken language and the classifier subsystem of signed language structurally segment a scene into the same three components, a Figure, a Ground, and a secondary Reference Object. Both subsystems represent the category of dimensionality with the same four members – a point, a line, a plane, and a volume. And both mark the same two degrees of boundedness: bounded and unbounded.

For certain categories, signed language has just a slightly greater membership than does spoken language. Thus, for motive state, signed language structurally represents not only moving and being located, but also remaining fixedly located – a concept that spoken languages typically represent in verbs but not in their spatial preposition-like forms.

For some other spatial categories, signed language has a moderately greater membership than spoken language. In some of these categories, the membership is probably gradient, but without the capacity to represent many fine distinctions clearly. Thus, signed language can apparently mark moderately more degrees of remove than spoken language's four or five members in this category.

It can also apparently distinguish moderately more path lengths than the two – short and long – that spoken language marks structurally (as in English *The bug flew right / way up there*). And while spoken language can mark at most three distinctions of relative orientation – parallel, perpendicular, and oblique – signed language can distinguish a moderately greater number, for example, in the elevation of a path's angle above the horizontal, or in the angle of the Figure's axes to that of the Ground (e.g., in the placement of a rod against a wall).

Finally, there are some categories for which signed language has an indefinitely greater membership than spoken language. Thus, while spoken language structurally distinguishes some four path contours as seen in Section 2.3.3, signed language can represent perhaps indefinitely many more, including zigzags, spirals, and ricochets. And for the category "locus within referent space", spoken language can structurally distinguish perhaps at most three loci relative to the speaker's location – 'here', 'there', and 'yonder' – whereas sign language can distinguish indefinitely many more within sign space.

Apart from membership differences across common categories, signed language represents some categories not found in spoken language. One such category is the relative lengths of a Figure's path before and after encounter with the Ground. Or again, signed language can represent not only the category of "degree of dispersion" (which spoken language was seen to represent in Section 2.3.3), but also the category "pattern of distribution". Thus, in representing multiple Figure objects dispersed over

a planar surface, it could in addition structurally indicate that these Figure objects are linear (as with dry spaghetti over a table) and are arrayed in parallel alignment, crisscrossing, or in a jumble. This difference in the number of structurally marked spatial category and element distinctions between spoken and signed language can be highlighted with a closer analysis of a single spatial domain, that of rotational motion. As seen earlier, the closed-class subsystem in spoken language basically represents only one category within this domain, that of "orientation of spin axis", and within this category distinguishes only two member elements, vertical and horizontal.

These two member elements are expressed, for example, by the English verb satellites *around* and *over* as in *The pole spun around / toppled over*. ASL, by contrast, distinguishes more degrees of spin axis orientation and, in addition, marks several further categories within the domain of rotation. Thus, it represents the category of "amount of rotation" and within this category can readily distinguish, say, whether the arc of a Figure's path is less than, exactly, more than, or many times one full circuit. These are differences that English might offer for inference only from the time signature, as in *I ran around the house for 20 seconds / in 1 minute / for 2 minutes / for hour*s, while using the same single spatial form *around* for all these cases. Further, while English would continue using just *around* and *over*, ASL further represents the category of "relation of the spin axis to an object's geometry" and marks many distinctions within this category. Thus, it can structurally mark the spin axis as being located at the center of the turning object – as well as whether this object is planar like a CD disk, linear like a propeller, or an aligned cylinder like a pencil spinning on its point. It distinguishes this from the spin axis located at the boundary of the object – as well as whether the object is linear like the "hammer" swung around in a hammer toss, a transverse plane like a swinging gate, or a parallel plane like a swung cape. And it further distinguishes these from the spin axis located at a point external to the object – as well as whether the object is point-like like the earth around the sun, or linear like a spinning hoop.

Finally, ASL can structurally represent the category of "uniformity of rotation" with its two member elements, uniform and nonuniform, where English could mark this distinction only with an open-class form, like the verbs in *The hanging rope spun / twisted around*, while once again continuing with the same single structural closed-class form *around*. Thus, while spoken language structurally marks only a minimal distinction of spin axis orientation throughout all these geometrically distinct forms of rotation, signed language marks more categories as well as finer distinctions within them, and a number of these appear to be distinguished as well by visual parsing of rotational movement.

To expand on the issue of gradience, numerous spatial categories in the classifier subsystem of signed language – for example, many of the 30 spatial categories listed in Section 3.2.3.1 are gradient in character. Spoken language has a bit of this, as where the vowel length of a *waaay* in English can be varied continuously. But the preponderant norm is the use of discrete spatial elements, typically incorporated into distinct morphemes. For example, insofar as they represent degree of remove, the separate forms in the series *on / next to / near / away from* represent increasing distance in what can

be considered quantal jumps. That is, the closed-class subsystem of spoken language is a type of cognitive system whose basic organizing principle is that of the recombination of discrete elements (i.e., the basic conceptual elements whose combinations, in turn, comprise the meanings of discrete morphemic forms). By contrast, the classifier subsystem of signed language is the kind of cognitive system whose basic organizing principle largely involves gradience, much as would seem to be the case as well for the visual and motor systems. In fact, within a classifier expression, the gradience of motor control and of visual perception are placed in sync with each other (for the signer and the addressee, respectively), and conjointly put in the service of the linguistic system.

While this section provides evidence that the classifier subsystem in signed language diverges from the schematizing of spoken language in the direction of visual parsing, one must further observe that the classifier subsystem is also not "simply" a gestural system wholly iconic with visual perception. Rather, it incorporates much of the discrete, categorial, symbolic, and metaphoric character that is otherwise familiar from the organization of spoken language. Thus, as already seen above, spatial representation in the classifier subsystem does fall into categories, and some of these categories contain only a few discrete members – in fact, several of these are much the same as in spoken language.

Second, the handshapes functioning as classifiers for the Figure, manipulator, or instrument within classifier expressions are themselves discrete (nongradient) members of a relatively closed set. Third, many of the hand movements in classifier expressions represent particular concepts or metaconcepts and do not mimic actual visible movements of the represented objects. Here is a small sample of this property. After one lowers one's two extended fingers to represent a knife dipping into peanut butter – or all one's extended fingers in a curve to represent a scoop dipping into coffee beans – one curls back the fingertips while moving back up to represent the instrument's "holding" the Figure, even though the instrument in question physically does nothing of the sort.

Or again, the free fall of a Figure is represented not only by a downward motion of the dominant hand in its classifier handshape, but also by an accompanying rotation of the hand – whether or not the Figure in fact rotated in just that way during its fall. As another example, a Figure is shown as simply located at a spot in space by the dominant hand in its classifier handshape being placed relaxedly at a spot in signing space, and as remaining fixedly at its spot by the hand's being placed tensely and with a slight final jiggle, even though these two conceptualizations of the temporal character of a Figure's location are visually indistinguishable. Or, further, a (soconceivedly) random spatial distribution of a mass or multiplex Figure along a line, over a plane, or through a volume is represented by the Figure hand being placed with a loose nonconcerted motion, typically three times, at uneven spacings within the relevant n-dimensional area, even though that particular spacing of three exemplars may not correspond to the actual visible distribution. And finally, a classifier hand's type of movement can indicate whether this movement represents the actual path of the Figure, or is to be discounted. Thus, the two flat hands held with palms toward the signer, fingertips joined,

can be moved steadily away to represent a wall's being slid progressively outward (as to expand a room), or instead can be moved in a quick up-and-down arc to a point further away to represent a wall relocated to a further spot, whatever its path from the starting location. That is, the latter quick arc movement represents a meta-concept: that the path followed by the hands does not represent the Figure's actual path and is to be disregarded from calculations of iconicity. All in all, then, the classifier subsystem presents itself as a genuine linguistic system, but one having more extensive homology with the visual structuring system than spoken language has.

3.2 In the expression

The second venue, that of any single spatial expression, exhibits further respects in which signed language differs from spoken language in the apparent direction of visual scene parsing. Several of these are outlined next.

3.2.1 *Iconic representation in the expression*

Spatial representation in signed classifier expressions is iconic with scene parsing in visual perception in at least the following four respects.

3.2.1.1 *Iconic clustering of elements and categories.* The structural elements of a scene of motion are clustered together in the classifier subsystem's representation of them in signed language more as they seem to be clustered in perception. When one views a motion event, such as a car driving bumpily along a curve past a tree, it is perceptually the same single object, the car, that exhibits all of the following characteristics: it has certain object properties as a Figure, it moves, it has a manner of motion, it describes a path of a particular contour, and it relates to other surrounding objects (the Ground) in its path of motion. The Ground object or objects are perceived as separate. Correspondingly, the classifier subsystem maintains exactly this pattern of clustering. It is the same single hand, the dominant hand, that exhibits the Figure characteristics, motion, manner, path contour, and relations to a Ground object. The other hand, the nondominant, separately represents the Ground object.

All spoken languages diverge to a greater or lesser extent from this visual fidelity. Thus, consider one English counterpart of the event, the sentence *The car bumped along past the tree*. Here, the subject nominal, *the car*, separately represents the Figure object by itself. The verb complex clusters together the representations of the verb and the satellite: The verb *bumped* represents both the fact of motion and the manner of motion together, while its sister constituent, the satellite *along* represents the presence of a path of translational motion. The prepositional phrase clusters together the preposition *past*, representing the path conformation, and its sister constituent, the nominal *the tree*, representing the Ground object. It in fact remains a mystery at this point in the investigation why all spoken languages using a preposition-like constituent to indicate path always conjoin it with the Ground nominal and basically never with the Figure

nominal,[6] even though the Figure is what executes the path, and is so represented in the classifier construction of signed language.

3.2.1.2 *Iconic representation of object vs. action.* The classifier subsystem of signed language appears to be iconic with visual parsing not only in its clustering of spatial elements and categories, as just seen, but largely also in its representation of them. For example, it marks one basic category opposition, that between an entity and its activity, by using an object like the hand to represent an object, and motion of the hand to represent motion of the object. More specifically, the hand or other body part represents a structural entity (such as the Figure) – with the body part's configuration representing the identity or other properties of the entity – while movements or positionings of the body part represent properties of the entity's motion, location, or orientation. For example, the hand could be shaped flat to represent a planar object (e.g., a sheet of paper), or rounded to represent a cup-shaped object. And, as seen, any such handshape as Figure could be moved along a variety of trajectories that represent particular path contours.

But an alternative to this arrangement could be imagined. The handshape could represent the path of a Figure – e.g., a fist to represent a stationary location, the outstretched fingers held flat together to represent a straight line path, the fingers in a curved plane for a curved path, and the fingers alternately forward and back for a zigzag path. Meanwhile, the hand movement could represent the Figure's shape – e.g., the hand moving in a circle to represent a round Figure and in a straight line for a linear Figure. However, no such mapping of referents to their representations is found.[7] Rather, the mapping in signed language is visually iconic: it assigns the representation of a material object in a scene to a material object in a classifier complex, for example, the hand, and the representation of the movements of that object in the scene to the movements of the hand.

No such iconic correspondence is found in spoken language. Thus, while material objects are prototypically expressed by nouns in English, they are instead prototypically represented by verb roots in Atsugewi (see Talmy 2000b: Ch. 1). And while path configurations are prototypically represented in Spanish by verbs, this is done by prepositions and satellites in English.

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6. As the only apparent exception, a "demoted Figure" (see Talmy 2000b: Ch. 1) can acquire either of two "demotion particles" – e.g., English *with* and *of* – that mark whether the Figure's path had a "TO" or a "FROM" vector, as seen in *The fuel tank slowly filled with gas / drained of its gas.*

7. The size and shape specifiers (SASS's) in signed languages do permit movement of the hands to trace out an object's contours, but the hands cannot at the same time adopt a shape representing the object's path.

3.2.1.3 *Iconic representation of further particular categories.* Finer forms of iconicity are also found within each branch of the broad entity-activity opposition. In fact, most of the spatial categories listed in Section 3.2.3.1 that a classifier expression can represent are largely iconic with visual parsing. Thus, an entity's form is often represented by the form of the hand(s), its size by the compass of the hand(s), and its number by the number of digits or hands extended. And, among many other categories in the list, an entity's motive state, path contour, path length, manner of motion, and rate of motion are separately represented by corresponding behaviors of the hand(s). Spoken language, again, has only a bit of comparable iconicity. As examples, path length can be iconically represented in English by the vowel length of *way*, as in *The bird flew waay / waaaay / waaaaaay up there*. Path length can also be semi-iconically represented by the number of iterations, as in *The bird flew up / up up / up up up and away*. Perhaps the number of an entity can be represented in some spoken language by a closed-class reduplication. But the great majority of spoken closed-class representations show no such iconicity.

3.2.1.4 *Iconic representation of the temporal progression of a trajectory.* The classifier subsystem is also iconic with visual parsing in its representation of temporal progression, specifically, that of a Figure's path trajectory. For example, when an ASL classifier expression represents "The car drove past the tree", the "past" path is shown by the Figure hand progressing from the nearer side of the Ground arm to a point beside it and then on to its further side, much like the path progression one would see on viewing an actual car passing a tree. By contrast, nothing in any single closed-class path morpheme in a spoken language corresponds to such a progression. Thus, the *past* in *The car drove past the tree* is structurally a single indivisible linguistic unit, a morpheme, whose form represents no motion ahead in space. Iconicity of this sort can appear in spoken language only where a complex path is treated as a sequence of subparts, each with its own morphemic representation, as in *I reached my hand down around behind the clothes hamper to get the vacuum cleaner*.

3.2.2 *A narrow time-space aperture in the expression*

Another way that the classifier expression in signed language may be more like visual perception is that it appears to be largely limited to representing a narrow time-space aperture. The tentative principle is that a classifier complex readily represents what would appear within a narrow scope of space and time if one were to zoom in with one's scope of perception around a Figure object, but little outside that narrowed scope. Hence, a classifier expression readily represents the Figure object as to its shape or type, any manipulator or instrument immediately adjacent to the Figure, the Figure's current state of Motion (motion or locatedness), the contour or direction of a moving Figure's path, and any Manner exhibited by the Figure as it moves. However, a classifier expression can little represent related factors occurring outside the current time, such as a prior cause or a follow-up consequence. And it can little represent even concurrent factors if they lie outside the immediate spatial ambit of the Fig-

ure, factors like the ongoing causal activity of an intentional Agent or other external instrumentality.

By contrast, spoken languages can largely represent such nonlocal spatio-temporal factors within a single clause. In particular, such representation occurs readily in satellite-framed languages such as English (see Talmy 2000b: Ch. 1 and Ch. 3). In representing a Motion event, this type of language regularly employs the satellite constituent (e.g., the verb particle in English) to represent the Path, and the main verb to represent a "coevent". The coevent is ancillary to the main Motion event and relates to it as its precursor, enabler, cause, manner, concomitant, consequence, or the like.

Satellite-framed languages can certainly use this format to represent within-aperture situations that can also be represented by a classifier complex. Thus, English can say within a single clause – and ASL can sign within a single classifier expression – a motion event in which the Figure is moved by an adjacent manipulator, as in *I pinched some moss up off the rock* and *I pulled the pitcher along the counter*, or in which the Figure is moved by an adjacent instrument, as in *I scooped jelly beans up into the bag.* The same holds for a situation in which a moving Figure exhibits a concurrent Manner, as in *The cork bobbed past the seaweed*.

But English can go on to use this same one-clause format to include the representation of coevents outside the aperture, either temporally or spatially. Thus, temporally, English can include the representation of a prior causal event, as in *I kicked the football over the goalpost* (first I kicked the ball, then it moved over the goalpost). And it can represent a subsequent event, as in *They locked the prisoner into his cell* (first they put him in, then they locked it). But ASL cannot represent such temporally extended event complexes within a single classifier expression. Thus, it can represent the former sentence with a succession of two classifier expressions: first, flicking the middle finger of the dominant hand across the other hand's upturned palm to represent the component event of kicking an object, and next moving the extended index finger of the dominant hand axially along a line through the space formed by the up-pointing index and little fingers of the nondominant hand, representing the component event of the ball's passing over the goalpost. But it cannot represent the whole event complex within a single expression – say, by flicking one's middle finger against the other hand whose extended index finger then moves off axially along a line.

Further, English can use the same single-clause format to represent events with spatial scope beyond a narrow aperture, for example, an Agent's concurrent causal activity outside any direct manipulation of the Figure, as in *I walked / ran / drove / flew the memo to the home office*. Again, ASL cannot represent the whole event complex of, say, *I ran the memo to the home office* within a single classifier expression. Thus, it could not, say, adopt the classifier for holding a thin flat object (thumb pressed against flat fingers) with the dominant hand and placing this atop the nondominant hand while moving forward with it as it shows alternating strokes of two downward pointed fingers to indicate running (or concurrently with any other indication of running).

Instead a sequence of two expressions would likely be used, for example, first one for taking a memo, then one for a person speeding along.[8]

Though the unacceptable examples above have been devised, they nevertheless show that it is physically feasible for a signed language to represent factors related to the Figure's Motion outside its immediate space-time ambit. Accordingly, the fact that signed languages, unlike spoken languages, do avoid such representations may follow from deeper structural causes, such as a greater fidelity to the characteristics of visual perception.

However apt, though, such an account leaves some facts still needing explanation. Thus, on the one hand, it makes sense that the aperture of a classifier expression is limited temporally to the present moment – this accords with our usual understanding of visual perception. But it is not clear why the aperture is also limited spatially. Visual perception is limited spatially to a narrow scope only when attention is being focused, but is otherwise able to process a wide-scoped array. Why then should classifier expressions avoid such wide spatial scope as well? Further, sign languages *can* include representation of the Ground object within a single classifier expression (typically with the nondominant hand), even where that object is not adjacent to the Figure.

3.2.3 *More independent distinctions representable in the expression*

This third property of classifier expressions has two related aspects – the large number of different elements and categories that can be represented together, and their independent variability – and these are treated in succession next.

3.2.3.1 *Many more elements / categories representable within a single expression.* Although the spatio-temporal aperture that can be represented within a single classifier expression may be small compared to that in a spoken-language clause, the number of distinct factors within that aperture that can be represented is enormously greater. In fact, perhaps the most striking difference between the signed and the spoken representation of space in the expression is that the classifier system in signed language permits the representation of a vastly greater number of distinct spatial categories simultaneously and independently.

A spoken language like English can separately represent only up to four or five different spatial categories with closed-class forms in a single clause. As illustrated in the sentence *The bat flew way back up into its niche in the cavern*, the verb is followed in turn by: a slot for indication of path length (with three members: "zero" for 'neutral', *way* for 'relatively long', *right* for 'relatively short'); a slot for state of return (with two members: "zero" for 'neutral', *back* for 'return'); a slot for displacement within the earth-frame (with four members: "zero" for 'neutral', *up* for 'positive vertical displacement', *down*

8. The behavior here of ASL cannot be explained away on the grounds that it is simply structured like a verb-framed language, since such spoken languages typically *can* represent concurrent Manner outside a narrow aperture, in effect saying something like: "I walking / running / driving / flying carried the memo to the home office".

for 'negative vertical displacement', *over* for 'horizontal displacement'); a slot for geometric conformation (with many members, including *in, across, past*); and perhaps a slot for motive state and vector (with two members: "zero" for 'neutral between location AT and motion TO' as seen in *in / on*, and *-to* for 'motion TO' as seen in *into / onto*). Even a polysynthetic language like Atsugewi has closed-class slots within a single clause for only up to six spatial categories: path conformation combined with Ground type, path length, vector, deixis, state of return, and cause or manner. In contrast, by one tentative count, ASL has provision for the separate indication of thirty different spatial categories. These categories do exhibit certain cooccurrence restrictions, they differ in obligatoriness or optionality, and it is unlikely – perhaps impossible – for all thirty of them to be represented at once. Nevertheless, a sizable number of them can be represented in a single classifier expression and varied independently there. The table below lists the spatial categories that I have provisionally identified as available for concurrent independent representation. The guiding principle for positing a category has been that its elements are mutually exclusive: different elements in the same category cannot be represented together in the same classifier expression. If certain elements can be concurrently represented, they belong to different categories. Following this principle has, on the one hand, involved joining together what some sign language analyses have treated as separate factors.

For example, the first category below covers equally the representation of Figure, instrument, or manipulator (handling classifier), since these three kinds of elements apparently cannot be separately represented in a single expression – one or another of them must be selected. On the other hand, the principle requires making distinctions within some categories that spoken languages treat as uniform. Thus, the single "manner" category of English must be subdivided into a category of "divertive manner" (e.g., moving along with an up-down bump) and a category of "dynamic manner" (e.g., moving along rapidly) because these two factors can be represented concurrently and varied independently.

A. Entity properties
1. identity (form or semantic category) of Figure / instrument / manipulator
2. identity (form or semantic category) of Ground
3. magnitude of some major entity dimension
4. magnitude of a transverse dimension
5. number of entities

B. Orientation properties
6. an entity's rotatedness about its left-right axis ("pitch")
7. an entity's rotatedness about its front-back axis ("roll")
8. a. an entity's rotatedness about its top-bottom axis ("yaw")
   b. an entity's rotatedness relative to its path of forward motion

C. Locus properties
9. locus within sign space

D. Motion properties
10. motive state (moving / resting / fixed)
11. internal motion (e.g. expansion/contraction, form change, wriggle, swirling)
12. confined motion (e.g. straight oscillation, rotary oscillation, rotation, local wander)
13. translational motion

E. Path properties
14. state of continuity (unbroken / saltatory)
15. contour of path
16. state of boundedness (bounded / unbounded)
17. length of path
18. vertical height
19. horizontal distance from signer
20. left-right positioning
21. up-down angle ("elevation")
22. left-right angle ("direction")
23. transitions between motion and stationariness (e.g. normal, decelerated, abrupt as from impact)

F. Manner properties
24. divertive manner
25. dynamic manner

G. Relations of Figure or Path to Ground
26. path's conformation relative to Ground
27. relative lengths of path before and after encounter with Ground
28. Figure's path relative to the Path of a moving Ground
29. Figure's proximity to Ground
30. Figure's orientation relative to Ground

It seems probable that something more on the order of this number of spatial categories are concurrently analyzed out by visual processing on viewing a scene than the much smaller number present in even the most extreme spoken language patterns.

3.2.3.2 *Elements / Categories independently variable in the expression – not in prepackaged schemas.* The signed-spoken language difference just presented was mainly considered for the sheer number of distinct spatial categories that can be represented together in a single classifier expression. Now, though, we stress the corollary: their independent variability. That is, apart from certain constraints involving cooccurrence and obligatoriness in a classifier expression, a signer can generally select a category for inclusion independently of other categories, and select a member element within each category independently of other selections. For example, a classifier expression can separately include and independently vary a path's contour, length, vertical angle, horizontal angle, speed, accompanying manner, and relation to Ground object.

By contrast, it was seen earlier that spoken languages largely bundle together a choice of spatial member elements within a selection of spatial categories for representation within the single complex schema that is associated with a closed-class morpheme. The lexicon of each spoken language will have available a certain number of such "prepackaged" spatial schemas, and the speaker must generally choose from among those to represent a spatial scene, even where the fit is not exact. The system of generalizing properties and processes seen in Section 2.6 that apply to the set of basic schemas in the lexicon (including their plastic extension and deformation) may exist to compensate for the prepackaging and closed stock of the schemas in any spoken language.

Thus, what are largely semantic components within a single morpheme in spoken language correspond to what can be considered separate individually controllable morphemes in the signed classifier expression.

The apparent general lack in classifier expressions of prepackaging, of a fixed set of discrete basic schemas, or of a system for generalizing, extending, or deforming such basic schemas may well accord with comparable characteristics of visual parsing. That is, the visual processing of a viewed scene may tend toward the independent assessment of spatial factors without much prepacketing of associated factors or of their plastic alteration. If shown to be the case, then signed language will once again prove to be closer to perceptual spatial structuring than spoken language is.

4. Cognitive implications of spoken / signed language differences

The preceding comparison of the space-structuring subsystems of spoken and of signed language has shown a number of respects in which these are similar and in which they are different. It can be theorized that their common characteristics are the product of a single neural system, what can be assumed to be the core language system, while each set of distinct characteristics results from the activity of some further distinct neural system. These ideas are outlined next.

4.1 Where signed and spoken language are alike

We can first summarize and partly extend the properties above found to hold both in the closed-class subsystem of spoken language and in the classifier subsystem of signed language. Both subsystems can represent multifarious and subtly distinct spatial situations – that is, situations of objects moving or located with respect to each other in space. Both represent such spatial situations schematically and structurally. Both have basic elements that in combination make up the structural schematizations. Both group their basic elements within certain categories that themselves represent particular categories of spatial structure. Both have certain conditions on the combination of basic elements and categories into a full structural schematization. Both have conditions on the cooccurrence and sequencing of such schematizations within a larger spatial expression. Both permit semantic amplification of certain elements or parts of a schematization by open-class or lexical forms outside the schema. And in both subsystems, a spatial situation can often be conceptualized in more than one way, so that it is amenable to alternative schematizations.

4.2 Where spoken and signed language differ

Beside the preceding commonalities, though, the two language modalities have been seen to differ in a number of respects. First, they appear to divide up into somewhat different sets of subsystems without clear one-to-one matchups. Accordingly, the spatial portion of the spoken language closed-class subsystem and the classifier subsystem of signed language may not be exactly corresponding counterparts, but

only those parts of the two language modalities closest to each other in the representation of schematic spatial structure. Second, within this initial comparison, the classifier subsystem seems closer to the structural characteristics of visual parsing than the closed-class subsystem in all of the following ways: It has more basic elements, categories, and elements per category in its schematic representation of spatial structure. Its category membership exhibits much more gradient representation, in addition to discrete representation. Its elements and categories exhibit more iconicity with the visual in the pattern in which they are clustered in an expression, in their observance of an object/action distinction, in their physical realization, and in their progression through time. It can represent only a narrow temporal aperture in an expression (and only a narrow spatial aperture as well, though this difference from spoken language might not reflect visual fidelity). It can represent many more distinct elements and categories together in a single expression. It can more readily select categories and category elements independently of each other for representation in an expression. And it avoids prepackaged category-element combinations as well as generalizations of their range and processes for their extension or deformation.

4.3 A new neural model

In its strong reading, the Fodor-Chomsky model relevant here is of a complete inviolate language module in the brain, one that performs all and only the functions of language without influence from outside itself – a specifically linguistic "organ". But the evidence assembled here challenges such a model. What has here been found is that two different linguistic systems, the spoken and the signed, both of them undeniably forms of human language, on the one hand share extensive similarities but – crucially – also exhibit substantial differences in structure and organization. A new neural model can be proposed that is sensitive to this finding. We can posit a "core" language system in the brain, more limited in scope than the Fodor-Chomsky module, that is responsible for the properties and performs the functions found to be in common across both the spoken and the signed modalities. In representing at least spatial structure, this core system would then further connect with two different outside brain systems responsible, respectively, for the properties and functions specific to each of the two language modalities. It would thus be the interaction of the core linguistic system with one of the outside systems that would underlie the full functioning of each of the two language modalities.

The particular properties and functions that the core language system would provide would include all the spoken-signed language properties in Section 4.1 specific to spatial representation, though presumably in a more generic form. Thus, the core language system might have provision for: using individual unit concepts as the basis for representing broader conceptual content; grouping individual concepts into categories; associating individual concepts with overt physical representations, whether vocal or manual; combining individual concepts – and their physical representations – under certain constraints to represent a conceptual complex; and establishing a subset

of individual concepts as the basic schematic concepts that, in combinations, represent conceptual structure.

When in use for signed language, this core language system might then further connect with particular parts of the neural system for visual perception. I have previously called attention to the already great overlap of structural properties between spoken language and visual perception (see Talmy 2000a: Ch. 2), which might speak to some neural connection already in place between the core language system and the visual system. Accordingly, the proposal here is that in the case of signed language, still further connections are brought into play, ones that might underlie the finer granularity, iconicity, gradience, and aperture limitations we have seen in signed spatial representations.

When in use for spoken language, the core language system might further connect with a putative neural system responsible for some of the characteristics present in spoken spatial representations but absent from signed ones. These could include the packeting of spatial elements into a stable closed set of patterned combinations, and a system for generalizing, extending, and deforming the packets. It is not clear why such a further system might otherwise exist but, very speculatively, one might look to see if any comparable operations hold, say, for the maintenance and modification of motor patterns.

The present proposal of a more limited core language system connecting with outlying subsystems for full language function seems more consonant with contemporary neuroscientific findings that relatively smaller neural assemblies link up in larger combinations in the subservance of any particular cognitive function. In turn, the proposed core language system might itself be found to consist of an association and interaction of still smaller units of neural organization, many of which might in turn participate in subserving more than just language functions.

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CHAPTER 11

Iconicity and space in French Sign Language

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This paper starts with a debate on iconicity in languages, particularly in French Sign Language (LSF) and is based on a wide discourse analysis on videos by Deaf signers. Following Cuxac (2000), I propose a new definition of classifiers based on *proforms* and *transfers*. Proforms are handshapes which take up the form of objects; they are one parameter of transfers, the whole linguistic structure (i.e., transfers of form/size, situation, or person). Furthermore, I analyze spatialization strategies and constraints in a narrative called *Horse Story*. Once signers have organized the signing space into three *figures* (horse, cow and bird) and *ground* (fence), the different positions of the fence (on horizontal or sagittal axes) imply the use of different types of transfers. Finally I provide an example of diagrammatic iconicity in the expression of space and time.

Introduction

This paper explores some aspects of the interrelation between iconic and spatial features in the grammar and discourse of French Sign Language (hereafter: LSF). Sign languages are by their gestural nature necessarily based on space – the three-dimensional signing space – where the message takes shape. One of the main consequences of the use of space in sign languages is their inherent iconicity. In actual fact, moving from the world of experience (real and imaginary life) results in fewer "losses" to the world of saying (language) in sign languages than in spoken languages. In sign languages the three dimensions of space are preserved and this allows for a fairly smooth crossover to language for most objects in the world. In comparison, in spoken languages, our phonatory apparatus forces us to rely entirely on the time dimension in order to link words together linearly. This seemingly trivial fact helps understand the main difference between sign languages and spoken languages. It also helps justify why in this chapter the notion of space cannot be separated from the notion of iconicity and vice versa.

Iconicity is a theoretical notion in both spoken and sign languages. But mainstream linguistics has not addressed the general issue of iconicity in its dominant epistemological paradigms, neither from a functionalist nor from a generativist perspective. Nevertheless, it is through syntax that some functionalist and cognitivist

researchers (Haiman 1985; Simone 1995) have integrated this notion, especially in dealing with linearity and diagrammaticity, imagic iconicity being marginal in spoken languages (especially restricted to onomatopoeias such as French *cocorico* or *miaou* and some limited groups of words, such as French *murmurer*, *chuchoter*, *caqueter*). The same goes for sign languages, although iconicity cannot be overlooked in this case, leading to the following options: a) demonstrate that iconicity is incompatible with the definition of language; b) to discard the whole notion altogether; c) to put it at the center of the description of sign languages. In this chapter, I take this last option to analyze LSF, following the model proposed by Cuxac (2000).

The most common form of iconicity in sign languages is imagic but can be complemented by diagrammatic iconicity. Imagic iconicity is a natural resemblance between the sign and the object to which it refers in the world (Fischer & Nänny 2001). Diagrammatic iconicity is a type of syntactical iconicity that is present in sign languages in the construction of space, time and person references, as well as in the order of signs in the utterance. Most sign language specialists mainly study the imagic iconicity of these languages – to mention only a few: Cuxac (1985, 1996, 1999, 2000) and Jouison (1995) for LSF; Klima and Bellugi (1979), Wilcox (2000) and Taub (2001) for American Sign Language; Pizzuto and Volterra (2000) for Italian and several sign languages. However, some researchers have also looked explicitly into the diagrammatic iconicity of sign languages, in complement to the imagic one: Engberg-Pedersen (1993) for Danish Sign Language, Risler (2000), Cuxac (2003b) and Sallandre (2003) for LSF; Emmorey and Falgier (1999), Emmorey (2002) for American Sign Language, Pietrandrea and Russo (2004) for Italian Sign Language, Fusellier-Souza (2004) for homesigns and Primary Sign Languages (of Brazilian "isolated" Deaf adults).

Cuxac's model hypothesizes that all sign languages involve the same *process of iconisation*, which is based on each signer's own perceptive-practical experience. This holds for both deaf children of hearing parents in their first stages of sign creation (Goldin-Meadow 1991) and "isolated" Deaf adults without any contact with a Deaf community, who invent gestural languages or homesigns that may be more or less elaborate (Fusellier-Souza 2004). According to Cuxac, such peculiar language situations inform us on know how sign languages have evolved diachronically.

To account for the imagic iconicity that is massively present in sign languages, in contrast to the phenomena observed in spoken languages, Cuxac (2000) proposes an explanation that is cognitive (of a perceptive/practical origin) and linguistic: imagic iconicity is less important in most frozen signs for reasons of linguistic economy (Frishberg 1975), particularly in frozen signs[1] and, whereas it is fully deployed in Highly Iconic Structures (HIS). Highly Iconic Structures are not discrete signs but whole structures (unlike pantomime) that can contain processes and roles. In HIS the signer

1. The term *frozen sign* ("signe standard" in French) refers to a lexicalized and standardized sign that can be found in LSF/French dictionaries, such as the *IVT Dictionary* (Girod 1997). By convention, I write signs of LSF in square brackets: frozen signs with capital letters, and highly iconic structures with small letters.

provides an imagic reconstitution of experience by means of *transfers* that can describe a whole scene with several roles simultaneously, whereas frozen signs that express only one concept at a time (also see Section 1 below on transfer). As shown in previous analyses (Sallandre 2003), HIS is highly relevant in LSF discourse, occurring with a very high frequency (75% of the signs) and with a lower remarkable frequency in explicative discourses such as "cooking recipes" one third of the signs).

In other words, Cuxac (2000) suggests that there are two ways of signifying in LSF, by "showing" or "not showing", which depend on two intents: illustrative and non-illustrative. A signer can always choose to sign by adopting one or the other strategy, depending on his/her intent. For example, *horse* can be signed either by using a HIS such as a *transfer of form*, describing with the his/her hands the outlines of ears, muzzle and tail on his/her body, or by using the frozen sign [HORSE] which is a conventionalized LSF sign made of small rotations with both hands forming a 'V' handshape[2] on the top of his/her head (a metonymy of the ears).

Building on these basic terms and concepts, the present chapter focuses on three aspects of HIS and meaningful spatialization processes in LSF discourse. I first consider structures that have been observed across many sign languages, and that have been or are most often described as *classifiers*. Drawing on the theoretical framework provided by Cuxac (1985, 2000, 2003a), I propose a different analysis of these forms as *proforms* and *transfers* (Section 1). I then examine how spatial constraints may influence the use of illustrative vs. non-illustrative structures and generate different spatialization strategies (Section 2). Finally, I provide an example of diagrammatic iconicity in the expression of space and time in a video sequence (Section 3).

1. Proforms and transfers, rather than classifiers

Classifiers are central in sign language research, perhaps because of the very frequent use of these constructions and because of the inherent iconicity of these languages. As Klima and Bellugi (1979:66) already pointed out, although they did not directly discuss iconicity: "Sign language makes use of dimensions of the spatial mode, which spoken languages lack, in creating visible shapes moving in space which reveal their mimetic origins yet are systematically and formationally constrained." In this section, I justify and illustrate why a new approach is necessary to account for the varied constructions of LSF and of all sign languages that are often called classifiers, and why I rather consider them as *proforms* (the handshape parameter) in *transfer structures*, that is the whole structures made up of four manual parameters (handshape/proform, orientation, location and motion) and four non-manual parameters (gaze, facial expression, body posture, and mouthing/mouth gesture).

2. Capital letters refer to the fingerspelling alphabet, used to call handshapes and *proforms*.

1.1 A break with the traditional "classifiers"

My aim is to stress the fundamental differences between signed and spoken languages, following Klima and Bellugi's (1979) suggestion and Emmorey's questions in her recent seminal collected volume, where she writes:

> Research in the early 1980s suggested that *classifier constructions* can be analyzed as combinations of discrete morphemes, specifically, as predicates consisting of one or more movement roots along with several other morphemes encoding the shape or semantic class of object involved (indicated by handshape), the location of a referent object, and the orientation of the object. However, several critical questions have since arisen regarding the syntactic, morphological, and phonological analysis of these forms. Some researchers have suggested that these constructions do not actually involve classifiers in the usual sense of the term, may involve gestural (rather than morphemic) components, and may be unique to signed languages. (. . .) Many have suggested that the term, classifier, is misleading and should be abandoned.

Supalla (1978, 1986) is one leading historical authors, who first organized classifiers in American Sign Language (ASL) by proposing two main types: *classifier predicates* (for verbs of motion and location, divided in *handling classifiers* and *body classifiers*) and *SASS classifiers* (size-and-shape classifiers). This classification followed two main theoretical positions. Supalla attributed the same properties to sign and spoken languages in order to prove that ASL was a true language, and he did not consider that iconicity could be an explanatory principle for natural languages (for more details, see Taub 2001: 39–41). More recently and in the framework of cognitive grammars, some researchers criticized Supalla's classification and showed why the terminology was not ideally suited (Emmorey 2001, 2003; Schembri 2003; Slobin et al. 2003). Slobin et al. (2003) follow Schembri (2003) in using a different classification than Supalla's: handle, entity, SASS. Briefly stated, the common characteristic of the different types of classifiers identified in spoken languages is that they differentiate entities on the basis of semantically defined classes (Craig 1986). These so-called classifiers in sign languages do have a classifying function in that they indicate relevant properties of entities. As Slobin et al. (2003) point out, however, this property does not mark the entity as belonging to a specific semantic class in the language, but rather serves to designate the entity in a specific context. The same object can be designated by using different handshapes that select different properties, depending on the focus or relevance in discourse. Slobin et al. (2003) propose the term *property marker* instead of the widely used term *classifier*. Furthermore, they emphasize the communicative function of property markers (2003: 273); in their words:

> Rather than emphasize classification as the central feature of "classifier" handshapes in polycomponential signs, it seems more useful to treat them as marking a relevant property of a referent. The major function of such a handshape is to evoke a relevant referent in discourse, indexing a particular referent according to properties that are appropriate for the current discourse.

This means that Slobin et al. argue that a property marker does not classify, but serves a function within a polycomponential verb – namely, the function of indicating a referent. As stated in the paper by Slobin et al. (2001), property markers are handshapes that identify a referent by indicating a relevant property of that referent.

1.2 Proforms and transfers

Crystal (1999: 274) gives the following general definition of *proforms*: "An item in a sentence which substitutes for another item or construction, such as *it* (*I saw it in the garden*) and *so* (*He did so too*). The central class of examples (which gave rise to the general term) is the pronoun, which substitutes for a noun phrase". This term has been used in relation to sign languages by several authors: first by Friedman (1975) to refer to pointing and pronouns in American Sign Language, then followed by Engberg-Pedersen (1993) and by Sutton-Spence and Woll (1999).

Cuxac (2003a: 25) recently used the term *proform,* but with a different meaning. According to him, the proform is the handshape parameter (one of the manual parameters) used in Highly Iconic Structures[3] where handshapes behave as a repetition of form, therefore as proforms. Proforms are both highly iconic handshapes and generic forms (for example: "flat", "thick", and "vertical"). Their function is to specify the form of a referent object by referring to "this form". They are included in transfer operations as handshape parameters, together with other manual and non-manual parameters.

In Cuxac (1985) the term *transfer* expresses the entire range of Highly Iconic Structures in sign languages. These transfers are the visible traces of cognitive operations which consist in transferring the real world into four-dimensional signed discourse (the three dimensions of space and the dimension of time). Transfers are operations which aim to identify forms and roles of discourse. In this typology, three main transfers can be combined to provide up to twenty different transfer categories (Sallandre 2003). A brief definition of the three main transfers is given below.

Transfers of form and size position objects or persons according to their form or size (no process or role involved) and the entity is described by means of proforms. For example, in Figure 2 (picture on the left), the signer describes the fence with both hands using proform 'U', horizontal orientation and internal to external movement; the two major non-manual parameters are gaze (which is oriented towards the form) and facial expression (which qualify the form).

Situational transfers involve the movement of an entity (signed with the dominant hand) relative to a stable locus (non-dominant hand). The situation is shown as if the scene were observed from a distance: the signer keeps his/her distance relative to what he/she is conveying. For example, in Figure 3 (picture at the bottom right), the object that moves is the horse, depicted by a proform 'X' with the dominant hand, while the

3. For handshape in frozen signs (i.e., signs without illustrative intent), Cuxac keeps the term *handshape* (manual configuration).

non-dominant hand shows the fence with proform 'M' (the stable locus); the facial expression is the horse's (he fears to jump over the fence, he feels he is falling down) and the gaze is toward the fence. Then the signer describes a complete scene (which can be translated by a complete English sentence such as "The horse is jumping over the fence") but his/her chest is not involved, as is the case with personal transfers.

Transfers of persons involve roles and processes. The signer "becomes" the entity to which he or she is referring. There is a role incorporation and the signer's entire body plays this role. In our proposed typology (Cuxac 2000; Sallandre & Cuxac 2002; Sallandre 2003), transfers of person are distinguished according to the signer's point of view and intent (fully illustrative or not): personal transfer, half personal transfer, double transfer, transfer with reported speech, etc. As for other transfers, the predominant parameter is the eye gaze: the absolute rule is that the signer's gaze must never meet the addressee's gaze. In transfers of person, the transfer begins when the signer's gaze moves away from the addressee and when his/her body shifts slightly to one side, to take on some other object or character. For example, Figure 2 (picture on the right) is a personal transfer because all the signer's parameters are used to embody the horse's body in an iconic one-to-one relation and without any distance with the embodied entity: the signer's hands do proform 'U' to refer to the horse's front legs, her chest refers to the horse's chest, her head to the horse's head and her facial expression and gaze to those of the horse. This example, then, contrasts with the one in Figure 3 which presents a situational transfer.

In the international sign language literature, transfers of form and size are commonly considered as SASS or classifiers (Supalla 1986). Situational transfers are considered as polycomponential signs (Slobin et al. 2003; Schembri 2003) or classifier predicates (Supalla 1986). Transfers of person are commonly called "role playing" or "referential shifts" (Engberg-Pedersen 1993, 1995; Emmorey & Reilly 1995; Taub 2001; Emmorey 2002) and some authors point out the fact that they allow different points of view to be expressed (Poulin & Miller 1995). In an analysis of some phenomena in Danish Sign Language, Engberg-Pedersen (1993:103) describes shifts and perspectives with the term *role shifting* that has been used to describe how signers take on a referent's identity in certain types of signing. As Taub (2001:88) explains, "signers can represent several characters and their interactions in a single discourse: each character will have a characteristic gaze direction and perhaps a facial expression or posture. At times, taking on a characteristic expression is enough to signal the start of a role shift."

1.3 Examples of proforms in different contexts

The examples below are extracted from a large database[4] that includes 90 LSF corpora of different types produced by 13 deaf adult signers. Among these corpora, some were

4. LS-COLIN database from a *Cognitique* Project (2000–2002) financed by grant LACO 39 from the French Department of Research and Technology.

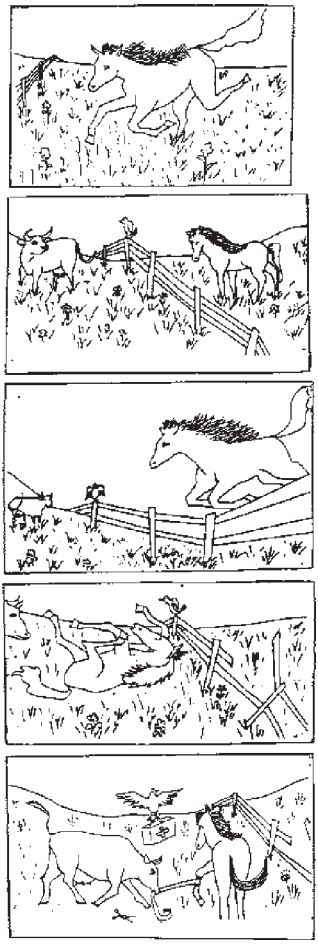

Figure 1. Pictures from the horse story (Hickmann 2003)

narratives elicited with a picture (the *Horse Story*, see Figure 1) originally constructed for language acquisition research in spoken languages (Hickmann 2003) and more recently recorded in several Sign Languages (French, Polish, Brazilian). This story is about a horse that wants to jump over a fence to join a cow on the other side, but falls and is nursed by his friends.

The first example (Figure 2) shows a single 'U' proform for two distinct referents: a transfer of form for the referent fence (left) and a personal transfer for one of thehorse's leg (right). Only one proform is used here because both referents share the common property having a long and thin form. However, the handshape orientation differs, thereby contributing to the process of indicating referents, along with the non-manual parameters of facial expression and gaze (towards hands).

Figure 2. Proform 'U' for two referents (form of the fence and form of the horse's legs)

Figure 3. A single referent *fence* for six different proforms (from left to right: 'N', 'V', 'C', 'H', 'W' and 'M' proforms, depending on the focus of the fence's form and function)

The second example (Figure 3) shows the opposite phenomenon since six different proforms are used for a single referent (the fence). The proform aims at making a form iconic; otherwise, a new classifier would be necessary for each new referent. As a result, the variation of proforms in this example. No one occurrence is preferable to another (there is no single "correct" form) even though the referent is the same. This example shows that signers have a repertoire to refer to fences, all of which are available within repertoire of LSF, none being ad hoc gestures. Signers are highly proficient in choosing proforms depending on their focus and point of view: (the thickness of pickets, the way they stick up from the ground, etc.).

2. Spatialisation constraints and narrative strategies

The analysis below focuses on how signers position the protagonists (horse, cow, bird) in the signing space at the beginning of the *Horse Story* (pictures 1 and 2, Figure 1) according to their point of view and to lead up to the "falling" sequence (pictures 3 and 4).

2.1 Figure and ground theory with transfers

Following some authors in cognitive and semantic linguistics (Talmy 1983, 2000; Levinson 1996; Vandeloise 1986; Cadiot & Visetti 2001), I applied theories of spatial referencing to this story in LSF. The terminology varies from author to author, but I have retained the most widely used terms: *figure* and *ground* from Gestalt psychology (see Cadiot & Visetti 2001: 51–63) and cognitive linguistics Talmy (1983, 2000).

In the *Horse Story* the field and the fence constitute the *grounds*, while horse, cow, and bird are each in turn the *figures* (moving entities). The horse is the main figure or *relator*, the mobile element that has to be situated in space. The cow is also a ground since it is the target towards which the horse is moving, the reason for which he jumps over the fence. The bird is only a figure, first playing the role of observer at the beginning of the story (up to the horse's fall) and then helper at the end of the story (it brings the cow a first-aid kit to nurse the horse). It is mobile in that it is perched on the fence at the beginning of the story (for most of the signers) and then changes referential space when it leaves to fetch the first-aid kit. The fence is the ground or *relatum*, the element in relation to which the form is situated. The fence is itself also a figure in relation to the stable ground represented by the field.

At the beginning of the narrative, a topological relationship is created with two subordinate-spaces side by side (pictures 1 and 2). As soon as the horse decides to go and join the cow, i.e., to enter into a spatial relationship with it, the action shifts into a new reference space: the horse jumps over the fence. That is, the horse moves toward the place where the cow is located. This general theoretical framework, which is valid for all natural languages, can be associated with a specific LSF model focusing on the wide range of highly iconic structures and in particular on the interaction between situational transfers and personal transfers.

2.2 Analysis of LSF narratives

The hypothesis is that the position of the fence acts as a constraint on the type of transfers that is selected by signers. What sorts of strategies does this constraint entail? An initial analysis showed that signers are divided into two almost equal groups. This first group included seven signers (54%). It oriented the fence along a horizontal plane (from right to left or vice-versa) or a slightly inclined plane. In this group, two signers represented a fence of quite considerable size at an angle (straight and rounded). This

Figure 4. Illustration of the use of the horizontal plane. The picture on the left shows a transfer of form of the fence (with 'V' proform and gaze oriented towards hands). The picture on the right shows a personal transfer of the horse (with 'U' proform, a happy facial expression and gaze oriented left, in a space far away from the signer to express happiness).

first option created physical proximity between the signer and the fence, with an extremely reduced physical space available between the signer's body and the portion of space situating the fence. This strategy has several consequences:

- It is not necessary to introduce the main character and figure by the frozen sign [HORSE]. The sequence can begin directly by a personal transfer of the character.
- Personal transfers of the horse are more likely than situational transfers.
- The proform used for the horse's legs is the 'U' (see Section 1.3, Figure 2).
- This option is comparable to the movie technique known as the "close-up".
- The frame of reference tends to be relative, one in which the signer describes the scene from his own perspective (Emmorey 1999).

The six signers (46 %) in the second group positioned the fence along a sagittal plane (from their body forwards). Among them only two signers – one of whom is left-handed – situated the fence on their right. Several strategies come into play:

- There is a tendency to introduce the main protagonist by means of the frozen sign [HORSE], introduced by [HORSE] followed by a pointing toward the portion of space on the right or the left of the fence.
- Succession situational transfers are more likely than the use of personal transfers. Thus, the scene is viewed in a more detached manner as in the first group, as if from a distance.
- This strategy is comparable to the movie technique known as the "long shot".
- The proform used for the horse's legs is the 'inverted V' while the proform for the fence could be the 'V', 'U', 'M', etc. (see Section 1.3, Figure 3).
- The frame of reference also tends to be relative, but in relation to a different viewpoint (Levinson 1996; Emmorey 1999).

Figure 5. Illustration of the use of the sigital plane. The picture on the left shows signing of the fence to the right of the signer's body ('W' proform and gaze oriented towards the camera). The picture on the right shows a situational transfer of the horse ('inverted V' proform, facial expression of effort and gaze oriented toward the field beyond the fence).

3. Diagrammatic iconicity in the expression of space and time

3.1 Diagrammatic iconicity

As already mentioned in the introduction, linguists and philosophers of language (Peirce 1902, 1955; Haiman 1985; Fischer & Nänny 2001) generally hold that there are two principal types of iconicity: imagic and diagrammatic. According to Haiman (1985: 4), diagrammatic iconicity stems from the philosopher Peirce (1902), who first distinguished "icons, indexes, and symbols", further divided into icons into *images, diagrams, and metaphors*. Peirce defined a diagram as an icon "which represents the relations, mainly dyadic, or so regarded, of the parts of one thing by analogous relations in their own parts." Consequently, the diagram corresponds to the things in the real-world that is being represented. For Peirce "every diagram is an icon, even although there is no sensuous resemblance between it and its object, but only an analogy between the relations of the parts of each." He refers to the parts of the *object,* and not to the parts of a concept. Thus, the essence of a diagram is that the relationships between its parts resemble the relationship between the parts of the object that it represents.

Generally, diagrammatic iconicity is visible in two main domains of natural languages: word order in the syntagmatic chain (in both spoken and signed languages) and space conceived of as a diagram (i.e., a schema created by the speaker/signer) which he/she will refer to throughout discourse (especially in signed languages). For LSF Cuxac (2000) has essentially focused on imagic iconicity, except recently to explore person, space and time references (Cuxac 2003b: 249–254). For example in reference to entities, he considers the utterance [GIRL (point to) BOY INFORM] as purely diagrammatic, since neither the girl nor the boy is really necessarily in this area of space, but the signer creates an abstract schema in the signing space to express the participant

roles, thanks to the pointing and the directional verb [INFORM] going from the "girl" space to the "boy" space.[5]

Diagrammatic space is somewhat analogous the notion of *token space* proposed by Liddell (1995: 33), who describes tokens as "conceptual entities given a manifestation in physical space", and states that "the space tokens inhabit is limited to the size of physical space ahead of the signer in which the hands may be located while signing" (see Emmorey & Falgier 1999: 13).

3.2 Analysis of a sequence in LSF dealing with space and time

The corpus of one signer was analyzed in relation to some aspects of the LSF temporal system in 2003 (Fusellier-Souza 2004). The video excerpt is an example of a complex spatial construction in LSF where space is conceived of as a diagram. We asked the signer to explain his weekly timetable to us. He began by constructing a "grid" which is based on an upper range with a horizontal arrow (from Monday to Friday) and continued from top to bottom with a vertical arrow (morning, noon, afternoon). I then excerpted a long sequence of 45 seconds near the end of the corpus, in which the signer realized that he had forgotten to mention an activity that he did every week, namely teaching LSF (first return to an earlier point), so he had to go back to mention it.

In the sequence examined here, the frozen signs [TEACH], [MONDAY MORNING], [MONDAY AFTERNOON], [FRIDAY], [UNIVERSITY] and [MUSEUM] are spatialized in relation to the grid of the timetable that the signer constructed at the beginning of the sequence. He begins by speaking of "Friday" then continues with "Monday" (second return to an earlier point). This sequence can be summarized in English as follows: "I finally teach LSF on Monday afternoons at the university (and not on mornings, because my boss asked me to invert the courses) and Friday mornings at the museum". With freeze-frame technique, the steps in constructing this example are:

(1) The signer goes back to a point he has forgotten and signs[FRIDAY].
(2) The sign [TEACH] is expressed as a regular frozen sign, i.e., both hands in the same space (compare with step 9).
(3) He points to the area of space on the schedule "Friday".
(4) He points to the same space and simultaneously points to a high trajectory toward the left (i.e., "Monday afternoon"), maintaining the temporal reference (see Figure 6, picture on the left).
(5) He explains that his boss asked him to invert the courses on Monday mornings by Monday afternoons, so he signed [MONDAY MORNING] then [not now MONDAY AFTERNOON];

5. By way of comparison, if the signer had taken the role of the girl and the boy as personal transfers, he would have chosen to sign with an illustrative intent (i.e. by imitating the actions of his/her characters as much as possible, showing that "this is how it happened"). This would then have involved imagic iconicity, and space would not be conceived of as a diagram

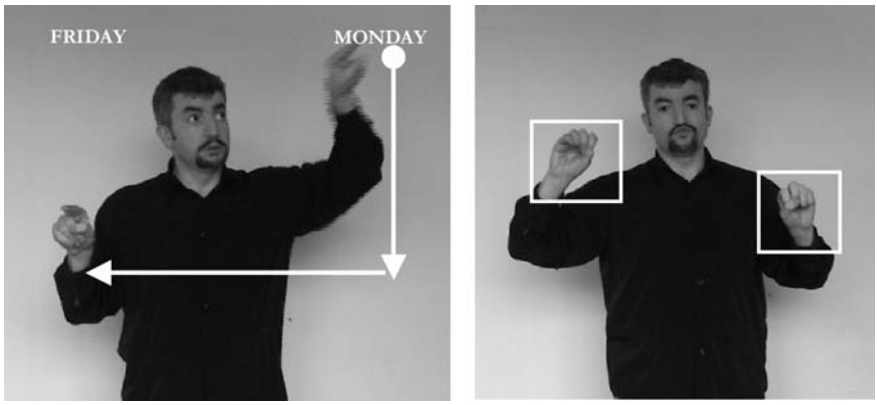

Figure 6. (left) Pointings in two places (with arrows representing his diagram) corresponding to step 4. (right) Final sign [TEACH] in two referential spaces, corresponding to step 9.

(6) He signs the diagrammatic construction [invert the hours of courses] with proform 'Claw' in describing a semicircle with each hand in both spaces to replace "Monday morning" by "Monday afternoon".
(7) With the right hand he points with proform 'Claw' to the space where "Monday afternoon" was located in the previous step.
(8) With the left hand he maintains pointing (spatial and temporal references); simultaneously the right hand signs [FRIDAY] [TWO].
(9) Finally, he signs [TEACH] in two referential spaces.[6] He expresses the first space (the university) with his left hand for "Monday afternoon" and the second space (the museum) with his right hand for "Friday morning" (see Figure 6, picture on the right).

3.3 Discussion

The space constructed by the signer is not the actual reproduction of a real space, but rather a construction by means of a diagram (Cadiot & Visetti 2001). The signer does not reconstruct a space which is a schematization of real space in his real life by spatializing the university in an area which stands for the north, the museum in the center, his home in the south. Instead, he spatializes the three space references according to time references (morning, afternoon) in a space (a timetable grid) that he himself constructs at the beginning of the sequence. A net economy of movement is achieved with the diagram and there is no need to repeat both space and time references. This lin-

6. Thus, the sign [TEACH] is not frozen anymore; it is "unfrozen" by the use of two different locations in the signing space (the location parameter is modified).

guistic economy by means of a pertinent use of space is very common in sign languages and specific to them. What makes this sequence highly diagrammatic is the presence of two linguistic features, both bearing Cuxac's (2000) non-illustrative intent: pointing which marks the continuation of time and space references and frozen signs inside a diagram. Moreover, this analysis of LSF is very close to that of Emmorey (2002: 112) who studied almost the same temporal sequence in ASL in a slightly different framework.

Conclusion

This chapter has provided a brief overview of how space is used in French Sign Language within the framework of an iconic model for sign languages. At the morphologic level (Section 1), I use the concept of proform and transfer rather than the concept of classifier, because a proform (i.e., the handshape parameter) represents iconically the form of the referent. For this reason, the same referent (for example a human) can be represented by different proforms (for example by 'I', 'curved I', 'inverted V' proforms) depending on the positions of this human in the context and on what the signer focuses. Moreover, the range of transfers (size and shape, situation, person, and their combinations) gathers what are often called *classifiers* in a coherent and progressive unified typology that fully respects the inherent iconicity of sign languages.

At the syntactic level, this chapter provides some evidence concerning the preferential use of imagic iconicity (Section 2) and diagrammatic iconicity (Section 3). The observation of narratives in LSF highlights two different spatialization strategies: with the sagittal axis, we find a tendency toward situational transfers, frozen signs, and pointings; with the horizontal axis, we find a tendency toward transfers of person. Further research on LSF and other sign languages is necessary to generalize this principle for the syntax of sign language. In addition, the presence of diagrammatic iconicity in LSF is characterized above all by pointings and frozen signs in a signing space that is itself conceived as a diagram.

While addressing the issue of space, I have shown that iconicity can handle abstract and highly structured concepts in LSF. This paper is thus a step forward towards redefining linguistic arbitrariness, which is often confused with the non-iconic nature of the Saussurian sign (Saussure 1916). In conclusion, iconicity is clearly a part of the linguistic system of natural languages.

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PART III

Space, language, and cognition

CHAPTER 12

On the very idea of a frame of reference[1]

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It is widely assumed that perception essentially involves a relative or egocentric frame of reference. Stephen Levinson has explicitly challenged this assumption and proposed a 'neo-Whorfian' hypothesis according to which the frame of reference that is dominant in a given language infiltrates spatial representations in non-linguistic modalities. Our aim is to assess this hypothesis at the philosophical level and to explore the further possibility that perception may be perspective-free, at least at the most basic level, in the sense that it does not necessarily involve any explicit frame of reference.

Introduction

It is widely assumed, both in philosophy and in cognitive science, that perception essentially involves a relative or egocentric frame of reference. In his dicussion of a variant of Molyneux's question concerning the relationship between the frames of reference used in particular languages and the frames of reference involved in non-linguistic spatial representations, Levinson explicitly challenges this assumption, proposing instead a 'neo-Whorfian' hypothesis. According to this hypothesis, the frame of reference that is dominant in a given language infiltrates spatial representation in non-linguistic and particularly in perception. In this chapter we assess Levinson's hypothesis from a philosophical point of view and explore the further possibility that, in some cases at least, perception may be perspective-free, in the sense that it need not involve any frame of reference (whether relative, intrinsic or absolute).[3]

1. This paper is based on earlier joint work on frames of reference; see Dokic and Pacherie (1999). We thank two anonymous referees for many helpful comments.

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3. We adopt Levelt's terminology (1996) and call "perspective-free" the representations that do not employ frames of reference in Levinson's sense and "perspective-bound" those that do. Of

We shall proceed as follows. First, we introduce Levinson's variant of Molyneux's question (Section 1) and his useful taxonomy of frames of reference (Sections 2/3). A logical reconstruction of Levinson's argument will then be given (Section 4). The rest of the paper will focus on perceptual and linguistic representations. We first discuss four important differences between them, which arguably are compatible with Levinson's argument (Section 5). Then we ask whether, contrary to what Levinson claims, perception is necessarily perspective-bound (Section 6). Finally, we introduce the notion of an implicit frame of reference (Section 7) and we examine its relevance to the part of Levinson's argument that concerns the compatibility of frames of reference across modalities (Section 8).

1. Generalizations of Molyneux's Question

In 1688, William Molyneux wrote a letter to John Locke posing the following celebrated question, which Locke reproduced in his *Essay Concerning Human Understanding* (1690: II, ix, 8):

> Suppose a man born blind, and now adult, and taught by his touch to distinguish between a cube, a sphere of the same metal, and nighly of the same bigness, so as to tell, when he felt one and the other, which is the cube, which is the sphere. Suppose then the cube and sphere placed on a table, and the blind man to be made to see: *Quaere*, whether by his sight, before he touched them, he could now distinguish, and tell, which is the globe, which the cube.

Nowadays, this question is emblematic of the issue of whether spatial representations are modality-specific or not. In other words, are spatial representations specific to a modality such as vision or touch, or are there supramodal or amodal ways of representing space?

In its original formulation, Molyneux's Question was about representations of *shape*, but it can be generalized to representations of *locations* and *directions*. For instance, one might devise the following variant of Molyneux's Question, which deals with the auditory modality:

> Suppose a man born blind, and now adult, and taught to locate in space two auditory sources, say a sphere and a cube placed on a table, one emitting a low note and the other a high note. Suppose then the blind man to be made to see: *Quaere*, whether by his sight and without hearing anything, he could now tell which objects the notes came from.

In his well-known essay on Molyneux's Question, Evans (1985) in effect tried to reduce the original Question to variants of this kind. Now there is another direction in which

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course there might be other senses in which a "perspective-free" spatial representation can be perspectival.

Molyneux's Question can be generalized. The questions formulated so far are about spatial representations in *sensory* modalities. However, *non-sensory* modalities (or representational systems) also involve spatial representations.[4] In other words, there are conceptual and linguistic representations of space. So we might think of other variants of Molyneux's Question which deal with linguistic representations of locations, such as the following:

> Suppose a man born blind, and now adult, is told about the location of a cube and a sphere in front of him. Suppose that the blind man is made to see: *Quaere*, whether by his sight and without any further testimony, he could now tell where is the cube and where the sphere.

One motivation for treating perception, conception and language as *modalities* is that there seems to be a *unifying concept* that can be invoked to describe our representations of locations at all three levels (Levinson 2003: 56–57). This is the concept of a *frame of reference*. As Pinker (1997: 262) puts it, "reference frames are inextricable from the very idea of location". Indeed, frames of reference are regularly invoked to characterize the structure of spatial maps and the modes whereby locations are presented in various modalities.[5]

As far as language is concerned, the expression of spatial relations involves frames of reference which can vary from one language to the other. The issue we would like to discuss concerns the relationship between the frames of reference involved in particular languages and the frames of reference involved in non-linguistic spatial representations, especially in perception. This issue has been addressed in Levinson's work on frames of reference (see Brown & Levinson 1993, 1994; Levinson 1996; Brown & Levinson 2000; Levinson 2001; Levinson 2003). In particular, Levinson gives Molyneux's Question a new twist by linking it with the following questions:

Levinson's Questions (1996: 153):

1. "Do the different representational systems natively and necessarily employ certain frames of reference?"
2. "If so, can representations in one frame of reference be translated (converted) into another frame of reference?"

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4. Levinson's own characterization of modalities is as follows (1996: 152–153): "What we should mean by 'modality' here is an important question. In what follows, I shall assume that corresponding to (some of) the different senses, and more generally to input/output systems, there are specialized 'central' representational systems, for example, an imaginistic system related to vision, a propositional system related to language, a kinaesthetic system related to gesture, and so on."

5. For instance, see the section on frames of reference in Eilan, McCarthy and Brewer (1993), and especially the introduction by Bill Brewer and Julian Pears. See also Campbell (1994) and Pinker (1997).

Levinson's own answers to these questions are based on a 'neo-Whorfian' hypothesis. The original Whorfian hypothesis (see Whorf 1956) was that our perception and conception of the world are to a large extent *determined* by the semantic and grammatical organization of our language.[6] According to Levinson's weaker, neo-Whorfian hypothesis, the various modalities can in principle operate in their own frames of reference, but Whorfian effects arise because of the need for them to coordinate and exchange information. In Levinson's own words (1996: 157), "the frame of reference dominant in a given language 'infiltrates' other modalities, presumably to ensure that speakers can talk about what they see, feel, and so on" and, as a consequence, "other modalities have the capacity to adopt, or adapt on, other frames of reference, suggesting a yes answer to Mr. Molyneux."

2. Three kinds of frames of reference

Since its modern introduction by Gestalt psychology, the notion of frames of reference has been widely used in various disciplines, such as linguistics, psychology, philosophy, and neuroscience. One of Levinson's important achievement is his systematic typological work surveying and simplifying the various distinctions to be found in the relevant literature. In this section, we describe what Levinson sees as the three main kinds of frames of reference, namely intrinsic, absolute and relative frames of reference.

Basically, any frame of reference involves the selection of *reference objects* (the referent and the relatum) and determines the way in which the spatial relation between them is represented.

The simpler frame of reference, and perhaps the most widespread in natural languages, is the *intrinsic frame of reference*. It allows for the representation of binary relations between referent and relatum. The origin is fixed by the relatum and the coordinate system is determined by intrinsic properties of the relatum. These properties exploit the relatum's asymmetries and functions, often in a culturally specific way.

The *absolute frame of reference* also allows for the representation of binary relations between referent and relatum (Levinson 1996: 145). Similarly, the origin is fixed by the relatum, but the coordinate system is determined by fixed bearings in the environment, such as the cardinal directions.[7]

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6. See for instance Whorf (1956: 213): "The categories and types that we isolate from the world of phenomena we do not find because they stare every observer in the face; on the contrary, the world is presented as a kaleidoscopic flux of impressions which has to be organized by our minds – and this means largely by the linguistic systems in our minds. "

7. One might ask whether the relation of *being north of* is not really ternary, since the environment seems to play a role along with the referent and the relatum. The answer is no, because the reference to the environment is built into the lexical meaning of "north" and hence does not act as a separate variable.

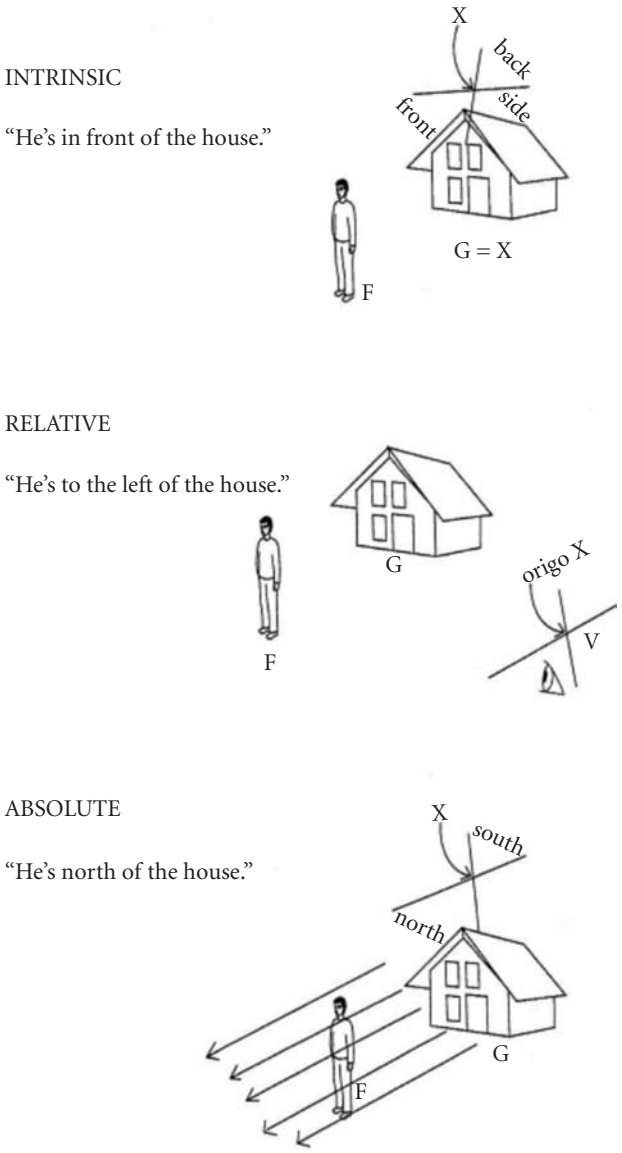


Figure 1. Intrinsic, absolute, and relative frames of reference; from Figure 4.9 of Levinson 1996: 139. F is the referent, G the relatum, and X the origin of the coordinate system.

Finally, the *relative frame of reference* allows for the representation of ternary relations among referent, relatum and point of view. The origin of the primary coordinate system is the point of view and the coordinate system "seems generally to be based on

the planes through the human body, giving us a *up/down*, *back/front* and *left/right* set of half lines" (Levinson 1996: 142).[8]

It is important to note that the use of each frame of reference involves different cognitive abilities and resources. First, using an intrinsic frame of reference requires the ability to *identify* and *analyze* the relevant relatum – its orientation, functional and dynamical properties (Levelt 1996: 87). Second, using an absolute frame of reference requires the ability to *keep track of the relevant fixed bearings* over time (dead reckoning might be necessary). Third, using a relative frame of reference requires in particular the ability to *keep track of one's left and right*, which goes hand in hand with the ability to *recognize enantiomorphs across perceptual contexts* (e.g., to recognize a left hand from one scene to another).

As it is now well known, all languages do not favor the same kinds of frames of reference. Levinson points out that some languages predominantly use only one kind of frame of reference, which can be the absolute one or the intrinsic one. It appears that if a given language uses a relative frame of reference, it also uses an intrinsic one. Other languages use two kinds of frames of reference, which can be either the relative and the intrinsic ones, or the absolute and the intrinsic ones. Finally, some languages, including English, Dutch and French, use all three kinds of frames of reference.

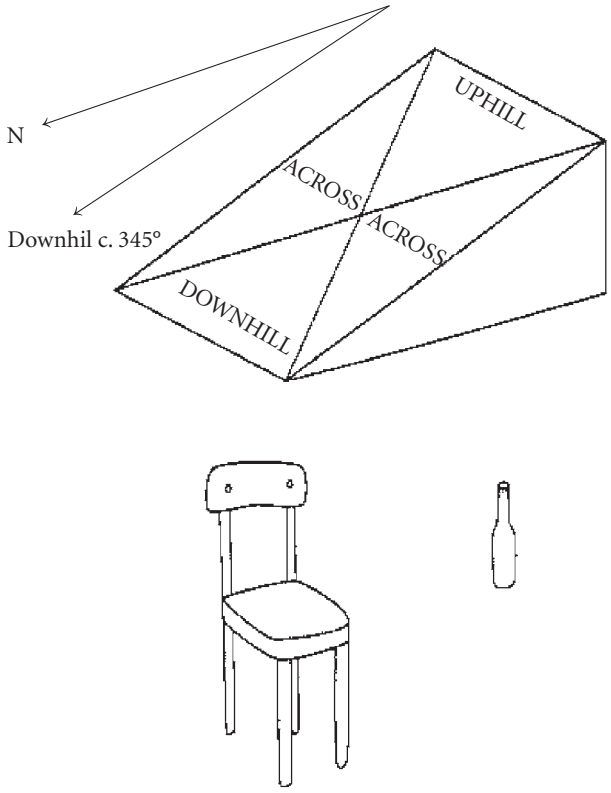
3. The case of Tzeltal

Levinson and his collaborators conducted a series of experiments in order to understand the relationship between frames of reference in linguistic and non-linguistic representations. More precisely, these experiments were designed to test the influence of linguistic frames of reference on the coding of spatial relations in non-linguistic tasks.

One target language in Levinson's experiments is Tzeltal, a Mayan language spoken in Tenejapa (Chiapas, Mexico). The peculiarity of Tzeltal is that it does not seem to involve a relative frame of reference; it has no words for 'left' and 'right'. Tzeltal employs an absolute frame of reference, which is used for coding the spatial relations between objects that are separate in space, and an intrinsic frame of reference, which is used only for coding the spatial relations between parts of a single object or between contiguous objects.

Tzeltal's absolute frame of reference is derived from a topographical feature; Tenejapa is a large mountainous tract which tends to fall in altitude toward the north-northwest. In particular, the term we might translate as 'downhill' designates approximately the northern direction, while the term we might translate as 'uphill' designates approximately the southern direction. There is only one word, which we might translate as 'across', designating indifferently the eastern and the western directions. Note

8. There can be a secondary coordinate system (often involving the 'front'/ 'back' terms) whose origin is the relatum. Moreover, the point of view itself can be fixed or mobile.



'The bottle is uphill of the chair.'

Figure 2. Topographical representation; from Figure 4.1 of Levinson 1996: 112

that this frame of reference is still used when Tenejapans are transported outside of their territory.

In his experiments, Levinson compared the performance of speakers of Tzeltal with that of speakers of Dutch in tasks of recognition and spatial reasoning.

In a typical experiment, the subject sees an arrow on a table. The arrow points to her right, or objectively to the north. The subject is then rotated 180 degrees to face another table. There are two arrows on the second table, one pointing to her right, the other to her left. The subject is asked to identify 'the arrow like the one he saw before' (1996: 114).

The results of these experiments are that Dutch subjects predominantly use a relative frame of reference (i.e., they tend to preserve the orientation of the arrow relative to themselves), whereas Tenejapans predominantly use an absolute frame of reference (i.e., they tend to preserve the orientation of the arrow relative to their environment). In another study, Levinson and Brown (1994) show that Tenejapans make no essential

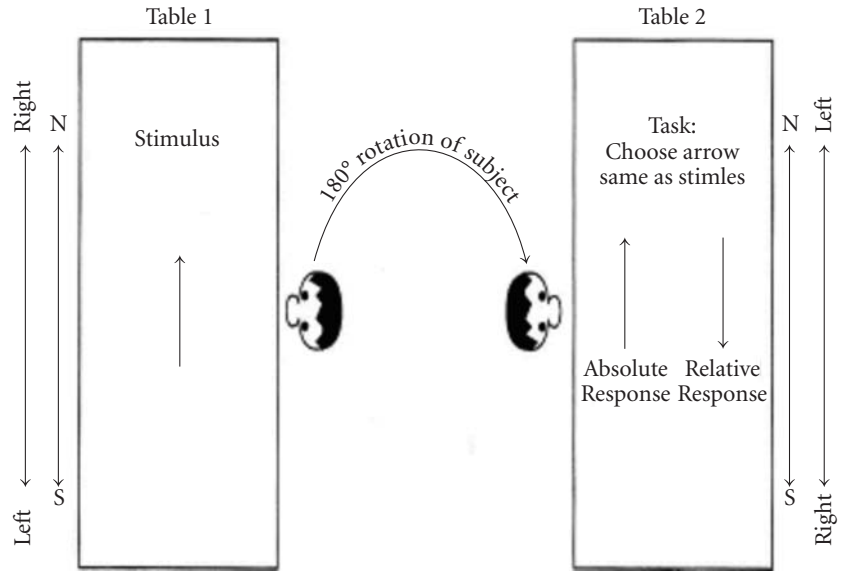


Figure 3. Design of some experiments; from Figure 4.2 of Levinson 1996: 113

use of the notions of left and right in daily life. As a consequence, they are relatively insensitive to left/right inversions of enantiomorphs.[9]

4. A reconstruction of the neo-Whorfian argument

In this section, we would like to reconstruct the main logical steps of Levinson's neo-Whorfian argument (as given for instance in Section 4.4 of Levinson 1996 and in Section 2.4 of Levinson 2003) in order to assess this argument at the conceptual level. We thus aim at a better understanding of the notion of a spatial frame of reference and of the nature of cross-modal transfer of spatial information.

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9. Levinson's experiments have been criticized, for instance by Li and Gleitman (2002). These authors have argued that speakers of languages using the three kinds of frames of reference can choose any of them depending on the context. For instance, if there are visible landmarks around, some native speakers of English have a preference for an absolute frame of reference, just as speakers of Tzeltal. In their reply, Levinson, Kita, Haun and Rasch (2002) point out that Li and Gleitman do not distinguish between intrinsic and absolute frames of reference, and argue that their experimental subjects actually use intrinsic frames of reference, which is fully compatible with Levinson's claim that subjects will tend to use the frames of reference which are predominant in their language, in that case intrinsic and relative.

Levinson's neo-Whorfian argument

1. "Any and every spatial representation, perceptual or conceptual, must involve a frame of reference" (Levinson 2003: 56).
2. There is a cross-modal sharing of information. For instance, we can talk about what we have seen, we can gesture about what we have explored by touch, and so on.
3. Such cross-modal sharing of information would only be possible under one of the following conditions:
   a. One can translate spatial information from one frame of reference to another.
   b. A single frame of reference operates in the relevant modalities.
   c. Some modalities can adopt various frames of reference depending on the context.
4. Against 3a: There are constraints on translation, so that one cannot freely convert information from one frame of reference to another.
5. Against 3b: It is not the case that all modalities operate with the same frame of reference.
6. Hence, from 3, 4 and 5, some modalities should be able to adopt various frames of reference depending on the context.
7. Some languages, such as Tzeltal, have only one frame of reference (in the case of Tzeltal, an absolute one).
8. Hence, insofar as one can express linguistically spatial representations acquired from other modalities (2), these modalities should be able to adopt the dominant (perhaps unique) linguistic frame of reference.

The argument is valid, so we have to reject one or more premisses if we do not accept the neo-Whorfian conclusion. In what follows, our targets will be the following:

Contra premiss 1: Spatial information carried by non-linguistic representations need not be based on a frame of reference.[10] In other words, there is a sense in which non-linguistic spatial representations can be perspective-free. This objection will be developed in Sections 6 and 7, focusing on perceptual representations.

Contra premiss 3: Cross-modal transfer of information need involve neither a unique frame of reference nor translatable frames. The model of translation is misleading to characterize the transfer of information across modalities. This objection will be developed in Section 8.

10. A different point is that at least some linguistic spatial representations do not involve any frame of reference. Consider for instance descriptions of simple topological relations as in "The fly is in the room". It is not clear in what sense such a spatial representation could be said to employ a relative, intrinsic or absolute frame of reference.

5. Four differences between perceptual and linguistic spatial representations

To begin with, let us mention four potential differences between perceptual and linguistic spatial representations.

(1) Linguistic representation of space can be as *selective* as one wants. In contrast, non-linguistic representation of space typically carries *nested information* (Dretske 1981).

In perception, spatial information is typically *nested in* other perceptual information. Normally, one cannot perceive a fact about an object without perceiving many other facts about it. Perceptual information is *dense*. This holds for spatial relations. Normally, one does not just perceive the distance between the chair and the bottle; one perceives many other spatial facts involving these objects, such as their spatial relations to other objects or to the background.

On the other hand, conceptual and linguistic representations carry more abstract information and allow for a *selective* representation of the scene. For instance, the distance between the chair and the bottle can be specified in language (at least in a coarse way; see below) independently of a linguistic representation of other spatial relations involving these objects.

(2) Linguistic representation of space is often *coarse*. Non-linguistic representation of space is *analogue* (Peacocke 1986).

In perception, it seems that any value of the spatial dimensions may enter into the fine-grained content of the representation. For instance, within certain psychophysical limits, any distance between two objects can be precisely represented. In contrast, our ordinary linguistic descriptions of a visual scene will often be less precise.[11] Of course, we can use precise numerical values, but not all languages and cultures have complex linguistic numerical systems (Gordon 2004).

(3) Any region of a represented scene can be *directly accessed* through perception, whereas some of them can only be *indirectly accessed* through language.

There is an indefinite number of different regions and directions in the perceptual field, but they can all be directly identified. For instance, when we perceive the region of the visual field which we call 'up to the left', the phenomenology of our perceptual experience is such that this region is directly accessed rather than represented as the product of two localizations: 'up' and 'to the left'. We could express this fact by saying that orientation in perception is homogeneous; all egocentric regions and directions

11. Levinson is well aware of this point, as the following quotation shows (2003:15): "Take, for example, the metric precision involved in seeing a cup before me, judging its distance from me, and reaching for it – there is nothing like this metric precision in ordinary language locative descriptions."

are perceived in the same way, i.e., without the mediation of a system of coordinates. This is not to deny that there are privileged dimensions in perception (such as the gravitational axis). The claim is rather that these dimensions are not used as axes *relative to which* regions and directions have to be located. In contrast, all languages have only a finite set of lexical items to represent locations and directions in space; many locations and directions can only be referred to using complex phrases.[12]

(4) Often, the origin of a coordinate system cannot be *dissociated from the figures to be located*. In language, such a dissociation is possible.

For instance, if perception represents things from a particular point of view, namely the perceiver's, this viewpoint is fixed at any given time and cannot be changed. I cannot *perceive* the world from another's point of view. In contrast, I can describe the bottle as being to your left, even if I perceive it as being to my right. It might be objected that the presence of alternative imagined perspectives is essential for the perception of three-dimensional objects in three-dimensional space.[13] But this is fully compatible with our point since the kind of imaginative act required for three-dimensional perception is precisely a simulation of possible perceptual experiences each with their fixed point of view. The significance of this point will appear in Section 7.

These differences between perceptual and linguistic spatial representations are substantial, but arguably they do not compromise the possibility of translation or conversion between non-linguistic and linguistic frames of reference. They do not contradict the general claim that perception and language can use the same *kind* of frame of reference but, as we shall see in Section 8, they suggest that the problem of cross-modal flow does not arise as proposed in Levinson's terms. Let us now turn to other potentially more significant differences between perception and language as far as spatial representation is concerned.

6. Perception and frames of reference

In what sense, if any, does perception involve a frame of reference? In this section, we try to answer this question with respect to each of the three kinds of frames of reference we have distinguished following Levinson. We argue that none of the three kinds of frames of reference is essential to perception. We further suggest the possibility that perception is in and of itself perspective-free (in the sense that it need not involve any of Levinson's three kinds of frames of reference). The reason it may appear perspectival

12. See Levinson (2003), especially Chapter 3.

13. An anonymous referee raised this objection. The role of imagination in objective perception is further discussed in Brewer (1999: 197).

is that perceptual information is reorganized by means of frames of reference at higher levels of cognitive processing.[14]

6.1 Intrinsic frames of reference

In *How the Mind Works*, Pinker speaks of frames of reference as "overlaying the visual field". In particular, he argues that "objects themselves can plot out reference frames" (1997: 266–267).

As an example, let us consider the spatial array depicted at the bottom of Figure 4 below. One way of *seeing* this array is by representing the bottle as being in front of the chair. It may seem obvious that this example and others of the same kind show that perception is perspective-bound, and in particular that it involves intrinsic frames of reference. Such frames of reference are intrinsic in the sense that they exploit functional or geometrical properties of the perceived objects.

However, it is not clear to us that the notion of an intrinsic frame of reference is needed to explain how we see the relation of the bottle to the chair. There is another way of seeing the array, namely by representing the bottle as being next to the chair. Of course there is a difference between seeing the bottle as being *in front of* the chair and merely seeing it as being *next to* the chair. The latter relation (x is next to y) is perspective-free[15] and requires no analysis of the objects in component parts (it is enough that they be seen as two different wholes), whereas the former relation (x is in front of y) is perspective-bound and requires such an analysis. Yet it may be argued that, insofar as we take into account the existence of geometrical and/or functional properties that are perceived *over and above* the spatial relations between elements in the scene, perspective-bound relations can be reduced to perspective-free relations. In the case of the bottle in front of the chair, we perceive the internal structure of the chair, which is spatially asymmetrical, so that we perceive the bottle not merely as being next to the chair, but as having various spatial relations to *parts* of it (this is of course a consequence of the fact noted in Section 5 that perception carries nested information). To say that we perceive the bottle as being in front of the chair is tantamount to saying that we perceive it as being near a particular side of the chair, namely its front.

Our claim is not that perception never uses intrinsic frames of reference; rather it is that such frames of reference cannot be the basic way in which spatial information is encoded in perception. Indeed, this can be formulated as a logical point. In order for geometrical properties of an object, such as asymmetries, to be exploitable for the definition of an intrinsic frame of reference, these properties must already be percep-

14. This claim is also made by Levelt (1996), although our arguments for it are different.

15. Of course, relational predicates such as 'near' or 'next to' are contextual in the sense that the context determines the relevant scale, but, as Levinson himself points out (2003: 65 sq.), they are not perspective-bound in his sense, i.e., they do not require the use of an intrinsic, relative or absolute frame of reference.

tually encoded independently of an intrinsic frame of reference, if we want to avoid infinite regress. Intrinsic frames of reference effects in perception are thus compatible with there being a basic level of perception which is perspective-free.

6.2 Absolute frames of reference

In his *Philosophical Remarks*, Wittgenstein made the famous claim that visual space involves a frame of reference:

> We can also say visual space is an oriented space, a space in which there is an above and below and a right and left.

Despite the use of terms like 'above', 'below', 'right' and 'left', which would seem to belong to *relative* frames of reference, Wittgenstein insists that the visual frame of reference is not relative to anything, but is *absolute*:

> And *this* above and below, right and left have nothing to do with gravity or right and left hands. It would, e.g., still retain its sense even if we spent our whole lives gazing at the stars through a telescope (1975: §206).

Interestingly, Russell defended a similar view in *Human Knowledge*:

> At every moment, what is in the center of my visual field has a quality that may be called 'centrality'; what is to the right is 'dexter', what to the left 'sinister', what above 'superior', what below 'inferior'. These are *qualities* of the visual datum, not relations (1948: 316).[16]

Wittgenstein gives the following argument for the claim that visual space involves an absolute frame of reference:

> Couldn't we imagine a visual space in which we would only perceive spatial relations, but not absolute positions? [...] I don't believe we could.
>
> In visual space there is absolute position and hence also absolute motion. Think of the image of two stars in a pitch-black night, in which I can see nothing but these stars and they orbit around one another (1975: §206).

Is this argument cogent? Wittgenstein's point holds at the level of what he calls a 'phenomenological language', which he contrasts with a 'physical language'. Phenomenologically speaking, visual space is exactly how it appears to us; there is no relevant distinction between visual space as it appears to us and visual space as it really is. As a consequence, if we can see two stars orbiting around one another without seeing any relational change in the scene, visual space must be absolute. However, it does not follow that, physically speaking, it is absolute. The stars actually change their spatial relations to at least parts of our body (including parts of the retina). There is more to the scene than what appears to us. Our perceptual systems can be sensitive to relational

16. On Russell's theory, see Casullo (1986).

changes without representing them explicitly. As situated perceivers, we can perceptually represent the motion of an object without representing the necessary changes in its spatial relations to some bodily sides. From the point of view of a physicalist theory of visual space, Wittgenstein's example shows at best that we can perceive motion in visual space independently of a *representation* of relational changes. It does not show that perception involves an absolute frame of reference, at least at the most fundamental level.

It might be objected that Wittgenstein's notion of an absolute frame of reference is different from Levinson's, insofar as it has nothing to do with the environment (for instance with cardinal directions). However, the point we raised against Wittgenstein has some bearing for Levinson's position as well. In both cases, absolute directions are not perceptually given. In Wittgenstein's case, they are pre-representationally individuated in relation to the perceiver's own body. In Levinson's case, in order to use an absolute frame of reference, a perceiver must at least initially anchor the coordinate system to some environmental gradient (mountain slopes, prevailing wind directions, celestial azimuths, etc.) and be capable of constantly keeping track of cardinal directions as he/she moves in space. An explanation of such a capacity cannot assume that these directions are in turn given in terms of an absolute frame of reference, if we want to avoid circularity.[17] The perceptual identification of a direction across perceptual contexts presupposes a non-absolute way of identifying them within a given context (for instance, using a demonstrative such as 'this direction'). In other words, the perceiver should have an independent way of perceiving the relevant directions, and thus absolute frames of reference cannot be the most basic way in which perceptual information is encoded.

So far, we have argued that neither intrinsic nor absolute frames of reference can be the basic formats of spatial representations in perception. Many cognitive scientists and philosophers indeed maintain that the most basic form of encoding of perceptual information uses relative frames of reference. But is this really the case?

6.3 Relative frames of reference

The claim that perception uses a relative frame of reference lies deep in a whole tradition of thought, from Kant to phenomenology and recent analytic philosophy. Here are some quotations from recent work:

> Our perceptual field has an orientational structure, a foreground and a background, an up and down. [...] This orientational structure marks our field as essentially that of an embodied agent. (Taylor 1978: 154; quoted by Evans 1982: 156)

17. If a subject had no other means of referring to directions than through an absolute frame of reference, he could not meaningfully wonder whether, or assert that, a certain perceptually presented direction is North. His assertions could only amount to tautologies, such as 'North is North', or contradictions, such as 'West is North'.

> [Let us] reflect upon how we might specify the spatial information which we imagine the perception to embody. The subject hears the sound as coming from such-and-such a position, but how is the position to be specified? Presumably in *egocentric* terms (he hears the sound as up, or down, to the right or to the left, in front or behind). These terms specify the position of the sound in relation to the observer's own body; and they derive their meaning in part from their complicated connections with the subject's *actions*. (Evans 1982: 155)

It may seem like a plain phenomenological fact that we always perceive objects as being to the left, to the right, above or below. However, we think that another of Levinson's great merits is to have shown, or at least suggested, that what we consider as a necessary condition of perception is in fact quite contingent. As Brown and Levinson put it:

> Kant was wrong to think that the structure of spatial regions framed on the human frame, and in particular the distinctions based on left and right, are in some sense essential human intuitions (1994: 9).

In particular, speakers of Tzeltal do not possess the notions of left and right. Of course, the fact that they lack these notions does not yet show that they do not *perceive* the world as being left-right oriented. However, once it has been shown that our cognitive scheme is not necessarily sensitive to distinctions based on left and right, the claim that perception must involve a relative frame of reference loses much of its force.

What are the arguments for the Kantian claim that perception must involve a relative frame of reference? One argument is that we need such a frame to recognize enantiomorphs across perceptual contexts. However, the case of Tzeltal shows that we can perceive the world while being relatively indifferent to enantiomorphs. Moreover, recognition across perceptual contexts might involve representations that are not strictly perceptual. The claim that at some level we *encode* perceptual scenes using a relative frame of reference does not show that, at the most basic level, perceptual information is itself organized in such a frame. If it were, indifference to enantiomorphs would indeed be difficult to explain.

Another common argument in favor of the claim that perception must involve a relative frame of reference concerns the connection between perception and action. Evans writes that "egocentric terms are the terms in which the content of our spatial experiences would be formulated, and those in which our immediate behavioural plans would be expressed" (1982: 154). However, it is not clear that perception has to use a relative frame of reference in order to *distinguish* directions in the perceptual scene, such as the left-to-right direction as opposed to the right-to-left direction. In each perceptual context, the relevant distinction can be drawn in *demonstrative* terms, for instance as the direction that goes from *here* to *there*. In general, acting on a location in the perceptual scene can be direct, in the sense that it does not rely on an

explicit identification of the acted upon location as opposed to other locations in the scene.[18]

In conclusion, although we naturally *specify* the contents of perception in egocentric terms, perception itself need not involve a relative frame of reference. To this extent we agree with Levinson. However, his point is that since the Tenejapans do not have a relative frame of reference in their language, their perception uses an absolute one. Our point is rather different. To say that in some cases perception does not use a relative frame of reference cannot imply that it uses either an intrinsic or an absolute one, since, as we argued in Sections 6.1 and 6.2, these latter frames of reference cannot themselves be basic, if we want to avoid infinite regress or circularity. Therefore, Levinson cannot conclude that, when perception is not organized at the most basic level in terms of a relative frame of reference, it must use either an intrinsic or an absolute one (the latter in the case of the Tenejapans). Instead, one should conclude that perception, at its most basic level, is either perspective-free or relative and that other kinds of frames of references are imposed on the perceptual data at higher levels of cognitive processing.

7. Implicit frames of reference

We have argued that perception can be perspective-free, in contradiction to the first premiss of Levinson's reconstructed argument in Section 4. This might seem strange, given the wide agreement in cognitive science that "directed action requires the brain to encode the positions of objects in multiple allocentric frames and multiple egocentric frames" (Gallistel 2002: 322). Here we focus on egocentric frames allegedly present in perception. Are these frames the same as Levinson's relative frames of reference?

It is in fact necessary to distinguish two notions of frames of reference. Perception need not involve a relative frame of reference in the sense that what it represents would have to be described by means of egocentric terms such as 'left' and 'right'. Perception is not necessarily relative in this sense. However, it can be said to be relative in a second, different sense. When we perceive objects and other spatial entities, we *exploit* our *actual* spatial situation relative to them. This relative situation need not be represented as such in perception. All perception is *implicitly* egocentric; it represents only *local* objects, regions, and directions, but it need not represent them *as* local. The implicit egocentricity of perception is well described by Perry in the opening passage of his essay "Thought without representation":

> I see a cup of coffee in front of me. I reach out, pick it up, and drink from it. I must then have learned how far the cup was *from me*, and in what direction, for it is the position of the cup relative to me, and not its absolute position, that determines how I need to move my arm. But how can this be? I am not in the field

18. For further development of this idea, see Dokic (2003).

> of vision: no component of my visual experience is a perception of me. How then can this experience provide me with information about how objects are related to me? (1993: 205).

In the next section, we try to go some way toward alleviating Perry's perplexity. In the meanwhile, the point is that even 'selfless' perception exploits at a pre-representational level one's spatial situation relative to the perceived scene. Perception represents things from a point of view which itself is not normally represented in our experience.

We can use the notion of a frame of reference to capture the second sense of the claim that perception is relative. Perception involves a frame of reference centered on a point of view, namely the perceiver's body, and whose axes are defined on the basis of our bodily axes. However, it is important to realize that this notion of a frame of reference is very different from the one used by Levinson. He assumes that distinctions between linguistic frames of reference can be aligned with distinctions between different formats of perceptual representations. He acknowledges that "at the level of perception, origin and coordinate systems presumably come pre-packaged as a whole, but at the level of language, and perhaps more generally at the level of conception, they can vary freely and combine" (2003: 54). But he suggests that in order to realign a linguistic with a perceptual relative frame of reference, it is enough that we set the origin of the linguistic coordinate system so that it coincides with ego. This may indeed be enough to make the two frames of reference extensionally equivalent. Yet, Levinson fails to grasp the full import of the fact that the origin is fixed in the perceptual case, and particularly its intensional significance.

In language a relative frame of reference allows for the representation of ternary relations among referent, relatum and point of view. In contrast, in perception the origin is necessarily implicit in the sense that it cannot be part of what is represented. Of course, there are cases in which one visually perceives parts of one's own body, but in such cases these bodily parts do not function as the origin of the relative frame of reference; rather, they are themselves located in the visual field relative to an implicit origin. The relative frame of reference used in perception is, as John Campbell puts it, intensional in the sense that "when the subject is identifying places egocentrically [in perception], he cannot be thought of as doing so by first identifying a physical thing, himself, through a body image, and then identifying places by their relation to his body" (1994: 13). In other words, the egocentric localization of a position in space does not depend on a prior identification of a body and does not presuppose an explicit representation of oneself as a term of a spatial relation to the position. Of course, it must be possible to exploit spatial relations between parts of our body and the world in order to perceive anything, but this is a condition for the possibility of spatial represent*ing*, not something that is itself spatially represent*ed*. If there is a frame of reference here, it is *implicit*, not part of what is explicitly represented. To use a

linguistic analogy, implicit frames of reference pertain to the *syntax* of perception, and only indirectly to its semantics.[19]

So we can maintain the claim that perception need not involve any explicit intrinsic, relative or absolute frame of reference and in that sense can be perspective-free. Moreoever, the possibility of implicit frames of reference has an interesting bearing on Levinson's claim about the commensurability between different kinds of frames of reference. We now turn to this last issue.

8. The cross-modal flow of information

According to Levinson, the cross-modal flow of spatial information presupposes shared frames of reference: "we will not be able to exchange information across internal representation systems that are not based on one and the same frame of reference" (1996: 155). Indeed, a crucial premiss of the neo-Whorfian argument is that one cannot freely convert information from one frame to another. Figure 4 below shows Levinson's summary of the compatibilities and incompatibilities of frames of reference (Levinson 1996: 154).

For instance, the representation 'bottle in front of chair', involving an intrinsic frame of reference, cannot be used to ground the representation 'bottle to right of chair', involving a relative frame of reference. In general, the only directions in which conversion is possible are from the two orientation-bound frames (relative and absolute) to the orientation-free one (intrinsic), and then only if the orientation of the ground object is fully specified.

We have two remarks on this premiss in Levinson's argument. The first one is fairly obvious, but perhaps worth reminding. When Levinson argues for untranslatability across frames of reference, he explicitly asks us to 'discard other information'. It is only at this condition that we cannot generate, for instance, the relative description 'bottle to right of chair' from the intrinsic description 'bottle in front of chair'. Such limitations occur only when other information is discarded. In contrast, appropriately nested representations are convertible. For instance, one may use a relative or an intrinsic mode of representation and nevertheless encode cardinal directions systematically enough to allow for a translation into an absolute mode of representation.

This point is relevant to the case of Tzeltal. As we saw, the Tenejapans cannot perceive the world exclusively in terms of an absolute frame of reference. Their ability to keep track of absolute directions cannot be explained unless these directions are perceptually presented, at the most basic level, in a non-absolute way. Now, keeping track of absolute directions enables them to conceive and talk about what they perceive, by converting perceptual information into absolute specifications and descriptions. There is no need to suppose that their language influences the way in which representations

19. For further thought on these lines, see Pacherie (2003).

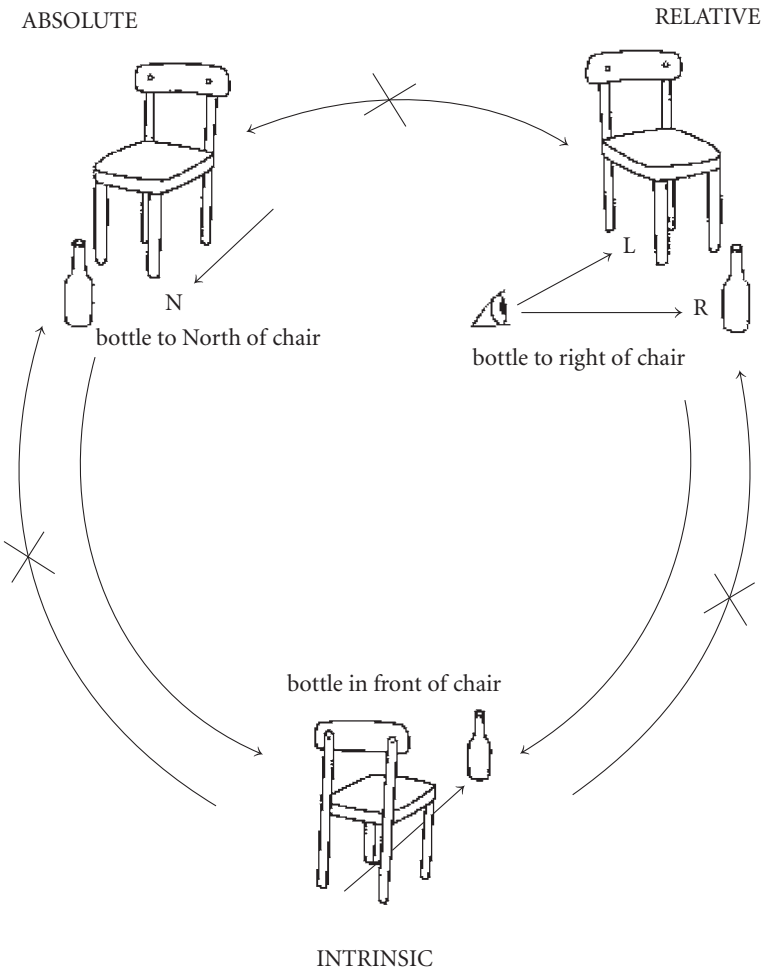

Figure 4. Slide from Figure 4.11, Levinson (1996: 154)

are coded at the perceptual level. As far as translatability constraints between frames of reference are concerned, perceptual representations might involve any kind of relative frame of reference, or indeed, at the most basic level, no frame of reference at all.

Our second remark is more general and concerns Levinson's model of cross-modal sharing of spatial information. Information flows from a source representational state to a target representational state, i.e., from one represent*ing* to another. Now Levinson seems to assume that the target representational state can only exploit what is explicitly represented in the source state. Thus, he uses the image of translation to capture what is involved in cross-modal information flow. However, Levinson's assumption is unwarranted. Even if the content of a source representational state cannot be translated into a target representation involving a given frame of reference, there can be

enough information associated with the state (although not part of its content) to ground a reliable perspective-bound representation.[20] In other words, relevant information which is not explicitly represented in the source state can be implicitly nested in it or associated with it.

Suppose for instance that I perceive a bottle next to a chair. We have argued that my perceptual representation might be perspective-free; in particular, I need not perceptually represent the bottle and the chair *as* bearing different spatial relations to parts of my body. As a consequence, there is no way of translating what is represented in perception ('bottle next to chair') into a relative description (either 'bottle right to chair' or 'bottle left to chair'). It does not follow that no relative description can be grounded on perception. The perceptual state supervenes on various mechanisms that carry information about spatial relations between elements in the scene and bodily sides. Such information is not part of what is perceptually represented, but can be exploited by a cognitive system in order to produce the perspective-bound representation 'bottle right to chair'. A conceptual representation based on perception can be sensitive not only to what is perceptually represented in perception, but also to the *mode* or *manner* of perceiving the scene.

In a nutshell, the cross-modal flow of information requires *reliable* transitions between representational states. A reliable transition can be sensitive to more than what is explicitly represented in the source state.[21] In particular, it can be sensitive to information that is implicitly nested in such a state or carried by underlying mechanisms. Levinson's model of translation is too crude to characterize the transfer of information from one mode of representation to another. Information can be exchanged even if there is some incompatibility at the level of content or what is explicitly represented.

From these two remarks, we conclude that there is no good argument from translation limitations to neo-Whorfianism and that Levinson's third premiss (Section 4) does not hold.

9. Conclusion

Although we agree with Levinson's negative point that perception need not essentially make use of a relative frame of reference, we are not convinced by his positive

20. This idea that information implicit at one level can be made explicit at higher levels is at the heart of the theory of representational redescription (Karmiloff-Smith 1992) and of the account of implicit knowledge given by Perner and Dienes (1999) in various cognitive domains.

21. This point also holds of other kinds of transition. For instance, the transition from the belief that it's raining to the belief that one believes that it's raining can be reliable (it is an instance of reflection), and is sensitive both to what is explicitly represented (that it's raining) and to the mode of the representation (the fact that what is represented is believed). For an account of such a transition, see Peacocke (1999).

neo-Whorfian claim. There are two alternatives to the view that perception essentially involves a relative frame of reference. One is that perception does indeed essentially involve a frame of reference, but that this frame can also be absolute or intrinsic. The other is that perception can be perspective-free, in the sense that it need not involve any explicit frame of reference. Levinson considers only the first alternative and claims that perception tends to adopt the frame of reference that is dominant in the language of the perceiver. We argued that this cannot be generally the case, given the dependent nature of intrinsic and absolute frames of reference. This clearly favors the second alternative. We also argued that once the existence of implicit, as opposed to explicit, relative frames of reference in perception is taken into account, the transfer of information across modalities can be explained without appealing to Levinson's neo-Whorfian hypothesis.

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CHAPTER 13

The relativity of motion in first language acquisition

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Available developmental research shows some variability across child languages, raising questions concerning universal vs. language-specific determinants of first language acquisition. We present results showing that the typological properties of French and English as verb-framed and satellite-framed languages strongly influence how adults and children (three- and five-year-olds) talk about motion. English speakers express path and manner in compact structures, while French speakers do so less systematically, frequently focusing on path or distributing information across utterances, depending on various factors (event properties, discourse context, lexicalization patterns). Children's language of motion is language-specific despite an increasing predicate density in both languages. From early on children construct a spatial language that tightly fits the adult system and further tune into this system during language and cognitive development.

Introduction

Developmental psycholinguistics has shown a growing concern for cross-linguistic research. Most of this comparative approach first aimed at generalizing claims about universal mechanisms of language acquisition. More recently cross-linguistic research has uncovered wide variations in how children acquire language, that raise some fundamental questions about such universals. Children's spatial representations seem to differ across languages, suggesting that language-specific factors have an impact on language and cognitive development. Such findings have been reported in relation to different aspects of space (location, voluntary motion, caused motion), at different moments during development (the prelinguistic period, the emergence of language, subsequent phases of acquisition until adult age), and on the basis of different types of data (naturalistic evidence, elicited productions, comprehension). This growing body of evidence has revived the Whorfian hypothesis of linguistic relativity, suggesting that language properties influence how children select or organize spatial information during the course of development.

After a brief reminder of some properties of spatial systems, we summarize some available results concerning children's spatial language that raise some questions concerning the role of universal vs. language-specific determinants in first language acquisition (Section 1). In the context of this debate, we then present the results of two studies comparing how French and English speakers (adults and children of three and five years) talk about motion in controlled experimental situations where they had to describe several types of motion events varying according to path and manner (Section 2). One central difference between French and English concerns whether manner and path information is expressed in verb roots or in verbal satellites (Talmy 2000). The results show that these language-specific properties strongly influence speakers' responses at all ages. English adults and children compactly express path and manner information and they do so systematically with all event types, even though they also do so increasingly with age and to different degrees in relation to various events. In contrast, despite an increase in the compact expression of path and manner with age, French speakers predominantly focus on path with most event types (at all ages) or on manner with some event types (children) and/or distribute these two types of information across utterances in discourse (children's disjoint reference).

The discussion explores several other factors that may partially account for these results (Section 3). In both languages discourse factors and particular event properties affect speakers' descriptions. However, this variability is much greater in French than in English. Furthermore, when describing some events, French speakers' responses also vary as a function of whether they have access to common verbs lexicalizing manner and path together (at all ages) and to some relevant path verbs (children). Finally, in both languages children's productions display an increasing degree of structural complexity and of semantic density, suggesting that general cognitive factors partially determine language acquisition. However, it is shown that such factors cannot account for the wide cross-linguistic differences that are observed at all ages. In conclusion (Section 4), despite some common developmental changes across languages, language-specific properties strongly influence how children acquire spatial language and partially structure their spatial representations from early on, inviting them to organize information in particular ways. This hypothesis is discussed in the light of currently available models addressing questions about the relation between language and thought in development.

1. Space in adult and child languages

1.1 Universals and linguistic relativity

Human languages provide powerful systems allowing all speakers to make a number of basic distinctions when talking about space. Thus, all speakers can distinguish situations that are static or dynamic, for example when locating entities or talking about displacements. In addition, they can distinguish motion events that do or do not imply

a change of location, when talking about displacements that imply distinct source/goal locations or that take place within a general location. In all languages predicates can also mark various aspects of dynamic situations, such as path (e.g., boundary, direction), manner (e.g., running, swimming), and whether displacements are spontaneous or caused by some external force (agentivity, causativity).

However, languages present wide variations in the particular systems they provide to mark such distinctions, some of which have been shown to affect how speakers conceptualize space (Bowerman 1996a, b, 2003, to appear, this volume; Bowerman & Choi 2001, 2003; Choi & Bowerman 1991; Choi, McDonough, Bowerman, & Mandler 1999; Brown 1994; Grinevald this volume; Levinson 1996, 1997, 2003; Weissenborn & Klein 1982). They provide different means of marking spatial relations (e.g., prepositions, postpositions, case, neutral or more complex predicates), highlight different dimensions (e.g., types and degrees of distinctions among spatial relations, posture, other spatial or functional properties of entities), and bring speakers to rely on different reference systems (absolute, relative, intrinsic). They also represent changes of location by varied lexical and grammatical means (Talmy 2000). *Satellite-framed* (or *manner-oriented*) languages encode the manner of motion in verb roots and its path in satellites (e.g., English (1)), whereas *verb-framed* (or *path-oriented*) languages encode path in verb roots, either leaving manner information unexpressed or throwing it at the periphery of the sentence (e.g., French (2)). These prototypical properties constitute paradigms that run through the language of motion, despite some exceptions, such as Latinate borrowings lexicalizing path in English (e.g., *to exit*, *to ascend*) or French verbs lexicalizing manner and path (e.g., *grimper* 'to climb up'), and they have implications for other domains beyond space *per se,* for example for the expression of causal relations (e.g., (3) and (4)).[1]

(1) He ran away [up, down, out of, into. . .] and crawled across the park.

(2) *Il est parti [monté, descendu, sorti, entré. . .] en courant et a traversé le parc à quatre pattes.*
(Lit. 'He left [ascended, descended, exited, entered. . .] by running and crossed the park on all fours.')

1. In contrast to the manner verb *to climb* (*to climb up, down, across. . .*), *grimper* lexicalizes manner and path ('to climb up', using limbs, necessarily upwards). Other such verbs in French (e.g., *escalader la montagne* 'to climb up the mountain', *dévaler les escaliers* 'to go down the stairs quickly'), as well as some adverbials (e.g., *au pas de course*, roughly 'by a running step'), are more marked and are not used by young children, e.g., they are only available for some actions, with specific grounds, and in a higher register. Path expressions can co-occur with manner verbs, for example to mark goal or direction (as in *courir à/vers l'école* 'to run to/towards school'), but are typically ambiguous with respect to location change outside of context (e.g., *marcher dans l'eau* 'to walk in [within/into] the water'). Causative constructions with intransitive path verbs mark caused motion (*faire descendre* 'to make go down'), but some transitive uses are possible (e.g., *descendre* 'to go down/to take down').

(3) He rolled the ball down.

(4) *Il a descendu/fait descendre la balle. Il l'a fait rouler.*
(Lit. 'He descended/made descend the ball. He made it roll.')

1.2 Space in child language

Until recently most researchers had agreed to view the development of human spatial cognition as being determined by universal and language-independent mechanisms that were either based on innate knowledge or gradually constructed during cognitive development. However, an increasing number of studies has shown wide cross-linguistic variations in how children acquire spatial language, leading some to question previous conclusions and to explore a new version of Whorf's (1956) hypothesis of linguistic relativity.

1.2.1 *Universal determinants*

Past developmental models predominantly focused on universal cognitive and perceptual determinants in the acquisition of spatial devices (e.g., since Piaget & Inhelder 1947; E. Clark 1972, 1973, 1980; H. Clark 1973). Until recently, most authors had agreed to view this domain of language acquisition as being strongly determined by underlying cognitive development, that was assumed to be general to all domains of knowledge and language-independent. For example, within the Piagetian framework, children first construct a *practical* space (topological relations such as neighbouring, separation, order, covering, continuity) on the basis of their displacements and interactions with entities. During later phases, they construct a projective space, when they can conceive of a relative perspective on objects (at around six years), then a Euclidean space (a system of axes and co-ordinates). Studies have indeed reported recurrent developmental sequences in the acquisition of spatial devices that seem to be observed in different languages (e.g., Johnston 1988). For example, children acquire prepositions that mark containment, then relations along the vertical axis (first *on/under*, then *above/below*), and finally relations along the sagittal axis (first *behind*, then *in front of*), which are at first based on particular object properties (e.g., intrinsic orientation).

A number of results also suggests the existence of extremely precocious spatial capacities, not predicted by any previous model. Infants display some remarkable knowledge of the physical world from a few months of age onwards, including knowledge of a large range of phenomena, such as object permanence, spatial and temporal relations, basic physical laws concerning motion and causality, as well as related notions such as agentivity (see reviews in Lécuyer, Streri & Pêcheux 1996; Hickmann 2003b). This research has led some to postulate a nativist view, according to which this *core* knowledge is initially preprogrammed and modular, despite the role of language in connecting knowledge modules during subsequent development (Carey & Spelke 1994; Leslie 1984, 1994; Quinn 1994, 1998; Quinn, Cummins, Kase, Martin, & Weissman 1996; Spelke 2003; Spelke, Breinlinger, Macomber, & Jacobson 1992). In

contrast, others argue that it is acquired through an early and active construction that is mediated by perception (Baillargeon 1987; Baillargeon, Needham, & deVos 1992; Cohen, Amsel, Redford, & Casasola 1998; Mandler 1988, 1992, 1998).

1.2.2 *Language-specific factors*

Other views propose that the semantic structures of languages have a major impact on how children acquire spatial language and organize spatial information. Some of the earliest comparative studies (e.g., Johnston & Slobin 1979) show that, despite a similar developmental sequence across languages, children encounter more or less difficulty in acquiring spatial markers as a result of language-specific factors (pre- vs. postpositions, morphological complexity, lexical diversity). More recent research (Bowerman 1996a, b; Bowerman & Choi 2001, 2003) shows cross-linguistic differences in how children describe static spatial configurations when locating entities. At three years of age children's productions look more like adults' descriptions in their own language group than like the ones that are produced by children of the same age in other language groups.

Cross-linguistic differences can also be observed in relation to how adults and children talk about motion (e.g., Allen, Özyürek, Kita, Brown, Turanh, & Ishizuka 2003; Berman & Slobin 1994; Bowerman 1996a, b, 2003; Eisenberg, Kako, Highter, & McGraw 1998; Hickmann 2003a; Slobin 1996, 2003, this volume). From the emergence of language onwards, children produce the devices that are most typical in their language (Choi & Bowerman 1991). For example, English learners use path particles for all types of motion (e.g., *out* to go out, *up* to be picked up, *down* when sitting down), whereas Korean children first talk about caused motion and only later acquire the equivalents of path particles for spontaneous motion. In more controlled situations (Bowerman 1996a, to appear) older children and adults distinguish caused displacements that do or do not involve a tight fit in Korean (e.g., putting on clothing, putting a cassette into its box vs. putting objects into a large box), whereas they make other distinctions in English (e.g., containment vs. support). Studies of early comprehension show that English and Korean learners are sensitive to these distinctions from 9 months on (Bowerman & Choi 2001; McDonough, Choi, Mandler 2003; see also Hespos & Spelke 2004 with five-month-old English learners). Finally, children speaking satellite-framed and verb-framed languages assert and presuppose different types of information in their narratives (Berman & Slobin 1994; Slobin 1996, 2003, this volume). For example, whereas English speakers provide manner information and elaborate trajectories, leaving locations to be inferred from path, Spanish speakers provide less manner information, less elaborate trajectories, and more static information situating protagonists and scenes.

This variability across several areas of space has begun to cast doubts on the existence of some previously postulated universals, raising fundamental questions concerning the relation between language and thought (for a review see Hickmann 2003a, b). This debate opposes different approaches that disagree with respect to whether language plays a role in structuring human cognition. According to one position, language

is a major tool mediating cognitive development (Gentner 2003; Vygotsky 1962). Beyond this position, it has also been claimed that language-specific properties further affect children's representations, inviting them to organize information in different ways (Bowerman 1996a, b, 2003, to appear; Bowerman & Choi 2001, 2003; Levinson 1996, 1997, 2003; Slobin 1996, 2003, this volume). In contrast, other views argue that language has no deep impact on non-linguistic cognition, beyond the fact that it may affect some of our linguistic behaviors (Clark 2003; Landau & Lakusta this volume; Munnich & Landau 2003).

In the context of this debate, very little research is available concerning spatial cognition during French acquisition. French can be described as belonging to the family of verb-framed languages (Talmy 2000) in that it most typically represents changes of location by encoding the path of motion in verb roots and does not easily allow the compact expression of multiple types of information (see examples (2) and (4) above). Recent analyses (Kopecka this volume) suggest that French verbal prefixes reflect remnants of a previous satellite-framed system, marking different types of information (e.g., manner, aspect, causativity, entity properties) concerning voluntary motion (e.g., *accourir* 'to run quickly to' combines the prefix *ac-* with *courir* 'to run') or caused motion (e.g., *écrémer* 'to take cream off' combines the prefix *é-* with a verb form derived from the noun *crème* 'cream'). Nonetheless, in contrast to satellite-framed languages, this system is now characterized by a low level of productivity (e.g., prefixes combine with few verbs which are rarely autonomous). Following Talmy, then, this language is predominantly verb-framed, despite minor variants of the satellite-framed type.

Previous studies of French acquisition have mostly focused on the expression of static relations (e.g., Piérart 1978), paying little attention to how children talk about motion and to the particular typological properties of this language. Our research (Hickmann to appear a; Hickmann and Hendriks in press) shows that, when talking about static spatial relations and about caused motion, French speakers massively rely on verbs to express particular types of information (manner of attachment, spatial and functional disposition), frequently using neutral prepositions or no preposition at all (e.g., *accrocher/être accroché (à)* Lit. 'to hook/to be hooked (at/to)', *emboîter/être emboîté* Lit. 'to in-fit/to be in-fit', *décrocher (de)* Lit. 'to unhook (from)', *désemboîter (de)* Lit. 'to un-in-fit (from)'). In contrast, English speakers massively rely on particles and prepositions together with relatively neutral verbs (e.g., *to put onto/into, to take off/out of*), using fewer specific verbs that mostly mark posture or the manner of causing displacements (*to be sitting in, to push into, to pull out of*). The results also show some developmental progressions among French children (three to six years), who produce some semantic overgeneralizations (e.g., *sur* 'on' instead of *au-dessus* 'above' at three years) and increasingly rely on verbs rather than on prepositions as their verbal lexicon expands (e.g., *mettre sur le crochet* 'to put on the hook' vs. *accrocher* Lit. 'to hook').

Other analyses (Hickmann 2003a; Hickmann, Hendriks, & Roland 1998) comparing narratives produced by adults and children (four to ten years) in four languages (English, French, German, Mandarin Chinese) show strikingly similar developmental progressions in children's ability to provide spatial anchors for locations and location

changes in their narratives. In all languages, this component of discourse cohesion is a late development, emerging after seven years of age and further evolving after ten years. Nonetheless, the data provide additional evidence showing cross-linguistic differences in how speakers represent motion from four years on. Predicates are least diverse and utterances least compact in French, most frequently focusing on one type of information at a time, such as path with changes of location (e.g., *partir* 'to leave', *monter* 'to ascend') and manner with motion that takes place within a general location (e.g., *voler dans le ciel* 'to fly in the sky'). In contrast, predicates are extremely varied and semantically dense in the other languages, frequently combining multiple types of information (e.g., *to run up/down, to fly into/away, to jump across, to pull down to, to scare/chase away)*.

We further compare below how French and English speakers talk about motion events in more controlled experimental situations that were designed to systematically examine how they express manner and path in different conditions. Particular attention is placed on how adults and children of three and five years describe spontaneous motion when presented with several types of displacements that are voluntarily carried out by agents in various manners and along different trajectories. Given previous results and French/English typological properties, it was predicted that French speakers should focus more on path and less on manner, in comparison to English speakers, who should describe both types of information as frequently. It was further expected that children within each language group would follow the adult pattern from the earliest age onwards.

2. Voluntary motion in French and in English

2.1 Method

The analyses below illustrate the results of two studies, both of which examined how English and French speakers described motion events that were presented to them in the form of animated cartoons on a computer screen (see Appendix). In all cartoons characters carried out a displacement in a particular manner (e.g., swimming, running, etc.), then left the scene. In some items (hereafter *target items*) displacements took place against a background scenery following particular trajectories before departure. In the first study animals moved up and down a vertical axis (six *up/down-targets*, e.g., a squirrel running up/down a tree and away). In the second study human characters moved across a boundary (six *across-targets*, e.g., a baby crawling across a street and away). A final set (*control items*) showed characters entering on one side of the scene against a blank screen, moving to the other side, and leaving. Manner corresponded to the types of actions that took place in the target items during the characters' departure in study 1 (e.g., a bear walking) or during their crossing of a boundary in study 2 (e.g., a baby crawling). These displacements were carried out in the absence of

any scenery that could provide specific relevant ground entities for the expression of path.[2]

The construction of these stimuli had two aims. First, target and control items were meant to provide a direct contrast between two conditions. One condition (target items) focused subjects' attention on location changes that involved relevant manner and path information, whereas the other (control items) minimized path information and highlighted manner.[3] It was therefore expected that subjects' responses to target items would vary across the two languages (less manner in French than in English), but not their responses to control items (mostly manner in both languages). Second, control items also provided a way of determining whether children were able to produce some manner information, particularly if they had not spontaneously mentioned this information in relation to target items.

The results reported below concern 120 French and English subjects (20 subjects per age group for each language in each study): 80 children aged three and five years, girls and boys in schools of Cambridge and Paris; 40 adults, women and men from the Universities of Cambridge and of Paris.[4] Subjects were seen individually and had to narrate each cartoon as completely as possible. The entire session was audio-taped. Adults were told that a future addressee, who would not be shown the cartoons, would have to reproduce the stories on the basis of the recordings. Children were introduced to a doll and were asked to blindfold her as part of a game in which they would be telling her secrets. They were reminded throughout to tell her everything that had happened because she could not see and would also like to tell the story. This procedure ensured that subjects produced full descriptions.

2.2 Coding

Descriptions typically consisted of one or two clauses with control items (e.g., (5)). They were more complex with target items, typically containing several narrative parts:

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2. Variations among target items included whether manner changed within event sequences for motion upward, downward, and away in study 1 (e.g., to run up/down/away vs. to climb up, to slide down, and to walk away) and for crossing/exits in study 2 (e.g., to run across/away vs. to swim across and to walk away). In both studies presentation order was varied within each set of target and control items (random orders) and counterbalanced across sets (targets before vs. after control items). Orders across sets tended to induce some expectations, but this effect does not change our conclusions (Hickmann & Taranne to appear b).

3. Control items nonetheless involved boundaries (entry/exit) and direction (forward). New control items have now been designed with the aim of further decreasing path information (no entry/exit, random displacements).

4. These data are part of a larger ongoing project involving seven groups of French and English speakers (adults, three- to ten-year-olds) and several spatial tasks. All effects reported here are statistically significant, unless otherwise described as tendencies or as not significant (Hickmann & Taranne to appear b).

a setting that provided initial background information ((6a) and (7a)); main events in the plot that included the characters' displacements up/down (*climbed up a table leg, slid down the table leg back to the floor* in (6b)) or across (*il a traversé une rue* 'he crossed a road' in (7b)); an ending that included the characters' departure from the scene (*tiptoed away* in (6c), *il est parti* 'he left' in (7c)).

(5) *C'est une souris qui marche.* (5 years)
('It's a mouse that is walking.')

(6) a. A mouse tiptoed across the floor,
b. climbed up a table leg, picked up a lump of cheese, and slid down the table leg back to the floor
c. and tiptoed away. (Adult)

(7) a. *J'ai vu un bébé marcher à quatre pattes dans un paysage urbain, il est descendu d'un trottoir,*
b. *il a traversé une rue*
c. *et il est remonté sur un trottoir et il est parti.* (Adult)
('I saw a baby walk on all fours in a city landscape, he came down a curb, he crossed a street and he went back up onto a curb and he left.')

Descriptions of motion events fell into three main types, depending on whether subjects expressed only manner (hereafter *manner-only* responses, e.g., (8)), only path (*path-only* responses, e.g., (9)) or both simultaneously (*manner+path* responses, e.g., (10)).[5] A fourth residual category included occasional responses that were ambiguous or expressed neither manner nor path (e.g., *to go*, *aller* with no further specification). Manner information was most frequently expressed by verbal forms (main verbs or gerunds, e.g., *A man is running across the street*, *Un monsieur traverse en courant* 'a man crosses by running'), although additional markings included adverbials (*monter avec les pattes* 'to go up with the paws', *to go/crawl on all fours*) and occasional subject nouns in utterances that otherwise expressed manner and/or path (e.g., in adults' responses such as (11)). Path information was expressed by verbs or by other devices indicating for example: a boundary (e.g., *across, off, away*; *traverser* 'to cross', *partir* 'to leave'), direction (*up, down, towards the left*; *monter* 'to ascend', *descendre* 'to descend', *vers la gauche* 'towards the left'), sources and goals (*from/to the tree*; *de/à l'arbre*), deixis (*to come back*; *venir* 'to come'), and other aspects of path (*along*; *le long de* 'along', *passer* 'to pass').[6]

5. General locations were not included as path information (e.g., *He was swimming in the river*). Verbal ellipsis was coded on the basis of context (e.g., *He crawled across and [he crawled] away; Il a traversé la route, puis [il a traversé] l'autre trottoir*' He crossed the road, then [he crossed] the other pavement'). Manner information was coded regardless of how closely it corresponded to the stimuli (e.g., *to walk* for crawling).

6. The path verb *passer* ('to pass') is highly polysemous. Despite some possible transitive uses akin to boundary crossing (e.g., *passer [dépasser] la maison* 'to go beyond the house'), it was

(8) a. to crawl, to swim, to run.
b. *ramper, nager, courir.*

(9) a. to cross, to go across, to go up/down, to leave, to go away.
b. *traverser* ('to cross'), *passer* ('to pass'), *monter* ('to ascend'), *descendre* ('to descend'), *partir, s'en aller* ('to leave').

(10) a. to run across, to crawl up/down, to walk away.
b. *traverser en courant* ('to cross by running'), *grimper* ('to climb up') *descendre avec les pattes* ('to descend with the paws'), *descendre en courant* ('to descend by running'), *partir en courant (*'to leave by running'), *s'en aller à quatre pattes* ('to leave on all fours').

(11) a. A jogger is running across the street. (Adult)
b. *C'est un nageur qui traverse la rivière.* (Adult)
('It's a swimmer that crosses the river.')

2.3 Results

Table 1 shows all responses and Figure 1 displays manner-path responses as a function of event type, language, and age. We first examine below how subjects described upward/downward motion and departures (study 1), then turn to their descriptions of crossing events (study 2), and finally discuss their responses to control items (both studies).[7]

2.3.1 *Up and down*

With respect to upward motion, English adults predominantly express manner and path together (89%). Children also do so, but increasingly with age (three years 67%, five years 86%), also producing some path-only responses (three years 25%, five years 11%), which practically disappear at adult age (3%). In comparison, although French adults frequently express path and manner together (61%), they do so less frequently than English adults and also produce path-only responses (35%). French children predominantly produce path-only responses (77% and 60%), less frequently manner+path responses (21% and 38%). With respect to downward motion, manner+path responses are frequent in English at all ages (children 62% and 67%, adults 69%). However, in comparison to descriptions of upward motion, path-only responses are

always used intransitively and with other readings by subjects (e.g., *passer sur la route* 'to pass on the road'). Almost all other path verbs in the corpora were also intransitive (*monter* 'to ascend', *grimper* 'to climb up', *descendre* 'to descend', *partir* 'to leave'), with the major exception of the transitive verb *traverser* ('to cross').

7. We only present data concerning departures in study 1 (up/down-targets), since departures were less systematically mentioned in study 2 (across-targets), where they were merely the continuation of a straightforward motion.

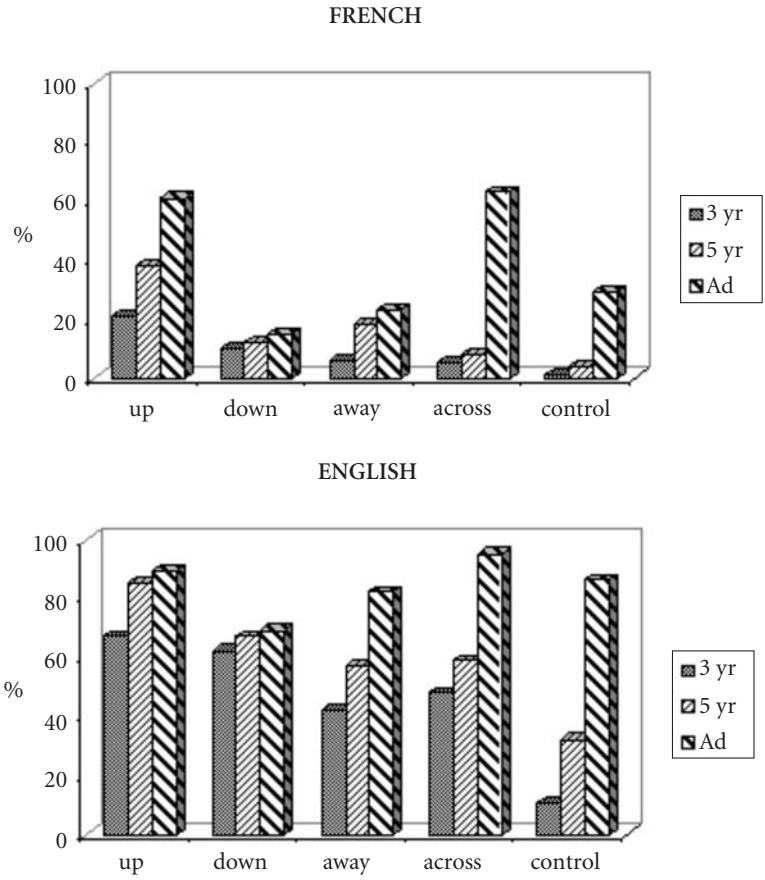
Table 1. Responses to target items (in %)*

	French			English		
	3 years	5 years	Adults	3 years	5 years	Adults
Up (study 1)						
Manner+Path	21	38	61	67	86	89
Manner	1	1	3	8	3	8
Path	77	60	35	25	11	3
Other	2	1	2	1	0	0
Down (study 1)						
Manner+Path	10	12	15	62	67	69
Manner	2	2	2	3	0	0
Path	87	81	72	33	33	25
Other	2	6	12	3	0	6
Away (study 1)						
Manner+Path	6	18	23	42	57	82
Manner	5	11	2	6	2	2
Path	86	68	74	48	42	17
Other	4	4	2	4	0	0
Across (study 2)						
Manner+Path	5	8	63	48	59	95
Manner	68	61	11	34	18	1
Path	1	1	3	1	0	0
Other	16	8	0	2	5	0
Control (studies 1 & 2)						
Manner+Path	1	4	29	11	32	86
Manner	92	94	66	87	68	14
Path	1	1	3	1	0	0
Other	5	1	1	1	0	0

* Two groups of 120 subjects (20 subjects per language and age in each study) produced responses concerning *up*, *down*, *away* (study 1), *across* (study 2), and *control* items (both studies).

more frequent (children 33%, adults 25%). French speakers of all ages massively focus on path (children 87% and 81%, adults 72%), less frequently describing both path and manner (children 10% and 12%, adults 15%). Manner-only responses are rare for any age and language group with upward or downward motion.

English speakers typically express the direction of vertical motion in particles and prepositions. In manner+path responses their verbs express manner (e.g., *to crawl up/down*) and in path-only responses they merely express motion (e.g., *to go up/down*), as well as occasionally deixis with downward motion (e.g., *to come back down*). French speakers massively express path in main verbs with both upward and downward motion. In path-only responses they provide no additional information about manner (e.g., *monter* 'to ascend', *descendre* 'to descend'). Manner+path responses most frequently contain the verb *grimper* ('to climb up', see Note 1), that simultaneously



*Two groups of 120 subjects (20 subjects per language and age in each study) produced responses concerning up, down, away (study 1), across (study 2), and control items (both studies).

Figure 1. Percentage of manner+path responses*

encodes manner and upward direction. Remaining manner+path responses provide manner in gerunds (especially among adults, e.g., *descendre en courant* 'to go down by running') or in adverbials (e.g., *monter avec les pattes* 'to go up with the paws').

2.3.2 *Away*

When describing the characters' departure from the scene (after upward and downward motion in study 1), English adults predominantly produce manner+path responses (82%) and occasionally path-only responses (17%). Within each age group English children produce these two response types as frequently, although manner+path responses tend to increase between three years (42%) and five years (57%) in comparison to path-only responses (48% and 42%). In contrast, French speakers frequently produce path-only utterances at all ages (three years 86%, five years 68%,

adults 74%), occasionally producing manner+path responses, which increase with age (three years 6%, five years 18%, adults 23%). Manner-only responses are rare in all groups. When describing departures, English speakers typically express manner in main verbs and path in other devices marking departure (e.g., *to crawl away*, *to run off*) or occasionally goal location (e.g., *to run home*). Most French responses only express path in main verbs (e.g., *s'en aller, partir* 'to leave'), but some occasionally specify manner in gerunds (mostly among adults, e.g., *partir en courant* 'to leave by running') or in adverbial phrases (e.g., *partir à quatre pattes* 'to leave on all fours').

2.3.3 *Across*

With across-targets English adults massively express manner and path together (95%), practically never producing other responses. English children also produce frequent manner+path responses, although they tend to do so increasingly with age (three years 48%, five years 59%), also producing some manner-only responses (three years 34%, five years 18%) and some path-only responses (three years 17%, five years 18%). In French, although French adults frequently express manner and path together (63%), other response types occur (path only 26%, manner only 11%). As expected, French children rarely express manner and path together (three years 5%, five years 18%). However, they focus more frequently on manner (three years 68%, five years 61%) than on path (three years 11%, five years 24%), contrary to our expectation that French speakers of all ages should focus on path (which is lexicalized in French path-verbs, while manner is peripheral), in comparison to English speakers (manner-verbs and path-satellites). Finally, note that in comparison to speakers' descriptions of upward/downward motion and departures (Sections 2.3.1 and 2.3.2 above), speakers of all groups rarely focus on path alone when describing crossing events and children in both language groups focus more frequently on manner alone.

In manner+path responses English speakers typically express manner in main verbs and path in other devices marking boundaries (e.g., *to run across*). Children sometimes use a path verb (*to cross*) or a neutral motion verb (*to go across*) and adults use additional devices to provide goal and/or further details about manner (e.g., *to crawl across on all fours to the pavement*). French speakers mostly use main verbs to express path (*traverser* 'to cross' among adults and *passer* 'to pass' among children, see Note 6), as well as manner or merely motion (e.g., *nager* 'to swim', *glisser* 'to slide', *aller* 'to go' mostly among children). In manner+path responses they also express manner by means of gerunds (mostly adults, e.g., *traverser en courant* 'to cross by running') or of adverbials (e.g., *traverser/passer à quatre pattes* 'to cross/pass on all fours'). French children also use prepositional phrases merely to mark general locations in manner-only responses (e.g., *nager dans la rivière* 'to swim in the river') and occasionally to mark goal locations in path-only responses (*passer/aller jusqu'à l'autre côté* 'to pass/go until the other side) or in manner+path responses (*nager jusqu'à l'autre bout* 'to swim until the other end').

Table 2. Responses to control items (in %)*

	French			English		
	3 years	5 years	Adults	3 years	5 years	Adults
Study 1						
Manner+Path	0	6	34	13	43	91
Manner	97	93	61	85	58	9
Path	3	2	4	2	0	0
Other	1	0	1	1	0	0
Study 2						
Manner+Path	3	3	25	8	26	81
Manner	93	98	73	90	74	18
Path	0	0	2	0	0	1
Other	5	0	0	2	0	0

* These results summarize two studies involving different subjects (20 adults, 20 three-year-olds, 20 five-year-olds in each study) who responded to control items in addition to up/down-targets (study 1) and to across-targets (study 2).

2.3.4 *Control items*

Recall that control items were meant to maximally focus subjects' attention on manner information. It was therefore expected that subjects in all groups would mostly produce manner-only responses. The results are only partly in line with our expectations (Table 2). In particular, although children do frequently focus on manner alone when describing these items in both languages, different patterns occur in the two age groups. Three-year-olds massively focus on manner both in French (92%) and in English (87%). In comparison, five-year-olds focus more on manner in French (94%) than in English (68%), where they also produce manner+path responses (32%). French adults frequently focus on manner (66%), but they sometimes express both manner and path (29%). English adults sometimes focus on manner alone (14%), but they predominantly encode both manner and path (86%).

These results show first that the absence of manner information in children's responses to target items (particularly in French) is not due to their inability to express manner. They also show some unexpectedly frequent manner+path responses at some ages in both languages (but see Note 3). Nonetheless, French speakers (adults and children) focus more on manner with control items than with target items, whereas English speakers (adults and to a lesser extent five-year-olds) frequently express both manner and path with both types of items.[8] A further qualitative difference can be observed in relation to the path information that is mainly expressed in English vs. French manner+path responses. As illustrated in (12) to (15), these responses express manner in main verbs and path in other devices that mostly mark two types of information: direction is most frequent in French, but the crossing of a boundary (based

8. It is unclear why manner+path responses tended to be more frequent with control items in study 1, although descriptions were generally less detailed in study 2.

on the screen as reference point, sometimes in addition to direction) is most frequent in English.

(12) *Un ours marche de droite à gauche.* (Adult)
('The bear walks from right to left.')

(13) A squirrel is running from right to left. (3 years)

(14) A baby is walking across. (5 years)

(15) A baby is crawling across the screen from left to right. (Adult)

3. Discussion

3.1 Manner and path across child languages

The results show first striking differences in how children and adults describe voluntary motion in English and in French. In English speakers show a preference for jointly expressing manner and path, despite some variations in their responses across ages and items. Manner+path responses are predominant at all ages, even though young children produce some path-only responses which decrease with age. They are also predominant with all target types, even though path-only responses are more frequent with some events (downward motion, departures) than with others (crossing events, upward motion). In addition, manner+path responses are frequent with control items, particularly among adults, who express manner together with direction and/or a boundary, even though these items were meant to focus subjects' attention on manner (but see Note 3). In general, English speakers express manner in the verb root and path in particles or prepositions, although occasional uses of verbs mark path or merely motion (when children do not express manner) and occasional uses of other devices provide further details about manner (especially in adults' responses).

In contrast, several patterns can be observed in French as a function of age and item types. Like English speakers, French adults do express both manner and path, but they do not do so as frequently with any event type and they do not do so as systematically across all event types. With target items their manner+path responses are more frequent with some events (across-targets, upward motion) than with others (downward motion, departures) and they frequently focus on path alone. With control items, they sometimes mark manner and direction but frequently focus on manner alone. Furthermore, French children rarely express manner and path together within the same utterance when describing any event type. Rather, they frequently focus either on path (upward/downward motion, departures) or on manner (across-targets, control items). When French speakers jointly mention path and manner, they typically express path in main verbs and manner in other devices. Otherwise, they use verbs to express only path or only manner. As discussed below (Sections 3.3. and 3.4), signif-

icant variations in French concern upward motion (manner+path responses occur at all ages) and across-targets (manner-only responses occur among children).

These differences between English and French directly follow from the typological properties of these languages. English is a satellite-framed language which encodes path in its satellites, thereby allowing speakers to simultaneously encode manner in the main verb root. In contrast, since French is verb-framed, it encodes path in the main verb root, thereby throwing manner at the periphery of the sentence. These language-specific properties highlight manner to different degrees, making this type of information more or less salient in the two languages (also see Slobin 2003, this volume). As predicted, English adult speakers systematically express manner with path, whereas French speakers clearly do not do so as systematically, frequently focusing on path alone. If English and French adults most frequently choose to represent motion in these ways, it is because they follow the predominant typological pattern of their language, even though other options are clearly available to them. Finally, notwithstanding some exceptions in French (particularly with across-targets, see below), children from three years onwards follow the adult system in both languages, suggesting the impact of language-specific factors early in acquisition. However, some developmental progressions also occur, showing that the joint encoding of manner and path increases with age in both languages. We return to these developmental progressions below (Section 3.5), but first consider additional factors that may partially account for the general patterns that were observed in the two languages.

3.2 Discourse factors and event properties

Two points concerning variations across event types deserve further attention. First, the data suggest that discourse factors may partially account for some of these variations. For example, recall that path-only responses were generally more frequent with downward motion and manner+path responses with upward motion, particularly in French, but also to some extent in English. This difference may partially result from the fact that subjects always mentioned upward motion before downward and may therefore have presupposed manner for downward motion when this information did not change across the two events (see Note 2). Some examples of adults' responses illustrate this phenomenon. Examples (16) and (17) (elicited with an item that showed the same manner for upward and downward motion) show manner+path responses for upward motion (*to climb up, grimper* 'to climb up'), but path-only responses for downward motion *(to come back down*, *redescendre* 'to come down again'). Examples (18) and (19) (elicited with an item that showed manner contrasts) show manner+path responses for both upward motion (*to climb up*, *grimper* 'to climb up') and downward motion (*to slide down, redescendre en se laissant glisser* 'to come down by letting oneself slide').

(16) A bear climbs up to a beehive, comes back down, eats some honey, and then walks away.

(17) *C'est un ours qui grimpe le long du tronc d'un arbre jusqu'à un nid d'abeilles qui est sur une branche. Il attrape du miel, il redescend et il s'en va.*
('It's a bear that climbs up along a tree trunk until a bees' nest which is on a branch. It catches some honey, it comes down and it leaves.')

(18) The monkey walks up to a tree, where there are various sorts of fruit, banana on the top, climbs up the tree, takes a banana, slides down the tree and walks off.

(19) *C'est un singe qui grimpe le long d'un bananier pour attraper une banane, il attrape une banane et il redescend en se laissant glisser et ensuite il s'en va.*
('It's a monkey that climbs along a banana tree to catch a banana, it catches a banana and it goes back down letting itself slide and then it leaves.')

However, although manner was rarely the same for departures and for upward/downward motion, discourse factors did not significantly affect how adults described departures in English (mostly manner+path responses, e.g., *to walk away/off* in (16) and (18)) or in French (mostly path-only responses, e.g., *s'en aller* 'to go away' in (17) and (19)). In comparison, as illustrated in the five-year-olds' responses (20) to (23), children were generally more likely to produce manner+path responses when talking about upward motion (e.g., *to climb/walk up, grimper* 'to climb up'), but path-only responses in their subsequent discourse about downward motion (*to come down, redescendre* 'to come down again') and departures (*to go away/back, repartir, s'en aller* 'to leave [again]'). We return below to other factors that may further contribute to this pattern, particularly in French, where it was most frequent (see Section 3.3).

(20) He [=bear] climbed up the tree. And got some honey from the beehive. And he came down and went away.

(21) A monkey was walking up the tree and getting a banana. He came down. He went back.

(22) *C'est un ours qui grimpe à l'arbre. Pour attraper du miel. Après il redescend et il repart.*
('It's a bear that climbs up the tree. To get some honey. Then he comes down again and he leaves again.')

(23) *Y'a un singe qui grimpe à l'arbre. Il attrape une banane, il redescend de l'arbre et il s'en va.*
('There's a monkey that climbs up the tree. He gets a banana, he comes down again and he leaves.')

Second, a closer look at the data shows that variations across stimuli within a given target type may be partly due to the fact that some items inherently highlighted manner or path. For example, one across-target showed a baby crawling across a street at an intersection where cars could be seen in the background. This situation tended to elicit path-only responses, particularly among children in both languages, who also produced a variety of comments (e.g., *Oh, it's dangerous* . . .). Crossing the road corre-

sponds to a conventional situation that is frequently highlighted by adults in relation to potential danger, irrespective of manner, thereby making path more salient than the particular manner in which dangerous actions might be performed. Similarly, manner was somewhat more salient with one item that showed a boy sliding across a frozen river in an unusual manner (without skates on), in addition to showing manner contrasts (he walks to the river, slides across, walks away). This item tended to elicit manner information in children's descriptions, as illustrated in (24), where the child searches for lexical items in order to highlight this unusual manner (sliding on shoes vs. ice-skating).

(24) *Le petit garçon et ben il avait pas de... chaussures pour faire de la glace mais il a glissé sur ses chaussures et après il est remonté. (5 years)*
('The little boy well he didn't have... shoes to do ice but he slid on his shoes and then he went back up.')

However, although such aspects of motion sequences may have influenced subjects' responses in both languages, few differences across items were significant and the distribution of responses was remarkably similar for all items within each language. More generally, although reliance on discourse presuppositions and particular event properties may partially account for why subjects expressed manner or path to different degrees in both languages, these factors have limited explanatory power in the face of the large differences that were observed between English and French at all ages. English speakers express manner more frequently than French speakers with all event types, including with those events that elicit the most path-only utterances in both languages. In addition, French speakers rarely express manner, except with upward motion (manner+path responses at all ages) and with crossing events (adults' manner+path responses, children's manner-only responses). We turn to other factors that may account for some of this variability in French.

3.3 Lexicalization in French

Some variations across items also result from specific lexicalization patterns in French. In particular, target items did not provide French speakers with the same opportunity to express manner and/or path by lexical means. This point can be illustrated in two ways. First, recall that upward motion elicited the most manner+path responses in French. At all ages speakers often described this type of event by means of the verb *grimper* ('to climb up'), which simultaneously lexicalizes manner and path, whereas no such common manner+path verb is available to describe downward motion, crossing events, or departures (see Note 1). With these other types of events, speakers mostly produced two types of responses: path-only responses (e.g., *descendre* 'to descend', *traverser* 'to cross', *partir* 'to leave'); manner+path utterances that contained a main path verb with peripheral manner information in adverbials (e.g., *partir/traverser à quatre pattes* 'to leave/cross on all fours') and/or in more complex structures containing

gerunds (mostly among adults, e.g., *partir en courant* 'to leave by running', *traverser en marchant à quatre pattes* 'to cross by walking on all fours').

Second, when describing across-targets, French adults used the verb *traverser* ('to cross'), but children rarely used this verb, which does not seem to be part of their spontaneous verbal lexicon. Recall that these children produced frequent manner-only responses with these events. These responses typically consisted of a manner-verb with no further information other than some general locations, as illustrated in (25) (e.g., *glisser* 'to slide'). The remaining responses were less frequent and varied: path verbs used alone, particularly *passer* ('to pass', see Note 6), illustrated in (26); path verbs or neutral motion verbs with adverbial phrases marking goals (in path-only responses, e.g., *passer/aller jusqu'à l'autre bout* 'to go/pass until the other end') and/or manner (in manner+path responses, e.g., *passer en vélo* 'to pass by bike', *aller en vélo jusqu'à l'autre côté* 'to go by bike until the other side'); manner verbs with adverbial phrases marking goals (in manner+path responses, e.g., *nager jusqu'à l'autre pente* 'to swim until the other slope.').

(25) *C'est un petit garçon qui a couru sur la neige, après il a glissé et après il a couru sur la neige.* (5 years)
('It's a little boy that ran on the snow, then he slid and then he ran on the snow.')

(26) *Il a passé sur l'herbe et il a passé sur la route et il a passé sur l'herbe.* (3 years)
('He passed on the grass and he passed on the road and he passed on the grass.')

Note that common manner adverbials marking peripheral manner information were most likely with some events, particularly those involving instruments (e.g., *en vélo* 'by bike', *en patins* 'with skates'), whereas only more marked adverbial expressions that are available to describe some activities such as running or swimming (e.g., *au pas de course, à la nage*, roughly 'with a running step, with a swim') were rarely used (see Note 1). Adults' descriptions of such activities typically involved gerunds in subordinate clauses (e.g., *traverser en courant* 'to cross by running', *partir en marchant* 'to leave by walking'), which were rarely produced by young children. The greater complexity of such structures may account for why manner+path responses were more frequent among adults than among children in French, as well as for why they were overall less frequent in French than in English, particularly with downward motion, departures, and crossing events.

These data suggest that the relative availability of particular lexical items may lead to different representations in speakers' responses. English speakers of all ages express path by means of particles or prepositions and systematically combine this information with lexicalized verbal information about manner. In contrast, given the properties of French, French speakers are more likely to jointly express manner and path when both can be simultaneously lexicalized in a common verb (adults and children with upward motion). In addition, French children's frequent manner-only responses with

across-targets may partly result from a lexical gap due to the fact that the most relevant path verb for this event type is not yet spontaneously available to them. Finally, manner+path responses are more costly than other responses in French, especially when they require complex structures, and they are therefore less likely to be used by children.

As suggested by Talmy (2000), different lexicalization patterns induce speakers to foreground and background information in different ways. Our data support this hypothesis, although they also suggest the need to modulate it in one respect. Talmy emphasizes the implications of satellite- vs. verb-framed patterns for what information should be most foregrounded (salient) or backgrounded (automatized) within the structure of individual utterances, irrespective of where these utterances occur in discourse. Analyses that go beyond individual utterances show that other factors contribute to highlighting manner or path to different degrees (presuppositions from prior discourse, contrastive contexts, knowledge of particular event properties). Thus, although processes of foregrounding and backgrounding are clearly influenced by typological language properties, they are not entirely independent of discourse context and world knowledge that invite speakers to focus on different types of information within or across utterances, regardless of the language they speak.

3.4 Joint vs. disjoint information

A further qualitative look at the French corpora provides complementary information concerning children's responses to across-targets. Some of these responses show that French children tend to distribute manner and path information across utterances when describing larger event sequences. Examples (27) and (28) each contain some manner-utterances (*en vélo* 'by bike', *pédaler* 'to pedal' in (27); *courir* 'to run' in (28)) and some path-utterances (*partir de l'autre côté de la route* 'to leave on the other side of the road' in (27); *aller de l'autre côté* 'to go to the other side' in (28)). Example (29) illustrates a related phenomenon among French adults (also see example (11) above), who occasionally focus on the path of a crossing event (*traverser* 'to cross'), but provide manner information in presentative structures (*C'est un coureur qui court* 'It's a runner that is running'). Thus, manner and path are frequently disjoint in French (particularly among children), whereas they are compactly expressed within the same structures in English (by children and adults, e.g., (30) and (31)).

(27) *La dame elle est arrivée en vélo, elle a pédalé sur son vélo et elle est partie de l'autre côté de la route. (3 years)*
('The lady she arrived on her bike, she pedalled on her bike, and she left on the other side of the road.')

(28) *Ça parle d'un grand monsieur qui a couru, couru, couru, il est allé sur la route et puis il est allé de l'autre côté. (3 years)*
('It talks about a big man that ran, ran, ran, he went on the road and then he went to the other side.')

(29) *C'est un coureur qui court et il traverse la route en pleine campagne.* (Adult)
('It's a runner that is running and he crosses the road in the countryside.')

(30) He got out of his pram and he crawled across the road to the other side.
(5 years)

(31) A baby is walking on a pavement, going down onto the road, and crawling across the road and pavement, getting back onto the pavement on the other side, and crawling away again. (Adult)

French children, then, do notice, recall, and verbalize both manner and path information, but they do not jointly express them within the same structure like English children. Rather, they express them in a disjoint way, as they describe successive events in unfolding discourse. This cross-linguistic difference further points to the impact of typological language properties on speakers' verbal representations. In particular, these properties affect children's descriptions at two levels of linguistic organization, influencing how they construct sentences about particular motion events by means of the most available structures in their language, as well as how they organize utterances in discourse when describing larger event sequences. Despite discourse factors, English children systematically represent most successive events in such sequences by providing both manner and path information. In contrast, French children rarely represent events in this way. They either exclusively focus on one aspect of motion (path or manner) or alternate path and manner information in discourse (disjoint information), particularly when relevant lexical items are not common in the system (manner+path verbs) and/or not spontaneously available to them (the path verb *traverser* 'to cross'). In both cases they successively string partial representations across utterances, leaving some information unexpressed at different points in discourse. When information is disjoint, however, the unfolding discourse provides a growing global representation that may allow the addressee to infer implicit information, if it is necessary to reconstruct all of the information that is associated with each event in the sequence.

3.5 General developmental changes

Finally, although comparisons across age groups show that children's responses generally follow the adult patterns from three years on, they also show some developmental progressions in both languages. English adults systematically encode both manner and path, but English children do so increasingly with age, also producing some path-only utterances, that decrease with age. Similarly, although French adults frequently focus on path alone, they do express path and manner together with some event types. In comparison, French children frequently focus on path or on manner and, even at five years, they still rarely express both path and manner simultaneously or distribute this information across utterances in discourse.

General cognitive factors may account for these developmental progressions in two ways. First, developmental change may reflect the greater complexity of structures that simultaneously express several types of information and are therefore formally

and semantically richer than structures expressing only one type of information. Indeed, despite strong language differences, children differ from adults in both languages in that they produce more utterances that only focus on one piece of information at a time (path or manner). Second, some types of information pertaining to motion events may be more basic than others. In addition to motion *per se* (kinesis), which corresponds to the most basic inherent property of dynamic situations, the particular path that is followed by a displacement in space may constitute a more central type of information in comparison to the manner in which it is carried out (Talmy 2000). Path is particularly relevant in the case of location changes, which have major implications for the overall discourse representation (e.g., locating protagonists throughout the plot line), and it is therefore the most frequently expressed component in these cases. In this respect, despite a frequent misinterpretation of Talmy's typology, which has been to assume that speakers of satellite-framed languages should prefer manner over path, our study shows the consequences that should be expected on the basis of this typology: satellite-framing favors more attention to manner, but not less attention to path. Indeed, when English children express only one type of information with target items, they typically focus on path, rather than on manner. This hypothesis may also account for why French children frequently focus on path alone with most event types.

General cognitive determinants, then, may partially explain the differences that were observed in both languages between children and adults, as well as between three- and five-year-olds. However, they cannot be the only determinants of developmental change for at least two reasons. First, general cognitive determinants cannot account for why jointly expressing path and manner is a predominant response in English, but not in French, among children of the same ages. Since universal cognitive determinants should have the same impact across languages, children should display similar verbal behaviors at the same age level, regardless of their language. Cognitive determinants seem to play a differential role in the two languages, precisely because children are confronted with different linguistic systems. In particular, developmental progressions are more striking in French, because jointly expressing manner and path constitutes a more complex task in this language. Second, cognitive factors cannot account for why French children sometimes focus on manner when describing some motion events (particularly crossing events). Although the data suggest that these children may have access to manner and path information, this information is frequently disjoint across their utterances. In contrast, despite some developmental progressions, English children compactly present joint information within the same structures.

Previous cross-linguistic research (Hickmann 2003a) shows strikingly similar developmental progressions in how children of different language groups learn to construct discourse cohesion in several domains (reference to entities, time, space). Despite wide cross-linguistic differences that can be observed in all of these domains, all children gradually learn to mark given vs. new information, to mark temporal relations that contribute to the foregrounding and backgrounding of information in discourse, and to provide the necessary spatial anchors for the overall discourse representation of locations and location changes. We therefore suspect that the different ways in which

English and French children distribute spatial information within or across utterances in discourse mainly result from language-specific factors influencing how they represent motion. Such factors include the typological properties of their language (as verb-framed or satellite-framed systems) and the relative availability of compact procedures expressing manner and path together in this system (frequent manner+path structures in English, rare common manner+path verbs in French). In addition, depending on their developmental level, children do not yet spontaneously have access to particular lexical items and to complex structures that are necessary to express both types of information simultaneously (e.g., French children's gradual mastery of some path verbs and of gerunds in subordinate clauses). Given these factors, and notwithstanding some discourse factors that may apply to both languages, manner is less likely than path to be a salient aspect of location changes in French, because path is lexicalized in the verb and because jointly expressing manner with it is more marked than in English.

4. Concluding remarks

French and English speakers do not talk about motion in the same ways. Their descriptions are strongly influenced by the typological properties of their language which distributes in particular ways relevant information in main verb roots and in other devices. Although various other factors may explain some variability (discourse relations, event properties, cognitive development), they cannot account for the massive cross-linguistic differences that were observed at all ages with all event types. In particular, the joint expression of manner and path is systematic in English (adults and children), whereas it is age- and event-specific in French, occurring in two types of cases. Adults and children jointly express manner and path when they can make use of a common verb that simultaneously lexicalizes both types of information (available for upward motion). In addition, adults use structures that express path in the verb and manner in its periphery, particularly when common manner+path verbs are not available in the system (downward motion, departures, crossing events). These structures, however, are complex and cognitively costly to children, who in addition do not spontaneously produce some relevant path verbs for the description of some events (crossing).

Cognitive determinants may also partially explain why structures become denser and more complex with increasing age in both languages. However, they cannot account for the strong linguistic differences that were observed at all ages, which show that manner is less salient to French children than to English children of the same ages. Children seem to start out with a system that is close to the adult system, in which either manner or path is lexicalized in the verb. They then further tune into this system during the course of language and cognitive development, for example as a result of increasing processing capacities (in both languages), as well as with the expansion of their verbal lexicon and their increasing ability to master structural complexity (in French). Furthermore, language-specific properties affect not only how children

construct sentences about motion, but also how they organize spatial information across utterances in discourse. These results raise some more general questions concerning the relation between language and thought during development. They suggest that language plays a role in channelling and filtering incoming information, thereby structuring in significant ways how children construct their spatial representations in discourse.

Further research must now address some remaining questions. For example, ongoing experiments examine the responses of older French and English children (from six to ten years) in order to determine when and how their productions become denser and more compact. This research also includes other languages that present different properties within the same typological families (such as German), as well as additional event types that invite them to express yet denser information (such as caused motion). Longitudinal analyses further examine younger French children's productions from the emergence of language onward in order to determine whether typological properties affect their earliest verbal representations of space and how these representations change during initial phases of language development. Finally, the inclusion of nonverbal tasks (categorizing motion events) with subjects of different language groups will provide complementary information concerning the impact of language-specific properties on speakers' non-linguistic representations at different points during development. All of these lines of research are necessary to determine the relative impact of general and language-specific factors on how children acquire spatial language and construct their spatial representations.

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APPENDIX
Up/down-targets in study 1

1) A bear walks to a tree, climbs up to a beehive, takes some honey, climbs down backwards, eats the honey, and walks away.
2) A cat runs to a telephone pole, jumps up to a bird's nest, drops an egg, jumps down backwards, licks the egg, and runs away.
3) A caterpillar crawls to a stalk, crawls up to a leaf, eats a piece of the leaf, crawls down head first, and crawls away.
4) A monkey walks to a banana tree, climbs up, takes a banana, slides down backwards, and walks away.
5) A squirrel runs to a tree, runs up to a hole, goes in and out of a hole, runs down head first, and runs away.
6) A mouse tiptoes to a table, climbs up to a piece of cheese on the table, takes the cheese, slides down backwards, and tiptoes away.

Across-targets in study 2

1) A man runs to a country road, runs across the road, and runs away.
2) A girl rides to railroad tracks on a bicycle, rides across the tracks, and rides away.
3) A baby crawls to a street, crawls across the street, and crawls away.
4) A boy walks to a river, swims across the river, and walks away.
5) A boy walks to a frozen river, slides across the river on his shoes, and walks away.
6) A girl walks to a frozen lake with skates on, skates across the lake, and walks away.

Control items in study 1

1) A bear walking. 2) A cat running. 3) A caterpillar crawling. 4) A kitten running. 5) A squirrel running. 6) A mouse tiptoeing.

Control items in study 2

1) A man running. 2) A girl riding a bicycle. 3) A baby crawling. 4) A boy swimming. 5) A boy sliding. 6) A girl skating.

CHAPTER 14

Spatial language and spatial representation

Autonomy and interaction[1]

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In this chapter, we explore the nature of spatial language and how it engages non-linguistic spatial representational systems. We ask to what degree and in what way spatial language depends on non-linguistic spatial representation for development, and to what degree it can emerge autonomously. We focus on spatial language in people with Williams syndrome, who have severe non-linguistic spatial impairments but relatively spared language. We consider the problem of what is to be acquired when one learns spatial language, and how it might be affected when one or more aspects of non-linguistic spatial representation is impaired. Our conclusion is that it depends: Where spatial language encodes the spatial world in a coarse manner, it emerges with normal structure even in people who have other spatial impairments. Where spatial language encodes the spatial world in a more detailed (less coarse) manner, we observe impairments that echo the ones observed in non-linguistic tasks. Quite different outcomes underscore the fact that spatial language is a system with its own special properties, that it interfaces with (but does not copy) spatial non-linguistic systems, and that finding sparing or breakdown may depend largely on where we look.

Introduction

As we look around the world, we effortlessly perceive objects, spatial layouts, and events. Perhaps more remarkably, we readily and easily talk about these things, describing what we saw and where, how things happened, and how events changed over space and time. How is this accomplished? The answer to this question is of central

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importance in understanding a fundamental fact about human cognition: We can talk about what we see.

Our general purpose in this chapter is to shed light on this problem. We will do so by exploring the relationship between our spatial representations of the world and the language that encodes them, asking which aspects of spatial language depend directly on non-linguistic spatial representations of the world, and which can emerge autonomously – independent of our spatial representations. We will evaluate the possibilities by offering evidence on the nature of spatial language in children and adults with Williams syndrome – a rare genetic deficit which gives rise to a unique cognitive profile in which spatial representations are severely impaired but language is relatively spared.

Williams syndrome (WS) raises questions of considerable general interest to scientists seeking to understand the architecture of human cognition, because dissociation across knowledge domains would support the notion that cognitive systems are highly specialized and therefore can emerge independent of each other – autonomously. There is currently much debate about the strong hypothesis of autonomy between space and language in Williams syndrome. Some have argued that there is indeed sparing of significant aspects of the language learning system, even in the face of severe spatial deficits, consistent with developmental autonomy of the two systems (Bellugi, Marks, Bihrle, & Sabo 1988; Clahsen & Almazan 1998; Zukowski 2001; Landau & Zukowski 2003). Others have argued that there is no sparing of language in Williams syndrome, nor of other cognitive systems, since genetic deficits that target one system will inevitably affect all cognitive systems (Karmiloff-Smith 1998; Thomas & Karmiloff-Smith 2002).[2]

Our chapter will address a very specific version of this broad hypothesis by asking whether, where, and to what extent language and space interact. We should say at the outset that we believe that some degree of autonomy between language and space is inevitable: In an important sense, spatial representations and language must be autonomous, since they engage quite different computational systems and serve very different functions. Thus, formal elements of language, such as noun phrase and verb phrase, do not appear as part of any known spatial computational system. And formal elements of spatial representation, such as reference systems, play no direct role in our knowledge of language. At the same time, this autonomy cannot be complete: Spatial representations and language must interact, since we must be able to talk about what we see. Yet how the brain and mind carry out this interaction is not well understood.

We believe that the case of Williams syndrome affords a unique opportunity to better understand the ways in which space and language interact, and how these inter-

2. There is much debate about use of the term "sparing" in developmental disorders. Some propose that there can be no sparing except in cases of frank lesions, which might be followed by some recovery. To be clear, in this paper, we use the term sparing to indicate the presence of normal structure, whether it occurs consequent to frank lesion or genetic/developmental disorder.

actions emerge in both normal and unusual development. In particular, the study of WS people – in comparison to normally developing children – allows us to identify the specific sites of interaction that might be more or less vulnerable to breakdown under severe spatial impairment. By exploring this issue, we hope to more broadly illuminate the degree of autonomy and interaction between language and spatial representation.

In the next sections, we first address the question of what is to be acquired. As in any study of language, we must be sure to understand the nature of the mature system before testing any hypotheses about sparing or breakdown. In the case of spatial language, we need to ask how – in principle – it could be affected by a severe deficit in non-linguistic spatial representation. Second, we review evidence of reported *deficits* in spatial language among children and adults with Williams syndrome. We argue that much of this evidence is ambiguous with respect to *knowledge* of spatial language because the reported deficits do not clearly distinguish between absence of knowledge and impairment in a host of performance mechanisms. Finally, we review evidence from our own lab showing that some aspects of language do indeed emerge unaffected by the spatial impairment, while others do not. Those aspects of spatial language that are negatively affected by the spatial impairment are – perhaps not surprisingly – those whose meanings call for more or less direct links to aspects of spatial representation that we know, on other grounds, are impaired in Williams syndrome. This provides evidence for the *dependence* of space and language. In contrast, those aspects of spatial language that do not require such direct links are not affected, providing evidence for *autonomy* of space and language. We conclude by arguing that the study of Williams syndrome – like other unusual perspectives on human cognition – can shed light on the normal architecture of cognition, and specifically, on the sites of interaction and non-interaction between the language faculty and the various domains of spatial representation.

1. Spatial language: What is to be acquired and how might it break down?

Many theorists have assumed that talking about objects and events in the world depends, in part, on our non-linguistic representations of the world. Because we can talk about aspects of our spatial experience, there must be some elements of linguistic and non-linguistic representation that are shared. This idea has been explored extensively by cognitive scientists including psychologists, computer scientists and linguists (H. Clark 1973; Fillmore 1997; Landau & Jackendoff 1993; Hayward & Tarr 1995; Herskovits 1986; Jackendoff 1983; Miller & Johnson-Laird 1976; Regier 1996; Talmy 1983; see Bloom, Peterson, Nadel, & Garrett 1996, for recent views).

But the connection between space and language is not a simple one. For example, one might suppose that the relationship between language and space is like a one-way entailment: Whatever is encoded in space is also encoded in language. This hypothesis is easily falsified by examining the general character of spatial language. Consider object names, which typically encode categories (e.g., *dog*, *house*, *table*). Each name en-

codes the object's membership in a category, regardless of the many distinctions that can be made by the spatial- perceptual systems – distinctions such as variation in size, color, and other surface properties. Language is essentially "blind" to these distinctions in its basic vocabulary, probably because of a basic design feature of language: Lexical items encode categories at a level of detail coarser than that available to perception (Landau & Jackendoff 1993).

The same is true for words that encode spatial relationships. Terms such as *above*, *below*, *in*, *out*, etc. encode a subset of spatial properties that are represented by other spatial systems. For example, when we reach for or grasp an object, our perceptual-motor system must encode metric information about the object, viewer, grasping hand, etc., and this information must be updated as the action is carried out. However, languages do not have a stock of basic spatial terms that encode absolute metric distance or orientation (Talmy 1983). Rather, English prepositions such as *above* or *below*, *near* or *far* (and equivalent terms in other languages) encode relationships that are blind to absolute distance. Of course, one can use language to describe metric relations, but this is usually accomplished by recruiting measure terms and number words, which make up the language's stock of metric terms. These, and many other examples, show that the basic terms of a language are highly selective in the properties they choose to encode and that these constitute only a subset of the properties available to the human spatial representational systems.

Given this, testing hypotheses of language-space autonomy and interaction will require that we understand which spatial properties language regularly encodes. The answer to this question will depend on what aspect of spatial language we consider. In our chapter, we will consider the linguistic encoding of objects, motions through space, and spatial relationships. Using Jackendoff's (1983) framework, these notions correspond to ontological categories <OBJECT>, <ACTION> and <PLACE> OR <PATH>, respectively. The representation of each lexical item will specify its relevant ontological category, phonological form, syntactic category, and where relevant, the item's link to a spatial representation. The latter will provide information crucial to picking out instances of DOG, RUN, INTO, etc. in the world. The nature of the spatial component will prove to be critical in making predictions about the impairment of spatial language in the context of severely impaired non-linguistic spatial representations.

Figure 1 shows an example, using the word "cat", adapted from Jackendoff (1996). This lexical item specifies that the word "cat" is pronounced /kæt/, that it corresponds to an OBJECT (animate), and that it is encoded syntactically as a Count Noun. Furthermore, the representation is linked to a spatial representation that specifies the object's geometric structure, along with parameters suitable to variation in size, color, etc. Note that this spatial representation is not generated internally to language, but rather, comes from within the perceptual system, which can specify many different properties. The spatial part of the lexical representation "points to" the spatial representation, which can then allow the speaker/hearer to recognize that some object is, in fact, a cat. Note also that the spatial representation does not encode any particular value of the parameters that specify colors, sizes, etc.; that is, it is "blind" to specific val-

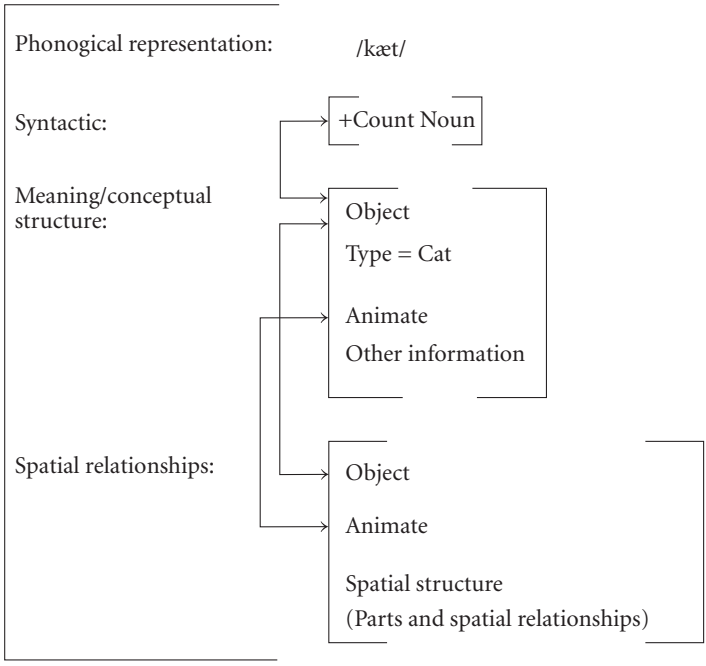

Figure 1. Different levels of representation for the lexical item "cat". Each level contains information specific to itself but commonalities across levels permit binding for a unified representation of the word. Our discussion emphasizes the inclusion of spatial information in the representation of some lexical items. (adapted from Jackendoff 1966).

ues. As another example, the lexical item "skip" is pronounced /skɪp/, corresponds to the ontological category <ACTION>, and is encoded syntactically as a Verb that has a single obligatory argument (the Actor). Additional arguments, such as <PATH> (e.g., "She skipped *into the room*") can be added, but are not obligatory. Other categories of verbs may specify two or more obligatory arguments, (e.g., "She put *the spoon in the dish*"). The representation of "skip" will also contain a link to a spatial representation that specifies the geometric structure of skipping, along with parameters that can specify, perhaps, the speed of the skip. Again, the geometric structure of skipping is determined by computational systems outside of language – plausibly, the motor system, which generates commands for skipping. The perceptual system will have access to these descriptions as well, in order to allow us to recognize the action of skipping.

As a final example, the expression of PLACES and PATHS, in English, is accomplished by lexical items such as *above*, *on*, *in*, *into*, etc., which express a spatial function designating the relevant spatial region of a specified reference object. This results in a phrase that specifies the spatial relationship, e.g., *in the dish* or *into the room*. The lexical items include phonological specification and relevant ontological category (e.g., PLACE-function or PATH-function). Because they usually represent relation-

ships, these terms take arguments; that is, they will need to specify the Place or Path function and the Reference object upon which it operates. These two items are then expressed syntactically as a Prepositional Phrase, with the Place/Path function expressed as a Preposition, and the Reference object as a Noun Phrase. The spatial component will specify the geometric content of the spatial relationship. For example, for the term *above*, the spatial representation will specify a reference system comprised of orthogonal axes whose origin is centered on the Reference object; within the reference system, the relevant region for "above" the Reference object will be indicated. As a contrast case, the term *into* need not specify a set of axes. Rather, it will need to specify the direction of the Path relative to the Reference object (e.g., "*into* the room" rather than "*away from* the room") and the geometry of the Reference object that is required to match this Path function (e.g., for the term *into*, any object that can be conceptualized as a "container").

Given these representations, we can make some predictions about the extent to which impaired spatial representations will result in impaired spatial language. Simply put, if the corresponding spatial representation is impaired, so should the use of the spatial term. For example, if there is impairment in the representation of axial reference systems, then we might expect corresponding impairment in the capacity to accurately describe Places or Paths that engage such reference systems. As another example, if there is impairment in the capacity to perceive actions, we would expect difficulty in using or understanding the word "walk" to refer to walking. Notice that these predictions apply to *referential* functions of language – that is, the ability to accurately and truthfully produce or comprehend spatial terms to name spatial relationships and actions as they occur in the real world.

However, the complete representations of these terms contain much more than their links to spatial representations, and the functions or uses of these terms are not just referential. The *non-spatial* aspects of the lexical representations should not be compromised by spatial impairment. For example, both verbs and prepositions take one or more arguments; these vary in number and type depending on the verb/ preposition's meaning. The verb *walk* takes just one NP argument but *give* takes three; the preposition *in* takes one NP argument but *between* takes two. Verbs also vary in the type of argument they can take, including NPs (for verbs like *give*) and Sentential complements (for verbs like *think*). The number and type of arguments that a Verb or Preposition takes should not be affected by spatial impairment, since this is a separate aspect of the lexical representation that does not require any spatial information. Research has shown that the argument structure of verbs and prepositions can be inferred from syntactic context alone (Landau & Gleitman 1985; Fisher, Hall, Rakowitz, & Gleitman 1994; Landau & Stecker 1990; Fisher 2002).

Other aspects of the lexical representation should also remain unaffected by impaired spatial representations. These include the phonological representation of the word and other aspects of meaning that can be induced from evidence in the linguistic input. For example, a noun's status as count vs. mass can be inferred from its determiners or broader conceptual knowledge about the kind of entity onto which the noun

maps. In general, much of the basic structure of spatial language should be expected to remain intact in the face of spatial impairment. The exceptions occur in cases where the lexical representation is linked to a spatial representation, where that spatial representation can be shown to be impaired, and where the word must be used referentially, i.e., to describe some spatial configuration.

In sum, severely impaired spatial representations would be expected to have impact if both of the following are true: (1) the meaning and use of a spatial expression engages non-linguistic spatial content, and (2) we have some reason to believe that this non-linguistic spatial content is impaired. For example, if a person cannot non-linguistically represent location (say, one object on top of another), then they would not be expected to be able to learn or use the expression "on top of". This is just the equivalent of saying that a blind person does not have the capacity to use color terms referentially – that is, he or she cannot point to or otherwise truthfully indicate that something is red, blue, etc. However, there are numerous aspects of spatial language that do not require spatial *content*. Moreover, there may be some aspects of spatial language that do have spatial content, but the coarseness of coding by language would be expected to yield a very "low bar" for spatial representations. In these cases we may expect preserved competence if such coarse spatial coding is retained in the non-linguistic spatial representations of WS individuals.

2. Previous findings and the Competence/Performance distinction

Evidence for a dissociation between language and space in Williams syndrome was first offered by Bellugi et al. (1988). They reported that adolescents with Williams syndrome could make accurate grammaticality judgments for complex aspects of syntax, even though they performed at the level of 4-year-olds on visual-spatial construction tasks. For example, WS adolescents correctly judged the grammaticality or ungrammaticality of sentences such as "Were delivered the flowers by the messenger?" and were even able to correct these ungrammatical sentences, saying, e.g., "Were the flowers delivered by the messenger?". In contrast, the same groups showed severe impairment in copying figures, even those that are relatively simple for normally developing 6-year-olds (see Figure 2 for examples from our lab). Bellugi et al. argued that language as a system of knowledge was spared in people with Williams syndrome despite the severe deficit in spatial representation. The claim focused on the apparent dissociation between the development of two quite broad and powerful systems of representation – language and space.

More recently, the claim that WS language is spared – that is, unimpaired – has been questioned. Mervis, Morris, Bertrand and Robinson (1999) have argued that, on a number of measures, WS language is better than would be expected for mental age, but is not identical to that expected for chronological age. One clear example comes from standardized tests for receptive vocabulary (Peabody Picture Vocabulary Test; Dunn & Dunn 1981) and grammar (Test for Reception of Grammar or TROG;

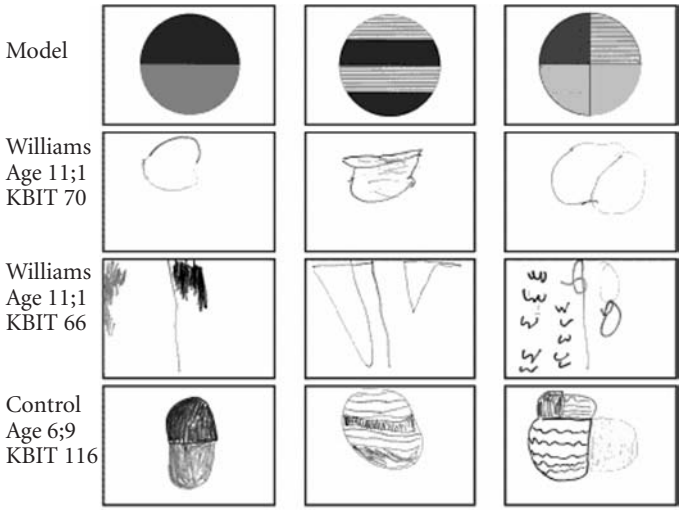

Figure 2. Sample drawings by two WS children, and one normally developing child who was matched for mental age. Matching was done using the Kaufman Brief Intelligence Test (KBIT, Kaufman & Kaufman 1990).

Bishop 1989), both of which show that language abilities are significantly delayed relative to chronological age. Yet, despite this delay, language scores tend to be higher than corresponding scores on so-called non-verbal tests (Mervis et al. 1999). Although this evidence does suggest that WS individuals have only a *relatively* spared capacity for these language abilities, they are consistent with the idea that these aspects of the language system – as measured by standardized tests – are spared, relative to the severe deficits in spatial organization.

More serious challenges to the hypothesis of dissociation have come from researchers who have suggested that aspects of syntax and morphology – and perhaps other areas of language – are impaired, both quantitatively and qualitatively. For example, Karmiloff-Smith, Grant, Berthoud, Davies, Howlin and Udwin (1997) have argued that WS children are impaired in their understanding of linguistic rule systems – arguably one of the defining characteristics of human language. Two widely cited pieces of evidence concern morpho-syntactic rules used to produce adjective-noun agreement within French noun phrases (Karmiloff-Smith et al. 1997), and performance on tests of relative clauses (Karmiloff-Smith et al. 1997; Mervis et al. 1999; Volterra, Capirci, Pezzini, Sabbadini, & Vicari 1996). For example, Karmiloff-Smith et al. (1997) found that WS children had relative difficulty generalizing gender marking across an entire noun phrase: If they heard "*une* plichon" (a novel noun with a masculine sounding ending preceded by a feminine article), they were less likely than normal children of younger ages to correctly infer that they should generalize the feminine marking to adjectives (e.g., "une plichon *blanche*"). Mervis et al. (1999) examined WS children's ability to process relative clauses and found that although grammatical comprehen-

sion may be a relative strength for WS children (compared to non-verbal abilities), "...performance on the most complex constructions was poor. For example, only 18% of the participants (22% of the adults) passed the (TROG) block assessing relative clauses (right branching), and only 5% (9% of the adults) passed the block assessing embedded sentences (left branching)" (p. 85).

The evidence on relative clauses makes an important point, because the tests that were used in these studies are assumed to be diagnostic of underlying linguistic knowledge. But in fact, they extensively recruit mechanisms of memory and attention, which may be impaired independently of linguistic knowledge. We make the distinction here between "*competence* (the speaker-hearer's knowledge of his language) and *performance* (the actual use of language in concrete situations)" (Chomsky 1957: 4). In evaluating a person's knowledge of spatial language, it will be important to carefully consider how much of a person's performance reflects "memory limitations, distractions, shifts of attention and interest, and errors... in applying... knowledge of the language in real performance" (ibid.: 3). This problem exists, of course, for all psychological studies of language, but it is exacerbated in the case of unusual populations, where disorders of memory and attention might lead to significantly different patterns of performance without reflecting differences in knowledge.

The results from the TROG provide a good example of this problem. This widely used standardized test is assumed to measure various aspects of grammatical knowledge. Items in the TROG do require knowledge of targeted grammatical structures, but they also require proficiency in a number of other, more general cognitive capacities. To illustrate, consider an item from the TROG that is used to test comprehension of relative clauses (see Figure 3). The child is shown four pictures, and is asked to point to the one where "The circle the star is in is red". In order to point to the correct picture, the child must be able to process the relative clause structure, which is an embedded structure of roughly the form

[[The circle [the star is in (t)] is red]]

Center-embedded structures such as this are known to be difficult to process, both among children and adults (e.g., Sheldon 1974; Correa 1995; Fodor, Bever, & Garrett 1974). Moreover, this specific form of the sentence does not contain any overt relative clause markers (i.e., *that, which, who*), which will further increase the difficulty of the task (e.g., Rayner, Carlson, & Frazier 1983; Ferreira, Henderson, Anes, Weeks, & McFarlane 1996). And aside from these linguistically relevant processing demands, the task also requires considerable visual-spatial processing and memory: One must visually scan and attend to all four items and then map the center embedded structure onto the correct visual item, essentially re-coding the linguistic structure as, perhaps, two coordinated structures (such as shown below) that would map more simply onto the visual items.

[[The star is in the circle] and [The circle is red]]

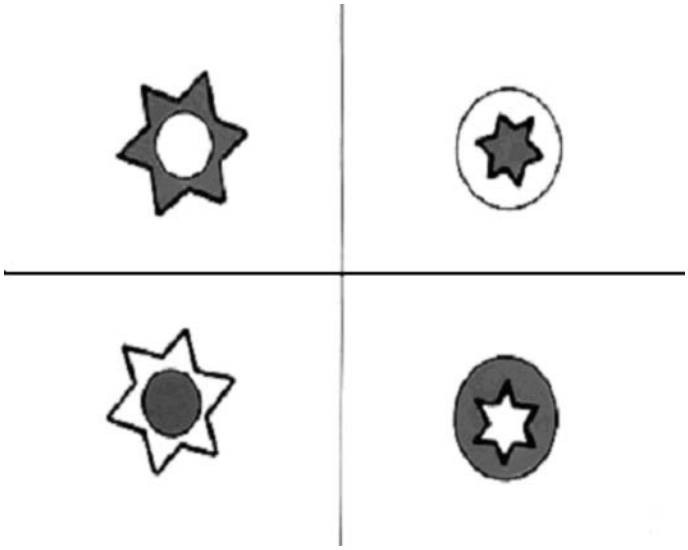

Figure 3. Test item taken from the Test of Receptive Grammar (TROG, Bishop 1989), designed to test comprehension of relative clauses. The child is shown all four pictures and asked to point to the one where "The circle the star is in is red" (Note that in the original test item, the darker color is red, and the lighter color is white). The test item requires cognitive capacities beyond the processing of a relative clause (see text for discussion). (Picture reproduced by permission of publisher).

Errors could be made at any number of steps. The child might be able to parse the sentence but not convert it into the coordinated structure. She might not be able to systematically scan all four options while carrying out this conversion. She might not be able to remember the original sentence after thoroughly scanning the items. And there are many other possibilities. A child who has either attentional or memorial deficits (as WS individuals do; Jarrold, Baddeley, & Hewes 1999; Wang & Bellugi 1994; Vicari, Brizzolara, Carlesimo, Pezzini, & Volterra 1996) might fail the task, leading the researcher to incorrectly conclude that the child cannot represent the linguistic structure used for relative clauses. Of course, it is also possible that the child *is* in fact impaired in this aspect of linguistic knowledge and that the TROG test is fairly representing this impairment. Our point is just that, given the task requirements of these items in the TROG, one cannot tell whether linguistic competence – the ability of the grammatical system to generate the structure at all – is impaired or whether impaired processing mechanisms mask or suppress performance.

As it turns out, children with WS do possess the linguistic knowledge required to represent sentences with relative clauses, as shown by their ability to produce these. Zukowski (2001) designed tasks that created felicitous conditions for eliciting subject and object relative clauses – tasks very different from those in the TROG. She reasoned that a child who could *produce* a relative clause must be equipped with the gram-

matical knowledge to represent these structures. If a person is capable of producing a well-formed sentence with each or both of these clauses, then it is the case that they possess the representational machinery to generate these structures. Zukowski's results showed that WS children who failed the TROG were nevertheless able to produce grammatically well-formed relative clauses in her task. In our view, this is evidence that the machinery for syntactic competence is present in people with Williams syndrome. As Zukowski (2004) points out, this evidence also rules out the possibility that people with WS perform poorly on tests such as the TROG because their grammars simply do not generate these structures.

To illustrate, consider the following situation aimed to elicit a subject gap relative clause. Zukowski showed children a scene displaying two boys – one sitting on a horse and the other standing on a horse. While the child looked at the scene, a change took place: One boy turned green and the other boy turned purple. When one WS individual was asked about the change, he said "The boy who was sitting on the horse turned green, and the boy who was standing on a horse turned purple." Zukowski also found that WS children were able to produce relative clause structures in situations that elicited object gap relative clauses. She showed children a scene displaying a girl chasing a cat and a dog chasing a cat. While the child viewed the scene the experimenter said: "Here are two cats, and a girl is chasing one cat, and a dog is chasing another cat. Let's see what happens. . ." Then, while the child continued to look at the scene, a change took place. For example, a small bird (Bill) looked at the cat that the girl was chasing. The experimenter then asked the child about the change. One WS child responded: "Bill is looking at the cat that the girl's chasing". These examples illustrate that WS individuals do indeed have the competence to produce relative clause structures.

Zukowski's findings on relative clauses illustrate the importance of evaluating task requirements before drawing a conclusion of sparing or impairment in the grammatical system. The same principle holds for studies of spatial language. Although there have not been many studies of spatial language in WS, several have reported deficits in spatial language. Some of these have been anecdotal, reporting that WS people make unusual errors in the use of certain spatial terms (Rubba & Klima 1991). Other studies have been more systematic and experimental. But we believe that these studies may suffer from problems of interpretation similar to those discussed above.

In one study, Karmiloff-Smith et al. (1997) examined spatial language using items from the TROG that tapped comprehension of spatial and other relational terms such as *longer/bigger/taller*, *in/on*, and *above/below*. A sample of one such item is shown in Figure 4. Karmiloff-Smith et al. tested 18 WS individuals with chronological ages ranging from 8;4–34;10, who had a mean TROG test age of 6 years, 3 months – lower than their mean chronological age (18 years, 2 months). Analysis of different item types showed that WS subjects had some difficulty on the items testing spatial language: 27.5% errors on items *longer/bigger/taller*, 14.5% errors on items *in/on*, and 27.9% errors on items *above/below*. Although these error rates are still considerably lower than

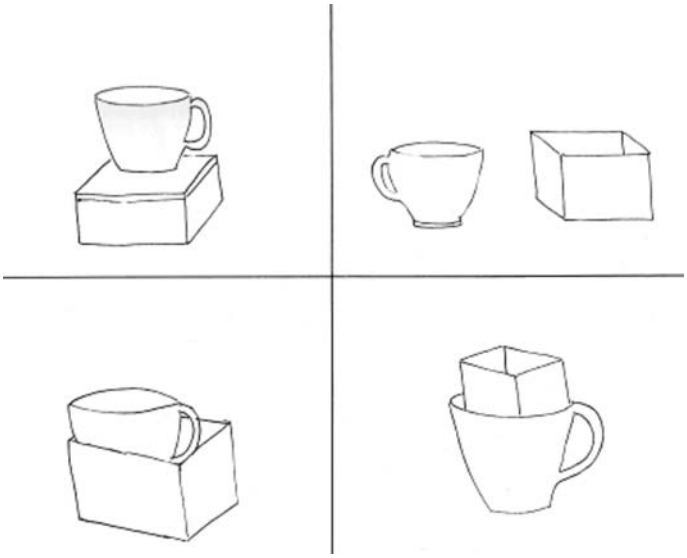

Figure 4. TROG item (Bishop 1989) used to test comprehension of spatial terms. The child is shown all four pictures and asked to point to the where "The cup is in the box". As in Figure 3, the test item requires considerable cognitive processing beyond the comprehension of the target spatial term. (Picture reproduced by permission of publisher).

those on 'complex' grammatical items (e.g., embedded structures; 67.9% errors), the authors followed up with a closer look at the spatial items of the TROG.

To do so, they developed a new test which was patterned after the TROG but included 48 spatial and 48 non-spatial items (Phillips, Jarrold, Baddeley, Grant, & Karmiloff-Smith 2004). They tested 15 WS individuals (chronological ages 9;9–31;3) and two control groups – one group of typically developing children and one group of children who had moderate learning difficulties. Although the groups were individually matched to the WS individuals on receptive vocabulary, Phillips et al. again found that WS individuals performed more poorly than their matched controls on items testing spatial and relational terms (e.g., *longer/bigger/taller*, *in/on*, and *above/below*). They did not differ on items that tested non-spatial terms (e.g., *neither/nor)*, and the authors concluded that spatial language may be an area of special impairment.

The Phillips et al. task was very similar to the TROG. Subjects were required to listen to a sentence (e.g., "The duck is above the boat") while being shown four pictures – one that correctly represents the sentence and three pictures that depict the same objects as the target picture but in different arrangements. The subjects' task was to point to the picture that they believed correctly represented the sentence. A similar method was used by Lichtenberger and Bellugi (1998), who asked WS subjects to "choose one of four pictures that best represent(s) the preposition or spatial phrase (e.g., through, between, above, in front of)" (Bellugi, Lichtenberger, Jones, Lai, & St.

George 2000: 22). Lichtenberger and Bellugi also found poorer performance among WS people than controls.

What should we conclude from these results? The lexical items tested – words such as *above/below* or *in/on* – might have deficient representations at any of the levels of description that we considered earlier. Or, WS subjects might have intact representations of the semantic, syntactic, and spatial properties of the terms, but fail the task because it taxes more general computational mechanisms, such as attention or memory.

Consider one of the spatial items included in the TROG, shown in Figure 4. The child is shown the panel with four choices and told to find the picture where "the cup is in the box". All four choices show a cup and a box, but only one of the pictures depict these two objects in the correct relationship. Two other pictures show different relationships between the objects, i.e., 'cup *on* the box' and 'cup *next to* box'. And the final choice shows a relationship of "in", but with figure-ground reversal, such that the "box is in the cup".

To get this test item correct, one must be able to form an accurate linguistic representation of the sentence "The cup is in the box". The crucial elements are (a) correct assignment of the two objects to the roles of "figure" and "reference object", which are carried syntactically by the subject and object of the preposition; and (b) correct spatial representation of the relationship "X IN Y" (contrasted with *on* and *next to*). Having done this, the subject must then scan all four pictures and form spatial representations of the relationships depicted there. Finally, he or she must map the heard sentence onto the pictures and decide which one matches. If any of these component processes is impaired – or if the mechanisms that align these processes smoothly during comprehension are impaired – the person will fail. The evidence for impairment suggests only that some process, mechanism, or representation is disrupted; or that the combination of these taxes the system more in people with WS than in normal individuals. It does not show that there is impairment in the linguistic representations of these terms, however.

3. Sparing and deficit in two domains of spatial language

We now turn to studies from our own lab examining the nature of spatial language in Williams syndrome. Keeping in mind the central question – the sites of possible impairment in spatial language – our strategy has been to examine both lexical and syntactic expression of space using experimental tasks that are quite different from standardized tests. We will report the results of studies in two spatial domains – the language of dynamic spatial events and the language of spatial terms such as *above/below*, which engage spatial reference systems. To preview, our findings suggest that much of the *structure* of spatial language – including syntactic, semantic, and spatial representations – is preserved in WS children and adults. Weakness appears where there is corresponding weakness in the non-linguistic spatial representations that interact with or are tightly coupled to spatial language.

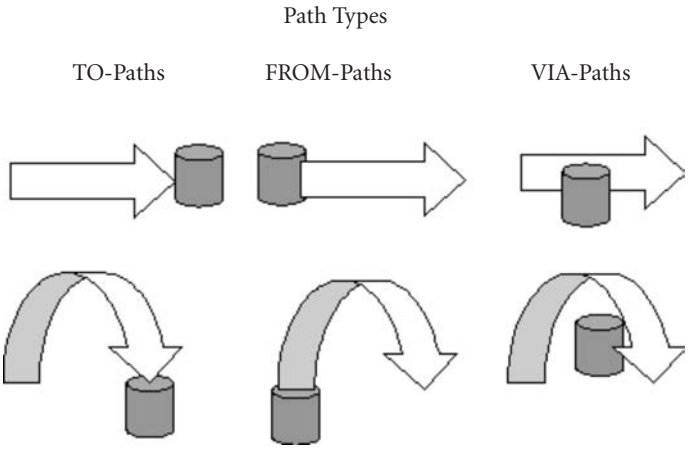

Figure 5. Basic English spatial prepositions typically encode three types of Paths: TO, FROM, and VIA, with each term engaging different constraints for the reference object (Jackendoff 1983).

3.1 Case 1: The language of dynamic spatial events

The linguistic representation of Motion events has obvious links to non-linguistic spatial representations: To describe an event of walking, running, or skipping, one must be able to represent the corresponding actions, which are inherently spatial, and encode them with appropriate verbs, which have argument structure. Moreover, Motion events often involve paths which must also be represented non-linguistically and converted into an appropriate linguistic expression.

Consider the following Motion event: A bird flies out of a bucket, past a cup, and into a bowl. According to Talmy (1985), events such as this are expressed using several key components. In English, these include (a) the *Figure* object, or object that undergoes the motion ('a bird'); (b) the *Manner of the Motion* that it performs ('fly'); (c) the *Path* the Figure object traverses ('out', 'past', and 'into'); and (d) the *Reference* object, which defines the region within which the Figure is located ('a bucket', 'a cup', and 'a bowl'). The Path and the Reference object together make up the entire Path expression ('out of a bucket', 'past a cup' and 'into a bowl'). According to Jackendoff (1983), Path expressions fall into three basic types: TO-Paths have a Reference object that is a Goal or endpoint of the Figure (e.g., '*into* a bowl'), FROM-Paths have a Reference object that is a Source or starting point of the Figure (e.g., '*out of* a bucket'), and VIA-Paths have a Figure that moves past the Reference object (e.g., '*past* a cup'), (see Figure 5 for an illustration of TO-, FROM-, and VIA-Paths).

Recall that the lexical representation of each item includes various pieces of information: Its ontological category, phonological form, syntactic category, and link to a spatial representation. Following our example, Figure and Reference objects are syntactically encoded by noun phrases (e.g., *a bird, a bucket, a cup*, and *a bow*l). Each is

also linked to a spatial representation that specifies the object's geometric structure. In contrast, the lexical representation encoding Path specifies that its syntactic category is a preposition (e.g., *out, past*, and *in*). Each of these is also linked to a spatial representation that specifies the direction of the Path relative to the Reference object (e.g., that "out" is a FROM-path), and the geometry of the Reference object (e.g., that it must be construable as a 'container' for the term "out" but a surface for the term "off"). Thus, the lexical components that encode Motion events contain both linguistic and spatial information and these must be preserved in order to produce a syntactically and semantically well-formed description of the event.

Do WS individuals have the capacity to perceive Motion events accurately and to convert their representations into language? In a first study, we showed a large set of videotaped Motion events to WS children and adults, and to normally developing children, and asked them to tell us "What happened?" (Landau & Zukowski 2003; Lakusta, Licona, & Landau 2004). The normal children included a set of 5–6 year olds, who were matched by mental age to the WS children, and a set of 3–4 year olds, who had lower mental ages than the WS children (as measured by the raw scores of the Kaufman Brief Intelligence Test; Kaufman & Kaufman 1990). The groups had the following median ages: WS children (N = 12, 9;7), WS adults (N = 13, 21;9), mental age matches (N = 12, 5;0), 3–4 year-olds (N = 12, 3;9). The 80 videotaped events were developed and used by Supalla and Newport to evaluate motion verbs in American Sign Language (Newport 1990; Supalla 1982; Supalla, Newport, Singleton, Supalla, Medly, & Coulter in press). The events portrayed Figure objects performing Motion in a variety of Manners (e.g., jumping, sliding, or flying) over a variety of Paths (TO, FROM, or VIA). For example, one event showed a girl jumping into a circular hoop that lay flat on the ground; another showed a cow falling off the end of a truck, etc. Each event showed just one Figure and one Reference object, hence naturally encoded just one kind of Path (TO, FROM, or VIA). Our question was how well people with WS could express the different components of the Motion events and whether this would differ from the expressions of normally developing children.

We found that the structure of spatial language was preserved in WS children and WS adults – in terms of both linguistic (syntactic and semantic) and spatial representation. WS children and adults correctly encoded objects with Nouns (NPs), actions with Verbs (VPs), and spatial relations with Prepositional Phrases (PPs). Their sentences were also syntactically well-formed, including the appropriate number of syntactic arguments for the various verbs that were assembled correctly into grammatical sentences. Perhaps even more impressive was the preservation of spatial information by WS children and adults. Both WS groups named the Figure and Reference objects using the same nouns as the other groups, indicating that they represented the objects in much the same way. They also used the same Manner of Motion verbs as the other groups, showing that they correctly represented the difference between walking, running, hopping, twirling, flying, etc. And they expressed the Path accurately – using prepositions that were from the appropriate Path type category (TO, FROM, or VIA)

and fit the geometric constraints of the Reference object (e.g., 'in' vs. 'on') within these categories.

The only place where we found a difference was in *how often* WS children included VIA- and FROM-Path expressions, relative to the uses of mental age-matched children (5–6 year olds). Specifically, whereas all groups included TO-Paths expressions whenever required (e.g., "into the pool"), the WS children often omitted VIA-, and especially, FROM-Path expressions. For example, in describing an event showing a girl walking past a block, WS children were more likely than MA controls to omit the Path and the block, saying, "The girl was walking" (rather than "The girl was walking past a block"). Similarly, when describing an event that showed a block falling off a swing, WS children were more likely than MA controls to omit the Path and the swing, saying, "The block fell". Note that such descriptions are perfectly grammatical – expressing the Path in these constructions is completely optional (and corresponds to the fact that Motion verbs typically take only a single obligatory argument, the theme/actor). Rather, such descriptions just omitted Path information. Since this effect was most pronounced for FROM-Paths, where the Reference object is the Source, we called this effect "Source Vulnerability".

What does this Source Vulnerability reflect? One possibility is the "Path Term Impairment" hypothesis – that omissions reflect impairment in the representation of Path terms. Such impairment could be at the level of correctly categorizing the Path types for the purposes of language (i.e., differentiating between TO, FROM, and VIA path types), or violating some aspect of the syntax of the verbs or prepositions that are selected. This hypothesis can be ruled out, since WS children and adults selected appropriate Path terms, and used them in appropriate syntactic contexts. It therefore appears that the vulnerability in expressing FROM-Paths is not due to impaired knowledge of this aspect of spatial language. In fact, the spatial language of dynamic events, as we have tested it, appears to be entirely preserved in people with WS.

Another possibility – which we consider more plausible – is the "General Processing Demands" hypothesis: That the frequent omission of FROM-Paths stems from the role of general processing demands that are involved in describing Motion events. Accurately describing an event requires attending to the event in order to form an accurate non-linguistic representation, then parsing the event into linguistically relevant units, and finally formulating a linguistic structure. A tendency to omit FROM-Paths may reflect fragility in attending to or retaining information about the origin or Source of the event – which might be generally less salient or important to the observer. When observers view Motion events, the most salient aspect (at least on an intuitive level) is the Figure object that is in motion. In cases of TO-Paths, the Figure moves from some origin, along a Path, and then ends up at the Reference object, which is the Goal. In these cases, the Figure object is spatially coincident with the Reference object at the end of the event – just the time when observers must produce a description. Thus the Figure and Reference object are likely to be joint foci of attention when the description is being produced. In contrast, in the case of FROM-Paths, the Figure moves from the Reference object (which is now also the origin), along a Path, and it ends up at some

point. In these cases, it could be easy to forget the origin (Reference object) and the Path leading FROM it, resulting in failure to include a Path expression. This problem could be exacerbated for people with WS, who have impaired visual-spatial memory (Jarrold et al. 1999; Wang & Bellugi 1994; Vicari et al. 1996).

If it is true that Goals are naturally more salient than Sources in Motion events, then we should observe the Source vulnerability in normally developing children if we increase the processing demands of the task by showing subjects events that include both Source and Goal Reference objects that fall at the ends of both a FROM-Path and a TO-Path. Lakusta and Landau (2005) tested this possibility by showing subjects (N = 10 WS children, mean age 13;7, N = 10 mental age matches, mean age 5;9) events that included both Path types, for example, an event in which a bird flew from a bowl into a bucket. We found that *both* WS children and MA controls frequently included TO-Paths, but not FROM-Paths. That is, if shown the flying bird event, children in both groups were more likely to say, "The bird flew *into* the bucket", than either "The bird flew *from* the bowl" or "The bird flew *from* the bowl *into* the bucket". We also found that the Source Vulnerability extended beyond Manner of Motion events to events that are not as clearly spatial, including Change of Possession, Attachment/Detachment, and Change of State events. For example, when children were shown an animated Change of State event in which a tiger's ears changed from red to black, they were much more likely to say "His ears turned to black" rather than "His ears turned from red to black".

Because we observed Source Vulnerability over a broad range of subject groups and a broad range of event types (i.e., Manner of Motion as well as Non-Manner of Motion), we hypothesize that fragility in representing Sources may be a fundamental characteristic of normal event representation. The bias to represent Goals more strongly than Sources is then reflected in the spatial language that is used to describe events. The similarity of the language produced by WS children, WS adults, and normal children and adults suggests commonality across all groups. Thus, the pattern shown by WS individuals reflects a normal part of the cognitive architecture – a structured aspect of event representation. We conjecture that this event structure should also be reflected in our non-linguistic representations of events – a possibility we are currently testing.

3.2 Case 2: The language of static spatial relationships

In a series of studies, we asked whether children and adults with Williams syndrome are impaired in their representation of spatial terms that encode static spatial relationships (Landau & Hoffman 2005). We focused on terms such as *above, below, left,* and *right*, which are of particular interest because their accurate use requires representations of spatial reference systems. These reference systems are formally equivalent to a set of orthogonal axes, with its origin centered on some designated "reference object" (see Regier & Carlson 2001, for discussion of conditions where the origin may be off-center). One's choice of reference object is quite varied and will depend on a

host of factors: An object can be located relative to another object, a person, a region of space, etc. Once the reference object is chosen and the reference system is centered on it, a person can map a linguistic term onto the relevant region. For example, the term *above* maps onto that region of the reference system that is positive along the Y axis extending from the origin. Acceptable uses of the term usually span a region that extends outwards from the axis into a pie-shaped wedge (see, e.g., Hayward & Tarr 1995; Munnich, Landau, & Dosher 2001).

The importance of non-linguistic representations of reference systems (often called "coordinate systems" in the literature) is uncontested: Almost all theoretical discussions of our capacity to locate objects – from the role of eye movements to reaching and grasping to navigation – assume the capacity to mentally impose reference systems on objects and layouts. The neural plausibility of these reference systems has been shown in studies that demonstrate damage to one or more reference systems in adults who have sustained brain lesions. The variety of phenomena has led investigators to propose that human spatial representations are characterized by a number of different kinds of reference systems, including object-centered, ego-centered, and environment-centered (Behrmann 2000; Colby & Goldberg 1999; Landau 2002; McCloskey 2001). Yet language systematically engages only some of these reference systems; in English, there is a set of terms for reference systems centered on a single object (*top, bottom*, etc.), a layout of two or more objects (*above, below*, etc.) and the earth (*north, south, east, west*). Languages do not appear to engage retinocentric reference systems with a special subset of terms (Carlson-Radvansky & Irwin 1993; Landau 2002).

The tight link between non-linguistic representations of space and linguistic terms suggests that our use of spatial terms such as *above* and *below* draws on corresponding non-linguistic representations. In terms of our earlier discussion, the lexical representation for these terms would include a spatial representation that "points to" a non-linguistic reference system that describes the location of X relative to Y. Depending on the set of terms, the reference system will be centered on another object, a layout, the earth, etc. The close link between non-linguistic representations and language predicts that the same or highly similar spatial structures should be engaged by both linguistic and non-linguistic tasks.

This theory of linkage has obvious relevance to the question of whether and how spatial language might be impaired in people with Williams syndrome. The hallmark of the spatial impairment in WS is severely distorted copying of figures and severely impaired visual construction tasks, which often require constructing copies of a spatial configuration in an adjacent (blank) space. Interestingly, copying in both cases requires that the individual set up a (mentally-imposed) reference system on the blank space in which the copy will be made; and then transfer spatial information from the model to the copy space. The only way this can be done is to establish corresponding reference systems and carry spatial information from the model space into the copy space. Absence of the capacity to set up reference systems could lead to severe spatial impairment of the kind we see in Williams syndrome. It might also lead to impaired learning of those terms that rely on these spatial representations.

In order to test this possibility, we followed up on a series of studies by Hayward and Tarr (1995), who sought to test the idea that normal mature use of spatial language is homologous to non-linguistic spatial cognition. In their studies, normal adults carried out two tasks (see Figure 6). In the Language task, people saw arrays in which one geometric object (Figure) was located relative to another (Reference object) and they were asked to fill in the blank in sentences such as "The (figure) is _____ the (reference object)". By sampling locations around the Reference object, Hayward and Tarr were able to determine whether people's use of spatial terms reflects any spatial structure. The findings showed that it did: People used basic spatial terms such as *above*, *below, left,* and *right* in very high proportions along the cardinal axes centered with their origin on the Reference object, and these uses declined with distance from the axes, "fanning out" to create a broad but constrained region of acceptable use for the terms.

In the Non-Linguistic task, people were shown Figure-Reference object arrays that sampled similar locations to those used in the Language task (Figure 6). However, this time, people were briefly shown the array followed by the same array or one in which the Figure had moved a small amount from its original location. They judged whether the second array was the same or different from the first. Performance showed that people were most accurate on locations falling directly along the extension of the Reference object's cardinal axes. Hayward and Tarr concluded that the evidence from the two tasks suggested similarity in the spatial representations underlying the two task types – both engaged axial structures. Similar effects have been shown in cross-linguistic extensions of these experiments (Munnich et al. 2001) and in other labs (but see Crawford, Regier & Huttenlocher 2000 for a different interpretation).

In our experiments on Williams syndrome, we adapted Hayward and Tarr's tasks to generate evidence for or against use of reference systems in both Non-linguistic and Linguistic tasks. In our Non-linguistic task, we showed WS and normal children (Ns = 10 in each group, mean ages = 10;4 and 5;5, respectively) a single "Model" panel with a square reference object and a circle. The location of the circle varied over trials, with some locations falling on the extension of the square's axes (three each above, below, left, and right of it) and some off its axes. Children were asked to observe this array, then match it to one of two test arrays shown below the Model; one array was identical to the Model, and the other was identical except that the circle had been moved to a new location 1/4" away from the original site. The results showed that both WS and normal children performed better when the Model showed a circle in on-axis locations than in off-axis locations, consistent with the pattern found by Hayward and Tarr among adults. This suggests that even WS children organized their matching responses using an axial structure, performing better when they could take advantage of axes that they mentally imposed on the Reference object.

To see whether this axial structure emerged in language tasks, we tested both production and comprehension of basic spatial terms. In the Language Production task, children with WS and mental-age-matched normally developing children were shown a Figure (circle) and a Reference object (square) on an otherwise blank sheet of paper. They were asked to name the spatial relationship between the two, by completing the

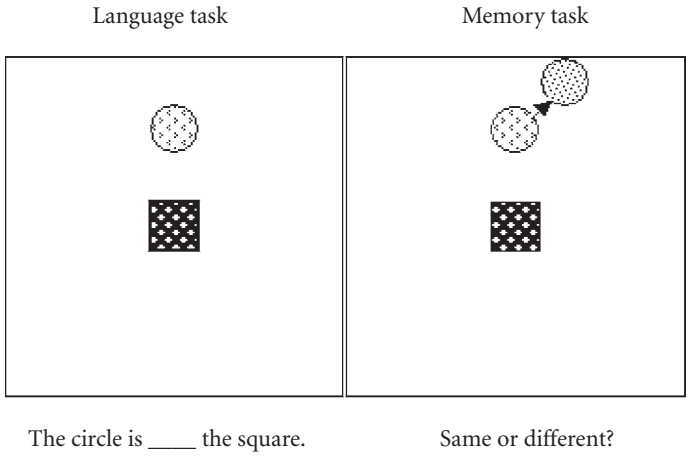

Figure 6. Sample of stimuli used in tests of static spatial relations (after Hayward & Tarr 1995; Munnich, Dosher, & Landau 2001). The Language task (Panel A) required people to fill in an appropriate term to express the spatial relationship. The Non-Linguistic task (Panel B) required people to remember the location of the target object, and judge whether it had moved after a brief delay.

sentence: "The circle is (*where?*) to the square". The space around the Reference object was sampled as in the Non-linguistic task, with Figure objects sometimes falling along the (virtual) axes of the Reference object and sometimes off these axes. In the Language Comprehension task, the same children were shown a Reference object (square) on an otherwise blank sheet of paper, and were asked to "Put a dot _____ to the square." We tested fourteen "vertical axis" terms (*above/below, right above/right below, way above/way below, on top of/underneath, on the top of/on the bottom of, over/under, higher than/lower than*), four "horizontal neutral" terms (*next to, right next to, beside, on the side of*) and four "horizontal directional" terms (*on the right/on the left of, to the right/to the left of*).

The results of the two Language tasks were quite similar, showing that both WS and normally developing children respected the cardinal axes when using the spatial terms. In Production, this was evident in their use of "vertical" terms such as *above/below*, *over/under* and "horizontal" terms such as *next to* and *beside*. The former terms were used densely along the vertical axis of the reference object, and the latter were used densely along its horizontal axis. Normal children also showed control over direction of the terms, with different terms distinguished within the vertical axis (e.g., *above* vs. *below*). Children with WS, however, showed some fragility in this aspect of their production – their most systematic error involved producing vertical positives (e.g., *above, over*) for locations that were vertical negatives (e.g., *below, under*). These errors were asymmetrical; that is, positives were used for negative locations, but not vice versa, suggesting that lexical retrieval problems may have caused them to retrieve the positive term more frequently overall. The occasional reversal of positives and neg-

atives occurs among normally developing 3 year-olds (see Clark 1972), suggesting that the WS pattern might reflect developmental arrest. Horizontal directional terms, such as *right/left* were not produced by either group of children – not surprisingly, since the terms are generally difficult, and the children could easily substitute terms like *next to* or *near* for these locations.

In the Comprehension task, the children's use of cardinal axes was again evident – this time from their placement of dots in response to the different terms. When queried on vertical terms, children placed dots along the vertical axis; when queried on horizontal terms, they placed dots along the horizontal axis. However, there were also strong indications that representation of direction was fragile in both normal children and children with WS. For one thing, the horizontal directional terms (*right/left*) elicited many *directional* errors, with "right" dots being placed along the left side of the horizontal axis, and "left" dots being placed along its right side. These errors for right and left occurred often among both groups of children; they also occurred prominently among WS adults, who were tested at a later date. This suggests fragility in the representation of direction for the horizontal axis for normal children (who eventually resolve this) and for children with WS, who apparently do not resolve the problem. The fragility among children with WS was not exclusively confined to the horizontal axis; rather, there were several errors for vertical terms in which the axis was correct, but the direction was wrong. Although these errors were rare among WS children, they reinforce the results of the Production task, which suggested some fragility in directional representations for vertical terms.

These linguistic results show that children and adults with WS – like normally developing children and normal adults – recruit spatial reference systems when they must produce or comprehend terms that refer to spatial locations organized around these reference systems. Note that it would have been possible for WS people – who show severe impairment in copying and visual construction tasks – to be incapable of engaging these structured reference systems. The findings are consistent with the strong hypothesis that spatial reference systems are part of the spatial representations of people with Williams syndrome. These spatial representations have been recruited during the learning process, resulting in lexical representations for terms such as *above*, *below*, *right,* and *left* (among others) that engage the reference systems that are the foundation for diverse spatial capacities.

At the same time, we found that directional representations within these axial systems were fragile: The directional distinctions for certain terms sometimes disappeared, leaving a representation that included the relevant axis (i.e., vertical or horizontal) without direction along that axis. Interestingly, we believe that this directional fragility is probably a characteristic of both linguistic and non-linguistic systems. The directional difficulty in *language* appears to persist among adults with Williams syndrome, and it is characteristic of learning even among normal children, who often reverse *right* and *left*. The directional fragility in *non-linguistic* spatial representation has been shown in several contexts, both in our lab (see Landau & Hoffman 2005) and in studies of normal adults (e.g., Logan & Sadler 1996; Carlson-Radvansky & Jiang

1998). Thus the directional fragility in language may reflect a vulnerability that has its origins in the larger system of non-linguistic spatial representation.

In sum, our experiments illustrate that spatial structure – specifically, axial reference systems – can be readily observed in both non-linguistic and linguistic tasks. The similarity in structure across language and non-language domains gives credence to the notion that static spatial terms engage non-linguistic spatial representations – and that these are available for linguistic uses even in people who are otherwise severely spatially impaired.

4. Conclusions

Our purpose in this chapter has been to shed light on the issue of how we talk about what we see. To do so, we have explored the nature of the mapping between language and spatial representations, proposed specific hypotheses about the possible sites of autonomy and interaction between these two systems of knowledge, and tested these hypotheses by examining spatial language in people with Williams syndrome. The results suggest strong preservation of structure, despite severe impairment in non-linguistic spatial representations. They also highlight the fact that spatial language is an amalgam of characteristics, sharing some but not all properties of other spatial systems, and possessing properties of its own. Because of this complex profile, omnibus hypotheses of breakdown or sparing are too simplistic and indeed have been proven to be false. Rather, much of spatial language emerges unscathed in Williams syndrome because it does not mirror other spatial systems, but engages them. Much of what is engaged is coarsely coded and preserved; some of what is engaged is more precisely coded and may be fragile, leading to corresponding fragility in language. Finally, the failure to find massive breakdown in spatial language (commensurate with non-linguistic breakdown) confirms a high degree of specialization in language and suggests that spatial language can emerge rather independently of much of the information that is represented in non-linguistic spatial systems.

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CHAPTER 15

Deficits in the spatial discourse of Alzheimer patients

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Three studies investigated the characteristics of spatial discourse in Alzheimer patients. In the first study, the participants were asked to give oral route directions in a familiar urban environment. The patients' discourse contained far less information than that of control participants, and in particular contained virtually no reorienting instructions. In the second study, the participants were invited to describe familiar environments from memory, but without any request to transform their knowledge into navigational instructions. The descriptions of urban scenes confirmed that overall the patients' descriptions contained less information than those of the controls, suggesting that visuo-spatial knowledge was less accessible to these patients. In the third study, the participants used a map when generating their spatial discourse. The results showed that the patients' deficit in generating spatial discourse virtually disappeared when they were able to use the map, indicating that the main difficulty experienced by Alzheimer patients in generating route directions arises from their difficulty in retrieving spatial information rather than from any underlying (purely) linguistic disturbance.

Introduction

Interest in investigating the mechanisms that interrelate language and spatial cognition has been amply documented in the past decade (e.g., Bloom, Peterson, Nadel, & Garrett 1996; Denis 1997a; Hayward & Tarr 1995; Landau & Jackendoff 1993; Munnich, Landau & Dosher 2001; Tversky & Lee 1998). This approach provides a way of developing hypotheses about the internal representations on which spatial knowledge is based and to demonstrate that these representations are not only private events, but also items of knowledge that can be shared in human communication. Interfacing linguistic and spatial representations involves processes that require a high degree of transformation, whereby information is translated from a visuo-spatial to a linguis-

tic format, and vice versa. Finally, investigating this aspect of representations helps to highlight the diversity of the sources of spatial knowledge, ranging from direct visual and navigational experience to the use of symbolic artifacts, such as maps, diagrams, and those based on linguistic materials, such as spatial descriptions. An additional advantage of studying the relationships between language and spatial knowledge is that it offers a way of investigating dysfunctional spatial representations when the linguistic system is preserved. In this approach, language can be viewed as revealing aspects of internal representations and reflecting most of their functions or dysfunctions. Furthermore, it is worth noting that spatial information is so basic to human interaction in the world, while also serving as the foundation for abstract thought, that disruptions to it may signal disruptions to other modes of thinking (cf. Gattis 2001).

In this chapter, we consider patients with Alzheimer's disease, one sign of which is spatial disorientation. It is one of a group of neurological and neuropsychological disorders, such as those resulting from parietal lesions, that not only affect perceptual and navigational behavior, but also the production of spatial discourse (e.g., Bisiach, Brouchon, Poncet, & Rusconi 1993; Denis, Beschin, Logie, & Della Sala 2002). Other disorders yielding psychopathological syndromes related to space include spatial anxiety and agoraphobia (e.g., Capps & Ochs 1995).

The occurrence of impaired spatial orientation in dementia of the Alzheimer type (DAT) is well documented (see Passini, Rainville, Marchand, Joanette, & Lepage 1997; Rainville, Joanette, & Passini 1994; Ricker, Keenan, & Jacobson 1994). The inability to orient oneself in space, particularly in unfamiliar environments, is one of the early signs of this disorder. Orientation difficulties increase with time. Patients get lost during routine displacements and can no longer live without permanent assistance. Empirical studies have explored the ability of Alzheimer patients to develop plans in wayfinding tasks. For instance, Passini, Rainville, Marchand and Joanette (1995) showed that patients' plans of actions are poorly structured, and reflect basic disorders in spatial problem solving, although the patients remain able to solve well-defined problems in routine situations. In DAT patients, general memory processes are disturbed, including limited recall of recent past events and limited use of recall cues, but with particular deficits of topographic memory, a typical initial manifestation of DAT. Significantly, DAT patients are not aphasic, suggesting that their language could shed light on the nature of their spatial problems.

The spared linguistic capacity of Alzheimer patients raises the intriguing possibility, which we investigate here, that these patients may still be capable of generating spatial descriptions despite their severe difficulties in planning and executing moves in natural environments. Are disoriented people suffering from DAT still able to "say" what someone has to "do" to reach a destination in a familiar environment, even though they themselves are unable to navigate to this target point? The answer to this question is of crucial importance. If a person is still able to describe what he/she is no longer capable of doing, then the deficiency probably reflects a dual (verbal/nonverbal) mode of cognitive processing of space. Such a dissociation would then indicate that the processes involved in the production of language and in the production of actions

(moving through space) are independent of each other. If, on the contrary, a person who can no longer "perform" is not able to "describe" how to proceed to get from one point to another either, then this deficiency would seem to reflect a disorder that affects a prelinguistic, amodal system of representation, simultaneously affecting both actions and language (see Bryant 1997). Another possibility is that the disorder could affect the translation of one kind of representation into another (e.g., representations of actions into language).

In the three studies reported here, our objective was to analyze the characteristics of spatial discourse in Alzheimer patients and to use this approach to shed light on the failures that may affect communication when people exchange information about space. The linguistic expression of spatial knowledge falls into two broad categories. One is the description of static environments, and this primarily reveals the speakers' ability to organize their discourse in sequences that help an addressee to construct a coherent representation at a reasonable cognitive cost (e.g., Axia, Baroni, & Mainardi Peron 1988; Daniel, Carité, & Denis 1996; Shanon 1984). In such discourse (or in written descriptions), speakers reveal what type of perspective (route or survey) they take on the environment and implicitly invite their addressees to adopt (e.g., Schneider & Taylor 1999; Taylor & Tversky 1992). The second broad class of spatial discourse consists of descriptions intended to convey procedures for navigation. Route directions have been amply investigated from the point of view of linguistics and psychology (e.g., Allen 2000; Couclelis 1996; Denis 1997b; Golding, Graesser, & Hauselt 1996; Klein 1982). These studies have revealed the subtle combination of distinct discourse components, namely *prescriptions* regarding the actions to perform, and *descriptions* of the scenes where these actions take place. Although the procedural component is crucial for guiding a moving person, the visual component (including descriptions of landmarks and their topological relations) occupies quite a large portion of route directions. The production of route instructions is assumed to call for a succession of cognitive operations: (a) activating an internal representation of the territory in which the displacement is to be made; (b) defining a route in the subspace of the mental representation currently activated; and (c) formulating the procedure that the user will have to follow in order to move along the route and eventually reach the goal. The studies reported here provide information about how verbal outputs are affected by the cognitive deficits of DAT patients. The deficits observed in these verbal outputs (compared with controls) could be taken to reflect the orientation deficits experienced by DAT patients. More direct evidence could be obtained, of course, by testing the participants in contexts requiring navigation. The present studies focused on language as a window onto non-linguistic cognitive deficits.

Study 1 – The production of route directions

Our first study consisted of investigating how a disorder such as DAT reveals itself in a cognitive task involving the generation of spatial discourse, namely the production of

route directions. This approach requires taking two constraints into account. The first one pertains to the specific characteristics of this type of discourse, which calls for an adequate method of analysis. The second constraint is related to the need to compare the performance of patients to that of control, non-disoriented participants. Because the disorder under study typically affects elderly people, particular care is necessary in matching controls and patients in terms of age.

The method of analysis used here took into account an inherent characteristic of route directions, namely the wide variety of outputs collected from people describing exactly the same itinerary. Even if we consider raw quantitative indicators, such as the length of descriptions, this indicator may vary from person to person by three or four fold. The content may also differ considerably in qualitative terms. It is therefore necessary to go beyond these massive interindividual differences and to identify the "guiding thread" that underlies the diversity of individual protocols. The method used here first requires formatting the original protocols and classifying the statements in a standard way. The classification refers to classes of statements such as the following: action prescriptions without reference to a landmark ("*Go straight on*", "*Turn right*"); action prescriptions with reference to a landmark, either remote ("*Go in the direction of the Eiffel Tower*") or close ("*Go past the Café de Flore*", "*Turn left at the bookshop*", "*Cross the square*"); landmark introductions, either without any specification of spatial location ("*You will see a baker's shop*") or with such specification ("*There is a shop on your right*"); landmark descriptions ("*It is a big white building*", "*There is a flag above the main entrance*"); commentaries ("*It is quite easy*", "*It will not take long*").

Once a set of individual protocols has been collected for a given itinerary, they are used to compile the full set of statements provided by the whole sample of respondents. Judges are then asked to review all of the statements. They are invited to keep only those items that seem to be necessary and sufficient to guide a moving person, and to cross out any item that is superfluous or of secondary importance. The remaining items compose what is called the "skeletal description", a description that conveys the schematic outline followed by all (or most) of the describers. This shortened version contains all of the essential prescriptions and landmarks useful to a moving person. The skeletal description turns out to reflect the essence of the route, distilled from actual original protocols. In short, it contains the minimum set of landmarks and instructions needed to navigate appropriately, but without any additional embellishment. It is then possible to compare the individual protocols to the skeletal description used as a reference. The protocols that match the skeletal ("ideal") description can then be considered to be "good" descriptions, whereas those that deviate from the skeletal description are "poor" descriptions. Protocols that have a lot in common with the skeletal description are indeed usually judged to be "good" descriptions by independent judges (blind to respondent group), and when they are used by people as navigational aids, they elicit fewer navigational errors (see Daniel, Tom, Manghi, & Denis 2003; Denis 1997b; Denis, Pazzaglia, Cornoldi, & Bertolo 1999). We wanted to find out the extent to which DAT would affect the match between individual protocols and the skeletal description.

Table 1. Average number of statements in each group of participants

	Controls	Patients
20–30	53.4	x
50–60	54.8	13.7
60–70	31.2	16.0

The study involved a total of 50 participants. Twenty of them were disoriented people, diagnosed as DAT patients on the basis of brain scans and clinical examination. They were divided into two age groups: 50–60 years and 60–70 years. The remaining 30 participants formed matched controls in the same two age groups (50–60 and 60–70 years), plus a group of younger participants (20–30 years). All the participants were residents of Paris or its close vicinity, and all possessed good knowledge of the city of Paris (because they were working or living there). The disoriented patients did not live in institutions, had no problems of mobility, and navigated from place to place on a daily basis. None of them suffered from aphasia. The participants were asked to give oral route directions to guide a person walking from one specific well-known site in Paris to another one. They were not given a map to use, that is, their descriptions were constructed solely from their memory of the locations. There were five routes to describe, none of which exceeded two kilometers (from the Panthéon to the BHV Department Store; from Place de la Bastille to Austerlitz Station; from the Eiffel Tower to Place Charles-de-Gaulle; from Montparnasse Station to Place de l'Odéon; from the Garnier Opera House to the Louvre Pyramid).

Each description was recorded, then transcribed and formatted in the form of lists of minimal propositional units. The first result of interest here concerns the size of the individual descriptions. Table 1 shows the average number of statements in the five groups (for all five routes combined). In the control groups, the number of statements was considerably reduced in the oldest participants, but the patients' productions were clearly more limited than those of the controls of the same age. This suggests that the patients included less information in their descriptions.

To substantiate the contrast between the controls and the patients, Table 2 provides some examples from the two 60–70 year groups, which reveal that the patients' discourse was dramatically impoverished compared to that of the controls. Their productions look like a series of sparse items which do not give any idea of the *structure* of the route. However, the overall course of the trajectory is preserved (e.g., going down along the Boulevard St. Michel) and the content of some items has genuine semantic validity (referring to students in the route that goes through the Latin Quarter). But the descriptions look like series of unrelated statements.

More relevant to our investigation is the degree to which participants included the core items of the skeletal description in their descriptions. A high frequency of these items is thought to reflect the ability of an individual description to grasp, and therefore to convey, the essentials of the navigational procedure. In contrast, omitting

Table 2. Examples of descriptions

Controls (60–70)	**Patients (60–70)**
From the Panthéon to the BHV Department Store	
Participant MG	Participant MD
– Walk to the Boulevard St. Michel. *– Go down as far as the Seine River.* *– Take the direction of Châtelet.* *– You come to a bridge.* *– Take the direction of City Hall.* *– The building is easy to recognize.* *– The department store is just across the square.*	*– Go down along the Boulevard St. Michel.* *– It is a street full of shops.*
From Montparnasse Station to Place de l'Odéon	
Participant PM	Participant LK
– Go down along the wide street. *– It is a long street.* *– This is the Rue de Rennes.* *– You come to the Rue du Bac subway station.* *– Take a 45-degree turn.* *– You reach the Boulevard St. Germain.* *– This leads you to Odéon.*	*– It is downtown.* *– Follow a street.* *– There are students around there.*

these crucial items demonstrates the limited ability of the speaker to access, and then convey, a coherent representation of the key elements of the route.

The skeletal description of each itinerary was constructed from the whole set of original protocols. It was composed of the subset of items that were selected by at least 7 of the 10 judges representing the entire age range of the experimental population. As an example, Table 3 shows the items that constituted the skeletal description for the route from the Panthéon to the BHV Department Store.

Table 4 shows the average number of individual statements belonging to the skeletal description. It reveals a decline in the oldest control group. It also confirms that the patients' descriptions included virtually no skeletal items. This pattern shows that the patients' discourse deviated considerably from the discourse of the controls, and included quite a high proportion of idiosyncratic items.

However, these absolute values may be somewhat misleading. They have to be corrected by taking the fluency of each group of participants into account. Table 5 shows the proportion of skeletal items that were present in the discourse of each group of participants. These values provide a more accurate estimate of the speakers' tendency to follow the skeletal description. In the controls, one interesting finding was that the oldest participants did better than the younger participants on this measure. That is, although their discourse was shorter than that of the other control groups, it was more highly saturated with the core elements of the description. Older people are more concise and the information conveyed by their discourse is closer to the skeletal

Table 3. Skeletal description for the route from the Panthéon to the BHV Department Store

– Stand with your back to the Panthéon.
– Take the Rue Soufflot.
– Walk straight on.
– You come to the Boulevard St. Michel.
– Turn right.
– Walk down the Boulevard St. Michel.
– Keep straight on.
– You come to a street along the bank.
– Cross the River Seine.
– Walk across the Ile de la Cité
– Keep straight on.
– Cross the River Seine once more.
– Keep straight on.
– You come to a square.
– Walk across the square.
– Proceed to the Rue de Rivoli.
– Turn right.
– Take the Rue de Rivoli.
– The BHV is on your left.

Table 4. Average number of statements of the skeletal description produced by each group of participants

	Controls	Patients
20–30	18.7	x
50–60	21.5	3.8
60–70	12.6	3.0

Table 5. Proportion of statements of the skeletal description included in individual descriptions in each group of participants

	Controls	Patients
20–30	35%	x
50–60	39%	28%
60–70	40%	19%

description, so that it is presumably of higher quality in terms of navigational assistance. The patients' scores confirm that their discourse was much poorer in skeletal items and that these items became even less frequent at more advanced ages.

More detailed analyses reveal that patients' discourse tends to contain fewer of every type of statements typically found in route directions than the discourse of the corresponding control groups. Their descriptions show a marked failure to refer to

urban locations that would have been likely to guide the moving person's progression. The virtual absence of any reorienting instructions creates a situation in which the patients' discourse tends to consist merely of references to a series of unrelated spots, providing little information about the surroundings or about what to do.

Note that this state of affairs is based on the analysis of direction-giving tasks, which make substantial demands on the speakers' capacities. This task involves not only recalling visuo-spatial information, but also a high degree of problem solving, because it requires speakers to deliver a *procedure*, that is to produce a solution and to convey it to another person. What would happen if people had to activate their memory of familiar environments, without having to transform their knowledge into instructions for action? This led us to consider tasks in which the participants would only have to describe static urban scenes. Would the descriptions provided by DAT patients still show the same distinctive deficiencies?

Study 2 – The description of urban scenes

The objective of this study was to investigate the structure and content of discourse elicited by a task consisting of describing a familiar urban scene. This situation is interesting because it is ecological to a large extent and it is therefore widely used in neuropsychological research to test patients' visuo-spatial long-term memory (cf. Beschin, Cocchini, Della Sala, & Logie 1997; Bisiach & Luzzatti 1978).

The 12 patients and 12 controls who participated in this study had all been living in the city of Toulouse for more than ten years. Their average age was 78 years. They were matched for socio-economic status. They were invited to provide an oral description of the Place du Capitole, that is the heart of downtown Toulouse. Individual descriptions were collected and later analyzed into smaller propositional units, following the procedure used for the analysis of route directions (Denis 1997b). These analyses were expected to reflect the essential differences between patients' and controls' spatial discourse.

The first classification of discourse content was made in terms of referential vs. modalizing expressions, following the distinction introduced by Nespoulous, Code, Virbel, and Lecours (1998). In spatial descriptions referential expressions provide factual information about the scene, the landmarks, their visual appearance, their topographical relationships, etc., for instance: "*The square extends in front of the City Hall*", "*It is a very large square*", "*There is a colonnade on the edge of it*", "*Rue Rémusat leads into the square*". Modalizing expressions introduce the speaker's subjectivity and include personal markers. Typically, in route directions modalizing expressions convey some moderation or uncertainty, which indicates that the speaker invites the addressee to carry out a form of checking, for instance: "*I don't know the center of Toulouse very well*", "*I can't remember the name of that street*", "*I guess it must be Rue Lafayette*", "*It is quite difficult to explain*".

Table 6. Average number (and proportions) of referential and modalizing expressions in the description of the Place du Capitole

	Controls	Patients
Referential	16.0 (74%)	5.2 (59%)
Modalizing	5.6 (26%)	3.6 (41%)
Total	21.6	8.8

Table 7. Distribution of statements in four classes

	Controls	Patients
References to actions	6%	5%
Landmark introductions	56%	43%
Landmark descriptions	17%	18%
Commentaries	21%	34%

Table 6 shows the average number (and proportions) of referential and modalizing expressions in the descriptions of the Place du Capitole. The most impressive feature is that overall far less information is conveyed by the patients than by the controls, a result which confirms the difference in fluency already mentioned. The patients' descriptions are two and a half times shorter than those of their control counterparts (an order of magnitude comparable to the corresponding values in the previous study). Furthermore, the descriptions provided by DAT patients included not only fewer referential expressions, but also a substantially higher proportion of modalizing expressions in their discourse. This finding demonstrates that the accessibility of visuo-spatial knowledge is lower for DAT patients and that this deficit is obvious from their descriptive discourse.

Detailed analysis reveals that more specific sub-classes of these expressions were differently represented in the two groups. Table 7 shows the distribution of statements in four classes: references to actions, landmark introductions, landmark descriptions, and commentaries. It reveals that the patients' descriptions contained far fewer landmark introductions, that is, statements that would help an addressee to construct a visual model of the environment to be traversed. Consistent with previous observations, commentaries (i.e., statements with low referential value) were more numerous in the descriptions provided by patients than in those of the controls.

The next analysis was devoted to the statements intended to convey spatial information (as distinct from the mainly visual information attached to landmarks). Three types of spatial descriptions were considered: (a) descriptions that referred to the visual properties of landmarks such as their shape, for example: "*It is a square-shaped place*"; (b) descriptions of the location of one landmark relative to another, for example: "*There is a fast-food restaurant at the corner of the street*"; (c) descriptions of the location of a landmark relative to the moving observer, for example: "*Behind you, there is a street*". As shown in Table 8, the positioning of landmarks relative to each other was

Table 8. Distribution of spatial descriptions in three classes

	Controls	Patients
Visual properties	18%	44%
Landmark/Landmark	63%	50%
Landmark/Moving observer	19%	6%

less frequent in patients than in controls and the positioning of landmarks relative to the observer was virtually absent from the patients' protocols (which results in relative increase of the proportion for the descriptions of geometric properties). This finding is probably related to the limited capacity of DAT patients to refer to the procedural component of route directions (as attested by Study 1).

A specific analysis of the landmarks cited in the descriptions confirms that the total number of landmarks referred to by the controls exceeded the number cited by the patients (87 vs. 43, i.e., an average of 7.3 vs. 3.6 items per participant). One remarkable feature is that a total of 22 different landmarks were cited by the controls, but only 14 by the patients. This once again suggests the lower availability of visuo-spatial information for DAT patients when they are attempting to retrieve it from long-term memory.

The data collected so far confirm that disoriented patients generate spatial discourse that reflects the intrinsic difficulties they experience in terms of spatial cognition. Not only are they limited in their capacity to deliver procedural information related to navigation, but they also seem to access blurred or uncertain visuo-spatial information, which they cannot externalize in the form of coherent spatial descriptions. The next step in our approach consisted of finding out whether the patients' difficulties would be reduced to any extent if they were allowed to rely on map information when generating spatial discourse. The type of discourse considered was route directions (as in Study 1).

Study 3 – The production of route directions from maps or from memory

In this third study maps were used to support the production of route directions, in contrast to the situation where recall is only based on memory, as was the case in the previous two studies. This study thus involved two conditions. The first condition required the participants to produce directions in a familiar city from memory. The study took place in Toulouse and the participants had to describe two routes across the city, one from the Parc des Expositions to the Halle aux Grains and the other from Place du Fer à Cheval to Place du Capitole. The objective was to compare these descriptions to those collected when the same participants were given a map indicating the corresponding starting points and target points. The experiment involved the same control and DAT patient groups as Study 2. All the participants underwent the test from memory first, then the test with a map.

Table 9. Distribution of successful (+) and unsuccessful (–) patients' descriptions in the memory and the map conditions

		Memory Condition		
		+	–	
Map	+	6	15	21
Condition	–	0	3	3
		6	18	

The assumption underlying this methodology was that the graphic information provided by the map would eliminate most of the difficulty experienced by the DAT patients in accessing memory. These patients, therefore, might not exhibit the same deficits as in the previous experiments. Such a result would make it obvious that their cognitive problems consist mainly of a limited capacity to access memory representations and to organize discourse on the basis of insufficiently available representations.

The measure of interest here was the degree to which individual descriptions would enable people who are unfamiliar with the environment to move securely along the prescribed route to the destination. These assessments were made by two judges who analyzed all 96 descriptions (2 descriptions from memory and 2 descriptions from a map per participant, with 12 controls and 12 patients, i.e., 4×24) and classified them dichotomously as either "successful" (when all the necessary information was given at each new intersection, either in terms of egocentric reorientation or heading towards a specified landmark) or "unsuccessful" (when at least one intersection was not described properly).

Not surprisingly, all the descriptions provided by the control participants, whether based on memory or on map reading, were classified as successful. The situation was entirely different for Alzheimer patients. Using memory, only 6 out of the 24 descriptions were successful, whereas the number of correct descriptions was 21 when the map was used. Performance was therefore impaired when memory was called upon, but this deficit was to a large extent compensated for when the patients had the opportunity to rely on maps. This finding indicates that the deficit that is apparent in the standard verbal descriptions of the patients was essentially a mnesic deficit. Table 9 shows the distribution of the descriptions into the four categories resulting from successful and unsuccessful descriptions in the memory and map conditions. Of the 18 patients whose memory-based descriptions were unsuccessful, the great majority (15) were successful when the map was used. Of the very few (3) who were unsuccessful when using the map, all failed in the corresponding protocols based on memory.

A more detailed study of the memory-based descriptions reveals another interesting aspect of the route directions provided by DAT patients. It is clear that the patients' spatial descriptions and route directions are overall poorer than those of the controls. However, beyond this overall deficit, we wanted to find out whether the production of directions was affected differently depending on the point that was reached along

Table 10. Distribution of statements in three parts of route segments (controls)

	Start	Middle	End
References to actions	36%	74%	0%
Landmark introductions	23%	11%	64%
Landmark descriptions	11%	11%	27%
Ref. to pedestrian positions	30%	3%	9%

Table 11. Distribution of statements in three parts of route segments (DAT patients)

	Start	Middle	End
References to actions	47%	89%	0%
Landmark introductions	19%	11%	87%
Landmark descriptions	5%	0%	6%
Ref. to pedestrian positions	28%	0%	6%

the route segments being described. This was studied by analyzing the route directions given by controls when they described three parts of every segment, namely, the starting point, the middle part of the segment, and the end point. Table 10 shows the proportions of four classes of statements: references to actions, landmark introductions, landmark descriptions, and references to pedestrian positions (including statements about the positions of landmarks relative to the moving observer). Not surprisingly, the statements related to the starting point focus on the first actions to be performed and the position of the moving person (when he/she has to be aligned with the correct direction). There are not many references to landmarks. In the middle part of the segment, when the person is moving straight on, references to actions are still important. When approaching the end point, the person is now invited to focus on the target landmarks that have become visible, and references to actions and directions are no longer predominant.

Table 11 shows the corresponding data for the DAT patients. The distribution of the four sets of statements over the different parts of the route segments are very similar to the corresponding distribution for controls. This is a significant finding, since it indicates that the patients remain sensitive to the value of referring to actions when it is relevant to refer to them and to the value of referring to landmarks when these are useful to the moving person.

To conclude, the significance of this study is to show that the main deficit experienced by DAT patients lies in *retrieving* the spatial information. They have no problem when they have a map. They find it difficult if they have to retrieve a route or a location from memory. In other words, DAT patients are good at recognition, but poor at recall.

Conclusions

The studies reported above demonstrate the severe communication deficits that affect the spatial discourse of DAT patients. Their capacities to communicate are limited in many domains, but this is especially evident in the domain of space. Language itself is not affected and no sign of aphasia was shown by the patients involved in our studies. This is an important point, in that it allows the scientist to obtain knowledge about the DAT patients' spatial difficulties, complementing the many studies that have documented the severe deficits they experience in spatial orientation and navigation. Access to memory representations seems to be the most severely damaged function for these patients. However, our data also point to some aspects of spatial cognition and communication that seem to be preserved to some extent.

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Author index

Language index

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